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The Gathering Gift of a River:
Responding to the Questions of the Ecological Food Web of the Eel River

By

Robert Alexander Parks

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Environmental Science, Policy, and Management

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Associate Professor Kathryn Teigen De Master, Co-Chair

Associate Professor Jake Kosek, Co-Chair

Professor Richard Capobianco

Professor Nancy Peluso

Professor Nathan Sayre

Fall 2022

Abstract

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Doctor of Philosophy in Environmental Science, Policy, and Management

University of California, Berkeley

Associate Professor Kathryn Teigen De Master, Co-Chair

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In this dissertation, I respond to questions that call me before them. I respond, inevitably incompletely, with my limited awareness and sensitivity, and—undoubtedly—with areas of blindness of which I am not aware. I begin with the question: *What are the ecological food webs of the Eel River?* Faithful, trusting, and lawful response requires me—but never forces me or acts upon me such that I am *made* to respond—to begin once and again, never anew, but always moving faringly and practically, with trust and faith, along the way these questions open before me.

(Q1) *What are the ecological food webs of the Eel River?* I respond: Given epistemologically-metaphysically, and, thereof, scientifically-epistemologically, the ecological food webs of the Eel River are actions-reactions, and thus actings-reactings, the activities-reactivities that these actings-reactings comprise, and, thus, interactions, interacting, and interactivities. In epistemological-metaphysical sense and sensibility, the ecological food webs of the Eel River, as actions-reactions, are forces forcing and being forced forcefully.

(Q2) *What is the ecological food web of the Eel River?* I respond: The ecological food web of the Eel River is the food web of the Eel River. Regardless of one or another of their actions-reactions, and forgivingly of these when they harm, the food web of the Eel River is the meeting-coming-together, safe-keeping, and faring together in this small opening-region of the world of the beings given to exist and, thus, to fare-existingly in and around the Eel River, including the river. The food web of the Eel River is, then, the giving-gathering of those beings, as they come to existing, into the opening revealing of sense, sensibility, and, thereof—for some of them, at least, and in degrees, probably—the commonly sensing understanding to which they are given, that they may learn to existingly-abide together familiarly, among *and* with one another—with varying degrees of awareness, with various sensitivities and proclivities, perhaps with kindness, perhaps befriendingly, perhaps with love in each and all of its senses—but, regardless, openingly

nourishing one another, as they are, and as each of them fares its way existingly through the world together with the others, for the limited time they are given.

Responding to these two questions leads me along a sinuous path of analyzing, thinking, and responding to the research and explanations of several scientifically-epistemologically oriented ecologists who have researched the ecological food webs of the Eel River. These ecologists' research and explanations, as well as the questions that have arisen for me from their research and explanations, lead me into an engagement with several historically foundational works of the science-epistemology of ecology, particularly those written during the twentieth century. I pay especial attention to *Principles of Animal Ecology* (1949) to help me learn what outstandingly scrupulous, scientific-epistemological ecologists understand science, ecology, an ecological community, an ecological food web, and a biological organism to be. From these readings, I respond, perhaps most importantly, to the questions of what action, activity, and practice are.

Finally, when analyzed scientifically-epistemologically, I find a consistency of scientific-epistemological problems in the scientifically-epistemologically ecological explanations of the literature I study. This consistency and continuity seem important, and I note them throughout. I do not, however, attempt to resolve these problems or explain *why* these scientific-epistemological problems are what they are, and persist ubiquitously—*if*, that is, they are scientific-epistemological problems at all. With attention and thorough analysis, I *have* judged them to be scientific-epistemological problems. I have so judged after thorough and meticulous attempts to piece together the scientific-epistemological consistency and coherency of *what* scientific-epistemological ecologists explain.

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Chapter 1

What are the ecological food webs of the Eel River?

1.0 A visitor, a guest

The reader should understand that I do not belong to the meeting-gathering of the Eel River of which I write. Over the last eight years, I have visited and resided with and among those that are of and in the belonging-gathering together that is the food web of the Eel River. Some welcomed me; some did not; some wished I had never come; some took interest in me; some ignored me; some regarded me from a distance; some befriended me; and I befriended some of them; many knew nothing of me. All nourished me generously and openingly and—in general—with kindness even when, for some, they probably would rather not have. As far as I can know, they have given me more than I have given them. This gift is such that I am unable to match it in return, regardless of what I, alone, give. I was a guest in the home that is the food web of the Eel River. This inequity will remain between the food web and those gathered-gathering there and I. Their gift to me will continue to awe me. It will continually remind me that I have been and am, without exception, being given much more than I, alone, can give. I have since left the food web of the Eel River, though its being-presencing in the world will always be with me, and I with it, even as the existing of the meeting that this food web is and this meeting-gathering's beings-existing reside, abide, and fare together many miles and minutes from my own home.

1.1 A beginning

What are the ecological food webs of the Eel River? To respond to this question, one must respond to another: What is the ecology of the Eel River? To respond to this question, one must respond to the following: What is ecology? To respond to this question, one must stop, rest and breathe, listen for, open to, heed, and give oneself in attunement, attention, and thinking to an unknowable, unforeseeable, and, at times, uncomfortably disorienting path of questioning along which one is always and only beginning.

This study began as a social scientific research project—my social scientific research project—which, at the time, I fully expected to be a decisive step into a career in social scientific academic research and teaching. I formulated and framed the research project to investigate an overarching problem, further evaluate it, analyze it, critique one or another aspect of it, and make some novel contribution to knowing it, and thereby fixing it, solving it, or at least making it better, as I judged what such improvement should be. By means of scientific research I could come to know the problem; by means of knowing the problem, I could better evaluate, examine, and analyze the problem in its various dimensions; and, perhaps, by means of so knowing the problem, in a best-case scenario, I could make novel suggestions for fixing, if not solving, the problem for the betterment of my own and related academic fields of research; my future research and my research tools and techniques; my development of my theoretical tools; my teaching; and a more complete and, thus, fairer, more just, more equitable knowledge of the world.

For my research project, I selected a spatiotemporally specific case study: the ecological food webs of the Eel River of northwestern California. My purpose was to scientifically-epistemologically investigate the historical and philosophical development of ecology, and its

similarities with the fields of engineering and economics, during the 20th and 21st centuries. Ecology, it seemed to me, was commonly understood in multiple ways. Three prevailing ways are as follows: (1) It is a scientific-epistemological research and knowledge specialty situated within the broad families of the biological sciences and the physical environmental sciences. (2) It is nature and the world, *either* characterized by a holistic system of interrelated interactions between living organisms, and living organisms and the nonliving environment, *or* nature and the world *as* a wholistic system of interactions between living organisms and living organisms and the nonliving environment. (3) It is a variety of contemporary awareness, a general point of view, and a loose set of lifestyle criteria of a genre that may be traced back, at least, to the formalization and academic expansion of the science-epistemology of ecology as a field in both undergraduate and graduate university education and research during the mid-twentieth century and this field's profound influence on the environmental movement of the 1960s and 70s in the United States and Western Europe. Often, I had noticed, these three general understandings of ecology comingle, implicitly or explicitly, when ecology is spoken of or referenced by scientists-epistemologists and non-scientists alike. Ecology, it seemed, as science-epistemology, as popular point of view, as lifestyle criteria, and as a tool for environmental activism was immensely an immensely valuable tool for the active production of science; knowledge; and social, political, and natural resource management policy; as well as for providing the scientific-epistemological ground for activities that could supplant, counter, or progressively reform the conventional sciences and systems of both economics and engineering.

That any of this is so, however, seemed to me to be often and pervasively assumed. My social scientific-epistemological project, then, centered on asking whether the historical and philosophical grounds of ecology in any of these three commonly understood forms are fundamentally different from either the prevailing systems and sciences of engineering and economics—as well as the sciences these draw upon and model themselves after—that have been, and continue to be, ecology's contemporaries in the 20th and 21st centuries. I hoped that, through a historical-philosophical research investigation of the ecology of the Eel River in California, I would be able to discern whether or not there are fundamental, intertwined similarities between ecology, engineering, and economics. *If* there were fundamental similarities, I intended to investigate *of what* these similarities consisted.

My preliminary social scientific research indicated that since at least the early 20th century, the Eel River has been entangled with, and often central to, both engineering and economic projects. Understood broadly and in their philosophical particulars, these two fields are often hard to tease apart. Examples were the Scott and Cape Horn dams on the Middle Fork Eel River. These were built in the first decade of the 20th century to provide irrigation water to Sonoma and Lake counties' agricultural enterprises and electricity to Mendocino County. Other examples of the confluence of engineering and economics around the Eel River over the last 170 years include gold mining, intensive logging and timber milling, dairy agriculture, and commercial fishing and canning. Yet for much of the trajectory of these industries during the first half of the 20th century and prior, formal scientific-epistemological ecological activity did not appear in the river's basin.

I had read several historiographical works that scholars have written on the development of the science of ecology in the United States. Likewise, I found multiple scholars that had examined and explained the relation between the environmental movement, cybernetics, and ecology in undergraduate and graduate university research and education, popular understanding, and progressive, ecologically aware lifestyle criteria. At the time, it seemed to me that was

missing was a historical and philosophical investigation that asked what, if anything, was different from, on one hand, ecology as science and as popular understanding and, on the other, the economic and engineering systems that ecology is understood to unsettle and offer directions for progressive reformation. Instead, it seemed to me, the assumption prevails that ecology provides a scientific-epistemological leverage apparatus and means of informing a popular consciousness with the power to challenge ecologically adverse economic and engineering projects, systems, and policies. But were these three fields, as they converged around the Eel River, fundamentally – in their philosophical origins, grounds, understandings, and activities – different? Again, I found no previous studies that investigated this question in general.

Utilizing various theoretical tools (as understood them to be at the time) I had obtained and begun to master in university seminars to evaluate and analyze my preliminary research data, I formulated and posed a broad puzzle about my case: How did ecology become all-enveloping of the Eel River such that one could say or write common sensibly *the ecology of the Eel River* or *the ecological food web of the Eel River*? How did ecology come to prevail and hold sway over the Eel River and our understandings of the Eel River as it does? In order to scientifically-epistemologically ground and research this puzzle, I refined it into three sub-puzzles which I framed by posing three case-specific sub-problems that could each be—if adequately researched and, thereby, evidenced, evaluated, and explained—partially constitutive of the overarching puzzle. The case specific sub-problems I posited were:

- (1) How and when did the Eel River become ecological?
- (2) How do ecologists today study the ecology of the Eel River, and what is it that they study (in their own terms)? Why do they study these—i.e. these *whats*, or whatever the answer is to the second part of the prior question?
- (3) What were the scientific understandings and activities involved in the Eel River becoming ecological, and do these—and if they do, how—continue today as in the past? In other words, *how* did the ecologists researching the Eel River understand the river such these ecologists' research activities proceeded from *and* proceeded to, though did not necessarily originate or finalize, rendering the Eel River ecological?

As I planned it, the research for my project would generally entail discerning and, then, closely observing, analyzing, evaluating, and critiquing structural and functional patterns both in the contemporary activities and explanations of Eel River ecologists and the ecological knowledge they generated as well as similar, antecedent structures and patterns the activities and ecological knowing of Eel River ecologists' genealogically direct ecological predecessors, as recorded in the latter's peer-reviewed publications. Concurrently, I would analyze historical documents of governmental institutions' surveys of, analyses of, plans for, and realized interventions on the Eel River and its immediate surrounds. From analysis of this type of archive document I would, I hoped, be able to pinpoint when, where, by who or what, and how the Eel River was first actively produced, constituted, and (or perhaps *or*) rendered ecologically *as* the ecology of the Eel River. Once I had generated sufficient research data from the aforementioned activities, I would evaluate, analyze, and order the data in order to discover and identify—though of course never exhaustively or conclusively—probable chains of actors, agents, actions, reactions, processes, and events both causative of such structures and patterns as well as those more elusive causes of which the aforementioned actors, agents, actions, *et al.*, themselves were

entirely the effect or by which these actors, agents, actions, *et al.*, were, at least, affected. Finally, in order to scientifically-epistemologically complete the research project, I needed to inductively infer and posit valid methodologically validated explanations of how ecological activities effected and, thereby, resulted in the emergence, endurance, and perhaps disappearance of the structures and functions I observed in both Eel River ecologists' theoretical, field, and laboratory activities or the historical activities of governmental agencies as recorded in corresponding government documents, reports, surveys, etc. By these means, I would come to scientifically-epistemologically know—that is, to produce scientifically-epistemologically valid explanations of—the three case-specific puzzles I had formulated, posited, researched, and attempted to explain. By these means, I would come to know the structural and functional patterns comprising these puzzles as well as, probably, the activities of which such structural and functional patterns were the historically emergent or contemporarily emerging effects. This knowledge would, as it should, lead progressively toward the scientifically-epistemologically valid propositioning of possible solutions, resolutions, or at least remedies applicable to—again, at least—the overarching research puzzle and its sub-problems as posed, researched, and addressed from within and—from without—by means of my framing of my particular social scientific research about the empirical content of my specific case.

In order to write my social scientific research proposal and, once approved, proceed beyond preliminary research, I had already had to have responded to the question—a question not my own, but waiting for me: *What is ecology?* I had begun to respond to this question with only an initial inkling and partial awareness of it as a question *at all*, much less a question *still* worthy of heeding, listening to, and, with time, responding to as my own. Yet, even without fully aware understanding, I still sensed that I could not proceed at all—not even with a research proposal and preliminary research, much less primary research—if I did not *first* heed and begin to respond to this question: *What is ecology?* At this early stage, I was, at best, vaguely aware of my own previous and contemporary understandings of ecology, even though I had for years professed myself a ecologically conscientious person and had, for the past four years, been entirely surrounded by professional research ecologists of various stripes and of the highest caliber. As I heeded, listened to the question, and slowly took up the question as my own, I began to sense and, therefrom, understand and be able to think through with slowly attuning awareness what ecology was. To do so, I drew heavily on—as I understood them to be at the time—the theoretical tools and framing techniques I had been afforded and—with unquenchable enthusiasm and innocent delight—arranged in my theory toolbox and begun to utilize during my early social scientific graduate training.

What is ecology? During this time, I responded, more or less, as follows: Ecology is a domain of activities of and by ecologists, as well as—no less—of and by the activities and interactivities of ecologists' material research objects and these objects' material environments, whether in the archive, the field site, or the laboratory. Ecologists' research activities culminate with methodologically validated scientific-epistemological explanations and, thereby, methodologically validated scientific-epistemological knowledge of the ecologists' research system. The specialized science-epistemology of ecology is a subdomain of science-epistemology generally. As a sub-domain, ecology is the product of the constant and continuous research activities of ecologists—research that is, in turn, the ongoing unification of the theoretical, archive, field, and laboratory activities of ecologists, their research assistants, their research technicians, their research objects (including human subjects for some), and their students. These activities and their particular, constituent actions, whether theoretical or applied,

are constantly synthetically composing and extending a historically specific regime of truth of truths or, what is the same, of worldviews, of governing frames, or of world pictures simultaneously both made and making of historically specific, materially situated and thereby empirically locatable perspectives, rules, discourses (or language games), and scientific-epistemological and, thereof, ecological knowledges. As a maker of, a function of, and a means to constantly and continuously enact and, thereby, progressively achieve an ecological regime of truths, ecology—I then understood—is an actively assembled and arranged enactment by ecologists’ driven, in turn, by their wills to validly scientifically-epistemologically explain, argue, evidence, and, thereby, scientifically-epistemologically know. A will to know, and thus a will to know truths generated and validly methodologically validated by means of ecological research activities are, in turn, actively utilized as a means of, and, thus, as functionally valuable to the will to power of the corresponding arts of governing human subjects as well as, in ecology’s case in particular, their environments.

Ecology, then, as I understood at the time, is a historically and geographically specific modality of rational, logical, and political activities and their correspondingly contextually specific techniques, strategies, and tactics for empowering, overpowering, regulating, controlling, and otherwise utilizing the powerful forces of individual human-actors and populational human-actors situated among and in the natural resources of their environments. Ecology, I understood at the time, was a collectively historically and materially produced scientific-epistemological apparatus of, again, tools, techniques, strategies, and tactics belonging to and, thus, collectively and individually utilized for actively, willfully mobilizing and thereby actualizing a comprehensive but nonetheless indeterminate and open art of governing individual human and other-than-human actor-units, populations of actor-units, and their environments, as well as informing and conducting the human-actors’ and human-populational actors’ reasoning, reckoning, understanding, and knowing.

As I conducted preliminary research and began to read ecological publications, and as I continued to respond once and again to the question *what is ecology?*, I increasingly found ecology to be entirely, through and through, in all of its iterations, *laissez faire*—even in its progressive, radical, communitarian or collectivist iterations, whose ecologists are not necessarily politically economically liberal. The historically and geographically specific art of governing that is ecology is an epistemological engine and its various specialized evaluating, testing, inventorying, deploying, and processing apparatuses. Ecology, as this art of governing, is feedback controlled, managerial, conductive, and economically and ecologically regulatory of populations, of the medium that is their environments, and, thereby, of evaluated individual and aggregated actor-units in their environments. Ecology *is* the willful activity of and by ecologists and their ecological objects *and is*, simultaneously and inseparably, the conduction, regulation, education, activation and mobilization *of* ecologists as means to both actively constituting and reconstituting this ecological art of government as well as means to actualize-by-achievement this art of government’s progressive end-goals of ever more knowledgeable, and thereby, greater efficiency, effectivity, and power in its activities of governing.

I understood that actor-units *in their environments* ecologically entails scientifically-epistemologically validated knowledge (this entailment does not entail that it be scientifically and epistemologically *conclusive* knowledge) of both brute (i.e. ostensibly linear, regardless of spatiotemporal directionality) dynamic mechanisms as well as feedback regulatory mechanisms by which various ecological patterns and structures emerged. Such knowledge was, again, essential for the limitlessly increasing efficiency, effectivity, and thereby power of the

mechanistically determinate or indeterminate feedback regulatory management, conduction, and control of the physical, chemical, and bioecological environments (as greater than the qualitative and quantitative sums of their parts) ecologists' researched.¹ *In their environments* includes, additionally, not only the bioecological populations of actor-units, but also their material cycles and their being materially cycled; their dynamically patterning or structuring aggregations, assemblages, and accumulations; and their dynamic energy securement and utilization, energy flows, and energy conversions, transfers, and exchanges.

In any given ecological case, I understood, ecological units could be aggregated, scaled, and unified hierarchically into greater encompassing open and increasingly complex dynamical systems.² An ecosystem or its hierarchically ordered ecological communities, alone individually or as systematically aggregated and combined, are examples. Unlike economics—its twin—ecology historically focuses on all existing beings *except* humans, and ecologists put the latter (including ecologists themselves) in the picture only insofar as and because the organisms of this peculiar biological species are causatively disturbing with ever-increasing magnitude to the larger ecosystems in which they are functioning, though not necessarily integral or valuable, parts.³

What, however, is an art of governing? At the time, I responded to this question more or less as follows: An art of governing is the technical (including but not exhausted by formally recognized technologies) apparatus that emerges piecemeal but progressively as the individual and collective re-action and, thus, interaction to historically and geographically contingent and, thus, particular material political, social, economic, and ecological conditions and the corresponding human practical activities, again individual and collective. An art of governing is a means to power. This power is power to will with increasing autonomy and sovereignty, whether individual, collective, or both. Autonomy and sovereignty of the will to will—including necessarily to will itself to will more efficiently, more effectively, and thereby more powerfully—is freedom of the will, and freedom of the will is freedom. Human subjects, individual and collective, will to achieve and actively strive to achieve this freedom and, thereby, the actualization of their full potential (again, individual or collective). An art of governing, as I understood, is an individually and a collectively actively constituted strategy and its toolbox of tools and techniques that are in service to, as means of, the will to empower the collective and its actor-units to effectively and efficiently play *actively*, not *passively*, and thus as autonomously and sovereignly as possible, in the *activities* of the *Lebensform*-specific games of utilizing, propagating, controlling, resisting, and otherwise relaying of the forces of and by human living, laboring, surviving, perhaps thriving and being happy, biologically reproducing, and dying.⁴ Ecologically, power is typically either (i) the meaning defined for “power” as is operationally defined and functioning heuristically in the reference frames of classical physics or it is (ii) a real, scientifically observable, detectable, testable material phenomenon. For human beings existing physically, chemically, and bioecologically and, thus, politically, power (or “power”) is also a measure of the effectivity of one's (individual or collective) actions or reactions in the continuous but always contingent play of forces (including our human activities of sense-making and meaning-making) that is politics. But what is politics? During that time, I responded, more or less that politics is, across the all boards, the *Lebensform*-specific games of activating, mobilizing, conducting, and resisting forces and these games' correspondingly specific arenas of knowledge-making and knowing; sense-making; meaning-making; effective rule- and regulation-making; rule- and regulation-following; rule and regulation enforcement; and the many other skills, strategies, tactics, tools, and techniques for—in the case of ecology—successfully

effecting the bio/ecopolitical art of governing. The bio/ecopolitical art of governing what or who? The bio/ecopolitical art of governing the human-being-subjects and, thereby, their making, constituting, and thereby actively producing: their human lives, their supra-individual organizations, the biopolitical means for laboring, the yields of labor, their biological surviving, their reproducing, and their dying, however each of these is evaluated. The bio/ecopolitical art, then, of governing human societies, human cultures, or human populational units and the environments they are naturally-politically inescapably in an of.⁵

Understanding what ecology is in this way, I could make little to no sense of asking *What is ecology?*, much less of asking this question for the social scientific research project of my doctoral studies. In light of my understandings at the time, what could I gather sensibly was that it was sensible to ask problems-*cum*-questions. It was sensible for me to *problematize* (*problématisation*) and, then, to labor with social-scientifically honed tools and techniques to unsettle and politically-epistemologically situate the layers of spatiotemporally-specific situatedly de-situated epistemologically ontological muck that had settled in and around my case, the ecology of the Eel River.⁶ It was sensible, that is, to ask: *What does ecology do in the world of my specific case (or, what is the same, in my social scientific research system)? How is the river rendered ecological? How is the river constituted as or made ecological? How does ecology function such that it does what it does in my research system? What is ecology utilized to achieve in this system? Who utilizes it and why? How is ecology utilized to achieve x or y in my spatiotemporally specified case, or research system? How does ecology function such that it is amenable to utilization by this person or group for their individual or collective goals but, perhaps, not amenable to or even available for utilization by that person or group for their individual or collective goals? How does ecology function such that it is utilized to achieve what it does in my contextually specific research system?*

Yet, I struggled with increasing awareness and attunement to my own responding to the question, *What is ecology?* Why, I slowly began to wonder, is it that my response to the question *What is ecology?* is, first and foremost, that the *question What is ecology?* is an epistemologically and, thereby, ontologically dubious question whose deeply problematic, context-specific histories and politics render it, at best, contemporarily uncouth and unpromising to entertain in an academically scholarly manner at all. If it was even be *possible* for me to *ask*, much less research in order to answer, for example, *What does it do in the world of my specific case? or How is it utilized by this or that specific individual or group in order to achieve this or that goal?*, then I had to *first* and *already* have responded, with awareness of my understanding and ensuing responses or not, what it is. *What is this it that I am looking for in order to research what it does, how it functions, how it is utilized, etc.?* One cannot even *begin* to research without a response—whether in awareness or not—to this question. Any and every response to this question, whether in advance or in awareness, and without exception, is—one might say—an understanding to which a human being existing in the world belongs and from which this human being could begin social scientific research, evaluation, analysis, problematization, critique, and solution such as those I had proposed and commenced. Insofar as the human being that responds is a human-being-ex-sisting in the world among other presencing-beings and existing-beings, this human-being-existing's response is given *metá* (μετά) *phusikós* (φυσικός) and may be only reach so far as that which is *metá* (μετά) *phusikós* (φυσικός). Insofar as the human being that responds is a human-being-ex-sisting in the world among other presencing-beings and existing-beings in the world, this human-being-existing's response both (1) is, lawfully, a *relatively* particular, *realtively* context-specific *lógos* (λόγος) of *eimí* (εἰμί) or of one or another *eimí* (εἰμί) given by

this particular human-being-existing or by some particular human group and (2) *belongs in advance* to a lawful *lógos* (λόγος) of *eimí* (εἰμί) to which and of which this human-being, with and among one or another human group or family, is given to exist in the world in lawful sense and sensibility with the sensible understandings thereof. *Eimí* (εἰμί) gives but is not nearly exhausted by what is given to *epí* (ἐπί) *histēmi* (ἵστημι), or what is the same, *ex stat* (*stāre*) in the world.

Amidst an increasing awareness of my struggle *as* a struggle whose questions—again, questions neither new nor my own—were worthy in and of themselves of my utmost attention and consideration, I nevertheless proceeded with my research with the securing of the understanding I did have during that time of what ecology is. It was an understanding that brought with it the security of relying on the tools and techniques, so to speak, that I had been afforded and was being trained to deploy in service to my research goals with increasing expertise. During the few early opportunities I was afforded to participate as a social scientific observer-*cum*-field technician in freshwater community ecologists' field work on the Eel River or its tributaries, I sought to problematize the ecology of the Eel River by discerning empirically what these ecologists did and how they did it. I sought to discern empirically *both* how ecology functioned both as an applicable set of methods, tools, and other techniques crafted for scientific-epistemological deployment by the ecologists in his or her research system on the Eel *and* how ecology, as an art of governing, conducted in advance the very understandings, knowing, sensibilities, and activities of the ecologist such that his or her ecological research on how the ecology of the Eel River functioned was sensible to him or her at all. Likewise, I began my archival research in which I proceeded in a similar manner from the understanding of what ecology is that I had at that time.

But, with the understanding I had at the time of what ecology is, the more fastidiously and scientifically-epistemologically rigorously I strove to scientifically-epistemologically empirically discern, discover, observe, analyze, evaluate, problematize, and critique the ecology of the Eel River, the more difficult it became from me to distinguish—to distinguish, that is, beyond empirical superficialities, or the mere facades of the phenomenological structures and patterns I scientifically-epistemologically encountered—between, for example, on one hand, the archival political, economic, biological, demographic, mechanical, and hydraulic engineering surveys, studies, reports, and plans I was reading and analyzing and, on the other hand, the ecology of the Eel River for which I was looking. With the understanding I had at the time of what ecology is, the more fastidiously and scientifically-epistemologically rigorously I strove to scientifically-epistemologically empirically discern, discover, observe, analyze, evaluate, problematize, and critique what it does in the world of my research system; how it makes or constitutes the Eel River and the river's basin as ecology or an ecological system; how it renders the river ecological; how it functions such that it does what it does in my research system; how it is utilized to achieve *x* or *y* in my research system; how it functions such that it is amenable to utilization by this person or group for their individual or collective goals but, perhaps, not amenable to or even available for utilization by that person or group for their individual or collective goals; and so on; the more difficulty I met understanding what the *it* was that was supposed to be socially scientifically encountering and subjecting to my scientifically-epistemologically evaluative research examinations.

These difficulties guided me, once and again, to the question that, when I listened, continued calling me: *What is the ecology of the Eel River?* And, thus, first, *What is ecology?* I decided—with more than a little resignation, resistance, and commonsensically condescending

dismay at the inutility of the question for progressing in my research and, thereby, toward my degree in an efficient and timely manner—to stop and heed the question as a genuine question that is, as it is, in and of itself, worthy of my attention, attunement, care, and thoughtful consideration. Thus, I began to wonder what ecologists *themselves* responded to the question, *what is ecology?* After all, it seemed it was, separately or together, their science, their scientific-epistemological expertise, their activities, their specialized knowledge, and the worldly, phenomenal object of their scientific-epistemological research and ensuing explanations. I began to read and listen to what they responded more sincerely, seriously, and thoughtfully. And I began to—with my fuller attention, attunement, and intention—thinkingly respond, once and again, to the question that called me: *What are the ecological food webs of the Eel River?* And therefore: *What is the ecology of the Eel River?* And therefore, essentially: *What is ecology?*

1.2 What ecologists respond to question, *What is ecology?*

This dissertation, which I have written but which is not merely mine, opens and orients me and, perhaps, my reader with the following question: What are the ecological food webs of the Eel River? As I noted above, if I am to respond, I must first hear the further question: What is ecology?

This question is not new, nor are responses to it. Following I read several such responses. I include them not for detailed analysis—though I do comment with brief analyses to indicate my own attunements and the orientation of my attention—but, rather, to attempt to discern what further questions I might listen for as I begin to respond to the question, *What is ecology?*

Thus, for example, the Ecological Society of America (ESA) currently responds to the question *What is ecology?* as follows:

Ecology is the scientific discipline that is concerned with the relationships between organisms and their past, present, and future environments. These relationships include physiological responses of individuals, structure and dynamics of populations, interactions among species, organization of biological communities, and processing of energy and matter in ecosystems.⁷

Insofar as the ESA writes of what science is contemporarily understood to be, hardly anyone in the world, past or present, has been or is an ecologist, for an ecologist is a scientist as contemporarily understood in common sense—whether by credentialing with a recognizably legitimate post-secondary degree or adhering to one or another recognizably legitimate set of scientific methodological rules and standards. The scientific discipline is concerned with relationships between organisms and their environment. Thus, understanding what an organism is, what its environment is, and what the relationship between them is would each seem paramount to begin to understand what ecology is. These relationships, in turn, can be categorized broadly, such as physiological responses, structure of populations, dynamics of population, interactions among species, organization of biological communities, and processing of energy and matter. Each of these is a category of relationships. Interactions are a category of relationship, as is physiological responses, for example, or dynamics, or the processing of energy and matter, or energy and matter, or existing *in ecosystems*, and so on. What, then is a relationship? What is to relate? What is a relation? What is the difference between, for example: a relationship and an interaction; an interaction and the *processing* of energy and

matter; an interaction and energy and matter; the dynamics of a population of biological organisms and the organization of biological communities? And so on. Likewise, what is science? And what is discipline? What is scientific discipline? Do my responses to these questions differ from those of ecologists? Do ecologists ask these questions at all, much less respond to them? Even if they do not ask, do they indicate an understanding of what each is? If so, is what ecologists understand each of these to be different from what I understand each to be? What do ecologists understand, and why do they so understand?

Elsewhere on their webpage, the ESA concurrently responds that “[e]cology is the study of the relationships between living organisms, including humans, and their physical environment; it seeks to understand the vital connections between plants and animals and the world around them.”⁸ Humans are bio-ecological organisms. Here, unlike above, one could infer that for the ESA, every human being that has ever existed in the world has been an ecologist and every human being that currently exists in the world is an ecologist, and every human being that will come to exist in the world will be an ecologist. What human being does not study the relationships between him, her, or themselves and their environment, physical and otherwise? Were such a living being to exist in the world, this being would not be a human being existing in the world. Yet what living biological organism does not sense the relationships between—minimally—itsself and its physical environment? In this general sense, such a being would not be an existing biological organism, or even a biological organism that *could* exist in the world—at least insofar as I understand. And of those biological organisms that sense the world, how many of us could we consider—each in our own way, perhaps—to study the relations of the world? If one responds that more than one biological species, *Homo sapiens*, could study the world, each individual of this species of biological organism—those that have existed, exist, and will exist—will be an ecologist. This inference from the ESA’s answer seems rather unusual to contemporary common sense—common sense in which ecologists are, minimally, human bio-ecological organisms, but more often, legitimately credentialed and thereby recognized scientific human bio-ecological organisms. The ESA continues, writing that “[e]cologists study these relationships among organisms and habitats of many different sizes, ranging from the study of microscopic bacteria growing in a fish tank, to the complex interactions between the thousands of plant, animal, and other communities found in a desert.”⁹ There has never been, is not, and will never be a human being existing in the world that is not, from its birth to its death, an ecologist. This response, again, is in striking contrast to the ESA’s prior yet simultaneous response to the question, *What is ecology?* It is a scientific discipline. Ecologists, then, are scientists recognizably and legitimately belonging to this scientific discipline.

In his 1919 presidential address before the St. Louis meeting of the recently founded Ecological Society of America, Barrington Moore wrote that “[a]ll life is controlled by two great forces, heredity and environment, and ecology is the science dealing with the environment. It therefore covers practically the whole field of biology, and is related in one way or another to every science which touches life.”¹⁰ Ecology, he writes, “is new in name but not in fact; it is superposed on the other sciences, not an offshoot as phytopathology grew out of botany.”¹¹ Ecology is a science. As a science, ecology is related in one way or another to every science which touches life; in other words, ecology is related to every science. Ecology is the science that deals with one of the two great forces that controls all life: environment. Ecology, the science that deals with one of the two great forces that control all life, is, therefore, new in name only. The science that deals with one of the two great forces that control all life is new in name

only: ecology. Ecology, therefore, is not new at all. There is, at least, a logical ambiguity here. Environment, we learn, in its entirety, is one of the two great forces controlling all life. Environment is a force. Life is and can be insofar as it is, minimally, controlled by this force and one other force—i.e. forced forcefully by these forces. As with the first ESA understanding of what ecology is and, thus, what ecologists are, insofar as Moore writes of science as what science was understood to be commonsensically in the United States in the early 1900s, very few were and could be ecologists. Ecology, however, is merely “ecology,” a name which some one individually or collectively applies to his, her, or their meanings concerning an empirical phenomenon as a means for achieving operative and effective communication and the goals such communication functions, in its turn, to progressively achieve. What, then, of “force.” Is force not also merely “force,” i.e. merely a novel linguistic vehicle for carrying and conveying defined meaning in order to communicate, that is, a name? And what of environment, or “environment”? In any case, the study of the force that is the environment is not new, either. Is the study of the environment, or ecology, the result of this force forcing, however? Is ecology distinguishable from this force forcing at all? What is a relation—even if only between ecology and all the other sciences that touch on life—if environment and heredity, both forces, control all life insofar as life is life at all?

In his 1935 presidential address to the St. Louis meeting of the Ecological Society of America, Walter P. Taylor asked “what is ecology and what good is it?”¹² He asks these two questions without pause. Each question—that of *what?* and that of the utility of *what*, understood as a good, as well as the responses to each of these questions—seem, as Taylor would understand, to belong to together. What is a good such that it is good at all? What good is seems to have something to do with the degree of utility or use of the *what*, as judged by—at least—Taylor. If this were the case, what good is would be very similar to what value is, and perhaps vice versa—though I would first need to ask what each of these is, as well as what Taylor understands each of these to be: *good* and *value*. And, if Taylor judges the utility or usefulness of the *what* in question, what is this judgement? And what, then, is such a judge? I would also need to ask such questions if I was to begin understand what Taylor understands ecology to be. Likewise, I would need to respond to such questions for myself if I were to take the question—*what is ecology?*—up myself as my responsibility.

In beginning to respond, Taylor had found that “[o]ne does not go far in the study of definitions of ecology before he realizes that, as a rule, the content of the definition depends to a considerable extent on the field in which the writer is at work.” If the content of a definition is what is defined by him, then, perhaps, Taylor would understand the form defining the content to be that which he understand *to define* to be in the first place. And what is this? In any case, to a considerable extent, the definition of ecology, and thus of what ecology is, is relative to the field in which the definer works. What is neither relative nor dependent upon the ecologist, however, is that ecology is “ecology;” ecology, in other words, is a definition which is, in its turn, the result of the scientific worker’s defining. A defining of what, and what is to define? I could speculate with some plausibility that Taylor would understand defining terms to be an activity of an scientific worker, such as he himself is. Whatever his responses to these questions could be, Taylor proceeds to review definitions of ecology as could be given by those working in variously related fields. After this review of definitions, he asks further: “Is ecology a science in its own right, or is it merely a point of view?”¹³ To respond, he cites *Webster’s International Dictionary*. He does so not to consider others’ responses to the question *What is science?*—for this question has already been answered by the editors of the dictionary. Rather, Taylor cites the dictionary to

learn *how* others—individually and collectively—are actively defining their meanings and, then, assigning this definition to the term “science.” The question *What is science?* has already been answered in advance: Science is “science.” However “science” is defined, science is first the result of the act of defining one’s (where one could be an individual or a collective entity) meaning and assigning this definition to the term “science.” Here I find similar questions as before for ecology. “If,” he concludes, “these definitions [of science] are accepted,” “ecology must certainly be regarded as a science,” even though “the boundaries of this science are a little hard to delimit.”¹⁴ In light of these considerations, Taylor writes that “ecology is the science of all the relations of all organisms to all their environment.”¹⁵ This, he writes, is “our definition” of “ecology.” Ecology is “ecology,” an operational and hopefully effective definition of the meaning one (individual or collective) diachronically assigns to the term “ecology” in order to communicate effectively how we define “ecology” to be what ecology is. If ecology is “ecology”—a definition defined by the worker relative to the field in which he, she, or they works—what, then, are relations, organisms, and environment, and what would *all* such relations, *all* such organisms, and *all* such environment therefore be? Is each of these, too, the result of the activity of one defining and assigning his, her, or their meaning to a term?

Whatever Taylor would respond to the prior questions, I infer that Taylor understands that *what* one (individual or collective) diachronically defines “ecology” to be is inextricable from or, at least, relative to *how* and *how much* “ecology” is useful to and utilized by this or that scientific researcher in their scientific research. “I like to think,” he writes, “of ecology as a sort of master diagnostician who tries not to lose sight of the fact that Nature, the patient, is not an accidental collocation of independent and unrelated objects, but is normally an organized and functioning whole.”¹⁶ Here Taylor offers the reader a definition defined by a scientific researcher relative to his scientific research. Yet, as he proceeds, Taylor distances himself from the initial “I like to think of ecology as” and, rather quickly, is writing of ecology as something generally beyond or, perhaps, more than the term “ecology” to which he has assigned a definition of his meaning relative to the value he judges “ecology” and his meaning for “ecology” to have as a means to achieve his end-goals, be these goals the objectives of his research or his attempt to communicate via journal article or presidential address. Taylor considers, for example, that a person “who is sick and in need of medical attention needs a physician who can see his difficulties as a whole.” “It is disturbing,” he continues,

to consult two or three specialists in as many different organs of the body and to be given a regimen for the improvement of each which cannot possibly be carried out in view of what has been prescribed already for the others. Some master practitioner must harmonize the various proposed cures or the sufferer is headed for difficulty. [...] The program of the Ecological Society [of America] bristles with information that shows what the ecological doctors are up against. [...] A conservation crisis, which means, doubtless, an economic crisis and a political crisis, continues upon us. The desirability of speed in adequate ecological application is so desperate that I want to stress some of the current opportunities and responsibilities of the science [i.e. of “ecology”] in a number of fields.¹⁷

The maladies; the illnesses; the diseases; the existentially urgent, unremittingly pressing crises—as Taylor understands them—that he cites are as familiar to some people today as they were for ecologists in 1935. Yet, again, is Taylor writing of, for example, conservation crisis, economic

crisis, and political crisis, or is Taylor writing of “conservation” “crisis,” “economic” “crisis,” and “political” “crisis.” As before, Taylor neglects including quotation marks indicating that, for each of these terms, he is defining his respective meanings and applying these definitions (i.e. his definings of his meanings) to their respective terms “conservation,” “economic,” “political,” and “crisis” relative to his scientific research goals as well as the utility, or good, he judges each of these definitions to have in its operationalization for achieving the goal of communicating with his audience. Yet insofar as this is what ecology is—i.e. “ecology”—and “ecology” wholistically diagnoses such crises as well as that from, of, and by which these crises come to be crises at all, crisis must be—logically, anyhow—“crisis,” and so on.

The inconsistency here could evidence Taylor’s privileged psychological bias, if not hubris—a bias and hubris that leads him—unconsciously, it seems—to enact the epistemological hoodwinking that is the god-trick of speaking of things in themselves—e.g. sickness, suffering, conservation, crisis, politics, science, etc.—*as if from* no-where and no-when or *as if* his readers did not inhabit a relatively situated, relatively specific *Lebensform* with games of its own distinct from those of Taylor’s. Hypothetically, then, in the wake of Taylor’s epistemological shortcomings, I could write: The “sicknesses,” “crises,” and the “suffering” Taylor cites are as “familiar” to some people today as they were for “ecologists” in 1935. This is still not entirely consistent, however, with what ecology is: “ecology.” For greater consistency and continuity, I could write: The “sicknesses,” “crises,” and the “suffering” Taylor cites “are” as “familiar” to “some” “people” “today” as “they” “were” for “ecologists” in “1935.” Yet such a rigorously—that is, consistently and continually—contextually situated perspective can only be, therefore, “a” “contextually” “situated” “perspective,” “situated” “dynamically” and “diachronically” “in” “place” and “history.” At an extreme, if I am to be consistent and continuous, however absurd, all the words, or rather, all the terms—as the definer’s (individual or collective) perspectively, diachronically defined meanings applied, according to externally inscrutable rules, to phonemic and syntactic vehicles (i.e. named) relative to this definer’s (again, individual or collective) dynamically specific spatiotemporal context as the definer subjectively experiences it—necessarily require scare quotes to indicate the grounded positionality of the definer’s meaning-making, meaning-defining, and, thereby, of the definer’s making sense as a means to the definer’s goal of communicating with an interlocutor. Here, my reader, likewise, upon sensing the stimuli activated by the senses I have actively made and conveyed, first frames them unconsciously and automatically from these senses’ physically-mediated excitation, or affectation, of this reader’s bodily sensory apparatuses. The reader’s automatic, *perhaps* contextually constructed, cognitive filtering devices then actively enframe these physical sensory affectations yet again both *as* and *upon* primordial conceptualization. *By means of* and *from out of*, i.e. resulting from the activity of this spontaneous conceptualization of the pre-filtered and pre-ordered stimulatory affectations, the reader experiences experiencing as being subjectively conscious. Further conceptual framing and ordering activity can then be undertaken by the experiencing, consciously sensing subject relative to, for example, their scientific research techniques and objectives as an ecologist—or rather, “their” “scientific” “research” “techniques” “and” “objectives” “as” “an” “ecologist.” In this manner we could hypothetically indicate the ground of both Taylor and his reader with their individual and collective, spatiotemporally specific, dynamic and diachronically evolving worldviews of and from within the relatively particular *Lebensform* to which they belong as actors, agents, or players, with this *Lebensform*’s various rule-governed games. We could indicate the worldliness of Taylor’s and his reader’s situation by graphically marking or gesturing kinesthetically so as to communicate that each

individual's or, more likely, each collective's dynamically and diachronically positioned perspective within and from out of a collective worldview of family resemblances and their way of life's corresponding, externally inscrutable rules, struggles, and games is not extrapolatable without epistemologically ontological folly. I, too, must consciously spatiotemporally situate myself. Thus—and I will leave this up to my reader as a hypothetical example—the reader could enframe each word or significant phrase of these sentences I write within and by means of their own—whether in isolation or collectively shared—framing and perspective (if these are distinct).

Taylor gives many examples of the types of sicknesses, crises, and suffering he has in mind—examples that, I suspect, are familiar to many if not most contemporary readers, whether they accept or reject Taylor's framings or not. Or, rather, I should, perhaps, write with qualified positioning: Taylor gives many "examples" of such "sicknesses," "crises," and "sufferings," at least as he consciously, i.e. subjectively experientially perceives and conceptualizes these concepts as such—"sickness," "crisis," and "suffering"—by means of and from within the individually and collectively perspectival, relatively contextually specific frames his brain utilizes in order to epistem-ologically order and conceptualize (perhaps still automatically, unconsciously, and simultaneously, and perhaps by means of socially constructed enframings) physical stimuli in an orderly, rule-governed, definitively constructed, consciously perceivable and, then perhaps, consciously conceivable fashion. Taylor's examples include

the obvious soil exhaustion as a result of wasteful cropping processes; soil erosion consequent on unintelligent practices or worse; decimation or even extermination of wildlife; overgrazing, not only on the vast open ranges of the West, but also, all too often, on pasture-lands in the East and South; wasteful logging and destructive burning of forests; plowing up of the native sod which should have been left for pasturage; exploiting our oil and other minerals; draining of marshlands for a prospective agriculture that can never be realized; reclamation of arid lands which can never pay the costs of development; importation of pests through careless introduction of foreign plants or animals; pollution of streams, lakes, and even the bays, harbours and shore waters of the open ocean with sewage and industrial wastes.¹⁸

Again, as before, Taylor includes not one quotation mark around these conceptual frames to indicate for his readers, minimally, the relative contextual specificity of his mundane positionality as well as, therefore, his definitions' of his concepts relativity to his framing, his values, and his ecological research objectives and techniques. Why not? I leave this as a bothersome question—bothersome for me, at least.

Taylor closes his list of crises and sufferings with exasperation: "Small wonder that Nature needs clinical treatment!"¹⁹ Not only are the crises and suffering Taylor cites familiar, I suspect, for many today, as I have already noted, but so too is the term "ecology" as a term for which one (individual or collective) diachronically defines and assigns the meanings one (individual or collective) diachronically makes in, of, and by means of and always relative to their scientific activities (including, for example, chemistry, botany, zoology, taxonomy, physiology, forestry, agriculture, psychology, anthropology, economics, sociology, and ethics), regardless of how these activities relatively enframed or, distinctly, regardless of the enframings that each of these activities *are*.²⁰ "Ecology," thus defined, is (i) valuable scientific methods, techniques, technologies, and other tools for diagnosing and treating the ecological maladies,

crises, and suffering to which Taylor gives alarm as well as (ii) what “ecology,” when utilized, effects in the world. “Ecology,” he emphasizes,

is one of the most useful and essential of the sciences, in at least the following fields: soil conservation, land classification and planning, resettlement projects, all the farm sciences, certain industrial and engineering enterprises, aquiculture, fisheries management, practically all phases of conservation of natural resources, reforestation, range rehabilitation, wildlife management, medicine and epidemiology, anthropology and the social sciences.²¹

Ecology is “ecology,” and “ecology” is a scientific and, thus, a technical means to progressively achieve the goals of diagnosing and fixing the vast problems causing the maladies and crises Taylor cites; “ecology” is, thus, a means to progressively achieve the myriad goals constitutive of progressively, diachronically achieving “comprehensive” scientific knowledge of “all the relations of all organisms to all their environment” in order to, in turn, successfully evaluate, examine, regulate, and manage the patient into the future so that it, the patient (i.e. “all the relations of all organisms to all their environment”), can wholistically and “comprehensively” be successfully conducted by the diagnosticians and doctors (see list of scientific specialties above) towards living a long, healthy, active, functional, useful, utilizable, and productive life.²² Each of these latter qualifiers I have inferred as plausible from Taylor’s presidential address.

In 1949, W. C. Allee (ESA president, 1929), Alfred E. Emerson (ESA president, 1941), Orlando Park (ESA president, 1943), Thomas Park (ESA president, 1959), and Karl P. Schmidt published their response to the question, *What is ecology?* These authors are *very unusually* scrupulous and thoughtful in their response. Due to the exceptional attention they give to the question, I quote them at length so that I may discover further questions I could ask. Here I wish to listen only, which I follow for the time being with a minimum of analysis. They write:

Ecology may be defined broadly as the science of the interrelation between living organisms and their environment, including both the physical and the biotic environments, and emphasizing interspecies as well as intraspecies relations. The *living organism* may be defined, though somewhat incompletely, as a physiochemical mechanism that is self-regulating and self-perpetuating, and is in process of equilibration with its environment. The *environment* of any organism consists, in final analysis, of everything in the universe external to that particular organism. Those parts of the total environment that are evidently of direct importance to the organism are regarded as constituting the *effective environment*. The relations of any organism or community of organisms with the environment are [...] (1) particular: specific for every organisms; (2) continuous: the organism living in its environment for its total life; (3) reciprocal: the environment affecting the organism, and *vice versa*; and (4) indissoluble: dissociation of an organism from its environment being impossible.²³

Allee *et al.* continue the elucidation in the subsequent paragraph, helping the reader understand how they define the meaning they give the term “relation,” and thus what they define “relation” to be:

The reciprocal relations require special attention. The interaction of the environment and the organism is obvious in almost every field of biology. Physiological processes are correlated primarily or secondarily with environmental fluctuations: energy for life is derived from the environment; growth and development show relationship to environmental factors; environmental forces and substances impinge upon the sense organs of animals and the reactive systems of plants; behavior patterns in large part are responses to environmental patterns; distribution of plants and animals is determined by variations in the environmental complex; isolation through environmental factors has profoundly influenced genetic systems of organisms, and the environment has acted as a selective agent in determining the survival of organisms and populations, thus leading to the evolutionary development of living systems.²⁴

The relations of the organism with its environment, and vice versa, are reciprocal relations. These relations are interactions, and vice versa. The interaction of the environment and the organism is obvious. The physiological processes of an organism correlate primarily or secondarily with environmental fluctuations. These interactions (or what is the same, these reciprocal relations)—including now the organismic physiochemical mechanism with its internal anatomical and physiological self-regulating and self-perpetuating interactions—in their totality both make and are not only the effective environment of any given living organisms at any particular time and place, but the total environment, which is to write, the universe, whether diachronically or synchronically and whether spatially exhaustively or in a particular place.

In an article based on his 1954 presidential address at the Gainesville, Florida meeting of the ESA, Lee R. Dice, too, takes up the question: *What is ecology?*²⁵ By the date Dice spoke, he considered the science of ecology to have “approached, if it has not already reached, an early state of maturity.”²⁶ Correspondingly, “[t]he definition that ecology is the science that deals with the relationships between organisms and their physical and biotic environments is accepted by practically everyone.”²⁷ He qualifies “ecology,” however, noting that “certain ecologists [...] construe this definition in a very broad sense,” including “in ecology almost all of biology, omitting only a few special subjects.”²⁸ Others, on the other hand, “restrict the definition of ecology much more narrowly.”²⁹ What one or another ecologists means when he defines “ecology,” much less what one or another ecologists means when he speaks or writes “ecology” is interminably variable, even if some general definition is accepted by *practically* everyone. Dice understands “the concepts of ecology”—concepts which are essential to its being defined as it is, i.e. as a science—“are those principles, natural laws, theories, and hypotheses that attempt to explain the relationship of organisms to their environment.” While Dice largely writes of relationships, often enough he seamlessly substitutes *reactions*, *reacts*, *action*, *act*, *interact*, *mechanism*, or *operate* either for *relate*, *relation*, or *relationship* or to describe *relation* or *relationship*—though perhaps it is, rather, vice versa. One cannot tell by reading alone.

By 1960, at least one member of the illustrious panel of authors of *Principles of Animal Ecology* had grown dubious of the point of defining what ecology is or debating over one or another ecologist’s meanings and definitions of his, her, or their meanings. In his presidential address to the ESA, Thomas Park informed his audience of the four final instructions he gave himself for the occasion, of which I note only two:

The first is to avoid completely the use of the word “dynamics.” [...] The third is not to raise the question: “What is ecology?” [...] A short defense of these instructions is in

order. “Dynamics” is a word which is often used in such a way as to suggest a greater degree of understanding of some even than in fact is the case. [...] With reference to the last two instructions [including the third], I hold the view that the time is past when it is either necessary to tell ourselves what our field is all about or to apologize, either directly or indirectly, for the fact that we are ecologists. We can take pride in the progress of our field and even greater pride in its potential.³⁰

So *What are dynamics?* and *What is ecology?* have exhausted their usefulness and utility, i.e. their value, even as means for ecologists to infuse themselves with scientific confidence or for ecological apologists to justify their science. But I can, perhaps, still glimpse what Park previously responded to the question of ecology, with echoes from 1949 reverberating with some indication of his frustration. He writes that there is

continuous reciprocity between any array of organisms and its non-living environment. We sometimes divide the total environment into “abiotic” and “biotic” as if the two are very different. In the connotation of ecological theory I think this custom should be forsaken. It is the relevant interactions that count. In a real sense the physical world extends into the biological, and contrariwise.

What counts—regardless of semantic wars, definitional disputes, or the presumptuous flaunting of “the dynamics of this” or “the dynamics of that”—is not just interactions *en toto*, which is to write the organism reciprocally relating with and to its environment (or what is the same, the universe), but rather the *relevant* interactions as judged by one (individually or collectively) for purposes of solving an as-yet unsolved ecological or, more broadly perhaps, scientific problem.

Yet the question stubbornly and, it would seem, inexplicably persists, even in only lurking unnoticed or ignored. In his 1981 presidential address at the ESA’s Bloomington, Indiana meeting, Robert T. Paine indicates indirectly what ecology is as he contemplates the “ample a priori reasons to suspect that ecological prediction will always be difficult.” These reasons include, for example, that “[n]atural communities are subtle entities, with chains of interaction often linking trophically distant species.”³¹ Another reason is that “[m]any, if not most of the fundamental interactions are nonlinear, and the exercise of some measure of free choice by mobile species adds noise.” “Further,” he continues, “numerous mutualistic or symbiotic relationships exist, implying that phyletically distant taxa can be inexorably bound to share common fates.”³² What ecologists research and attempt to predict are interactions and relationships and from these, as Paine understands, emerge effects such as changes in the distribution and abundance of an organism’s primary prey, “an effect which in turn cascades to that prey’s prey.”³³

In 2018, former ESA president (2009-2010) Mary E. Power wrote that ecology is the “scientific study (since 1902) of interactions of organisms with their environments.”³⁴ Below this, she cites H. G. Andrewartha’s and L. C. Birch’s 1954 book, *The Distribution and Abundance of Animals*, writing “Andrewartha and Birch 1954: The scientific study of the distribution and abundance of organisms.”³⁵ The title of the slide is “Ecology,” so presumably Power cites Andrewartha’s and Birch’s understand of what ecology is. Alternatively, one can refer back to R. T. Paine’s indications, noting that the distributions and abundances of organisms are the effect of interactions—or, what is identical, the effect of activities-reactivities, such as those that cascade through trophic interaction chains.

Andrewartha and Birch, however, very purposefully do *not* define ecology—at least not forthrightly.³⁶ Ecology, they feel, “is so complex and subtle that it is easy to fall into the error of false abstraction.”³⁷ To avoid what they warn is, citing A. N. Whitehead, “the fallacy of misplaced concreteness,” they write of “‘the environment’ of the individual, regarding the population as part of the environment rather than itself having an environment.” With explicit purpose and reasoning, they do not formally write what environment is or define what environment is, instead writing that they “are seeking a concept of *environment* which will help [them] to understand and explain the observed distribution and abundance of animals in nature.”³⁸ What they are seeking, then, is not what the environment is, but rather, “a concept of environment.” In other words, the environment is “the environment.” They do write how they seek such a concept: “Rather than attempt a formal definition [of “environment”], we prefer to classify and describe all the material things (like trees and logs and other animals, etc.) and all the qualities (like temperature, moisture, radiation, and so on) which we can think of as influencing, either separately or in interaction one with another, the animal’s chance to survive and multiply.”³⁹ Yet “the components of the environment must be defined in such a way that they can be studied individually by observation and experiment, especially their respective influences on the longevity, speed of development, and fecundity of the animal.” One of the four components of any and every individual animal is, however, “other animals and organisms causing disease.”⁴⁰ An animal separate in its environment is nonetheless, insofar as it is in an environment at all, interacting with other organisms which are a defined component of the animal’s environment. Andrewartha and Birch do define the four components of environment; in other words, the four components of what environment is (which they decline to formally define) are definitions of meanings. And the study of the “interactions between components of the environment will form quite an important part of the whole study,” i.e. of *The Distribution and Abundance of Animals*.⁴¹ For both Power and Andrewartha and Birch, as for Paine, interactions are either what ecology is or what ecology—as the definition of the definer’s definition of his, her, or their meaning then assigned to the term “ecology”—is.

Similarly to Power, Albert Ruhi—a freshwater community ecologist and professor in the Department of Environmental Science, Policy, and Management at the University of California, Berkeley—told me that ecology is

a set of relationships between animals, and animals and plants, and the animals and plants and their environment. So...by relationships, I mean...predation, competition, things like that, but also the environment they are exposed to. So stressors and disturbance, and some of these are nature, and some of these are anthropogenic. So I consider humans as being part of the ecology, to the extent that they set the context where these interactions are happening, but also because they drive some of the stressors and disturbance that drive the trajectory of the ecosystem.⁴²

As examples, Ruhi lists two of the most commonly ecologically researched relationships, predation and competition. “[B]y relationships,” he says, “[he] mean[s]...predation, competition, things like that.”⁴³ These relationships are ecological interactions.⁴⁴ Scientifically-epistemologically and, thereof, ecologically, a relationship is an interaction. A relation is an interaction. *To relate is to interact*. Thus, all biologically organisms, including humans, are interactors, interacting with each other and with the interactivity of the environment. Ruhi, too, spoke of the relations between biological organisms and biological organisms and the

environment, such as competition and predation, as interactions. And all ecological interactions are with an ecological system—in this case, an ecosystem. A food web, he told me, is “a reflection of all of the interactions” between animals, animals and plants, and the animals and plants and the environment.⁴⁵

At least some previous and current doctoral students of ecology at the University of California, Berkeley, respond similarly to Andrewartha and Birch, Paine, Power, and Ruhi. For example, to my question, *What is the ecology of the Eel River?*, Suzanne Kelson asked me in turn, “Like, what does that mean?”⁴⁶ I responded, “Right. What do you understand by that [i.e. the ecology of the Eel River].” She then replied that the ecology of the Eel River “to me, means all living things in the Eel River and how they interact with each other and how they are also influenced by physical processes.” The ecology of the Eel River is a meaning—in particular, either Kelson’s own meaning or the meaning she senses the words or phrases *themselves* to have. For Kelson, a food web is, similarly, “interaction of living organisms who are eating each other and primarily affecting each other in their desire to make a living and increase their own biomass to make a living in their environment.” In an interview with Hana Moidu, Moidu responded to my question, *what do you understand the ecology of the Russian River to be?* similarly to Kelson: “So to me,” she says, “the ecology of the Russian River would mean how different organisms are interacting within the Russia River [...] the nuance behind ecology is also the physical, the biogeochemical, and all of that. That’s all interrelated...but when I think of the ecology, I’m thinking more about how these organisms are interacting, not necessarily just within the Russian River itself, but also within the riparian [zone] and all the interconnected terrestrial-to-aquatic [processes? relations? interactions?...]” (unfortunately, my electronic recorder stopped inopportunistly).⁴⁷ For Moidu, ecology is what “ecology” means, or at least what “ecology” means to her. And what is this meaning? For her, “ecology” means interactions of organisms with organisms and, behind this—i.e. behind the interactions of organisms with other organisms and the environment, which is the meaning of “ecology”—the physical, biogeochemical processes or interactions, including riparian zone interactions and other terrestrial-to-aquatic interactions.

1.3 Scientific-epistemological ecology: *How?* (the ecology of the Eel River functions) and *Why?* (it functions as it does)

In a 1961 *Science* article, Ernest Mayr wrote that proximate causes are the purview of functional biologists and ultimate causes the purview of evolutionary biologists.⁴⁸ For any given phenomenon, he wrote, scientists must discover, discern, and unify into a single scientific explanation both types of causes if we are to arrive at a complete understanding of the phenomenon under investigation. In other words, a complete human understanding, as he understood, is a complete, unifying scientific explanation of the proximate and ultimate causes of a given phenomenon in the world. May explains that the distinction between proximate and ultimate biological causes is indicative of two general categories of biological problems; and, thus, of two general categories of biologists; and, therefore, of two general categories of biological research. The two categories of biological problems, and, thus, of biologists and of the corresponding categories of biological research are functional biology and evolutionary biology.

The experiment is the primary technique of the functional biologist and her “approach is essentially the same as that of the physicist and the chemist.”⁴⁹ In other words, she “attempts to

eliminate, or control, all variables, and she repeats her experiments under constant or varying conditions until she believes,” or judges, “she has clarified the function of the element she studies.”⁵⁰ The functional biologist’s “ever-repeated question” is *How?* “How does something operate, how does it function?”⁵¹ The functional biologist, then, is “vitaly concerned with the operation and interaction of structural elements, from molecules up to organs and whole individuals.”⁵² Mayr emphasizes that, “[i]n spite of certain limitations of this method, one must agree with the functional biologists that such a simplified approach is an absolutely necessity for achieving his particular objectives. The spectacular success of biochemical and biophysical research justifies this direct, although distinctly simplistic, approach.” Functional biologists evaluate and value their methods relative to these methods efficiency and effectivity as means to the biologist willfully actualizing by achievement her end-goals, or objectives. Methods, too, are purely functional. The methods of physicists and chemists, and, thereof, of functional biologists are purely functional, purely means to willfully actualize by achievement these scientists’ end-goals.

Notably, Mayr neglects to explain to the reader whether or not the evolutionary biologist’s methods differ from that of the functional biologist’s and, if so, how the methods of functional and evolutionary biologists differ. I do not judge this a mere coincidence or oversight. Mayr explains that “the functional anatomist who studies an articulation shares this method [that of physicists, chemists, and functional biologists] and approach with the molecular biologist who studies the function of a DNA molecule in the transfer of genetic information.”⁵³ He offers another example of the distinction between the problems a functional biologist and an evolutionary biologist research. “The functional biologist,” he writes,

deals with all aspects of the decoding of the programmed information contained in the DNA code of the fertilized zygote. The evolutionary biologist is interested in the history of these codes of information and in the laws that control the changes of these codes from generation to generation.

The evolutionary biologist, in this case, is also a molecular biologist that utilizes the many of the same techniques and technologies of the functional molecular biologist. Their difference, as Mayr indicates, is that the functional biologist is going to explain from the statistical calculations comprising the results of experiment while the evolutionary biologist is going to explain from the statistical calculations comprising the results of comparative molecular analyses of DNA without a formal experiment. The evolutionary molecular biologist, on utilizing the technologies and techniques of molecular analysis of DNA, must still control for variables and—in the spirit of Mayr’s article—channel noise (see information theory).

But more importantly, the evolutionary biologist dedicates herself to a different category of problems than those of the functional biologist. The evolutionary biologist’s basic question is *Why?* Mayr is emphatic that this is *Why?* is the sense of *How come?* and not *Why?* in the teleological sense of *What for?* Mayr is unequivocally unambiguous: “scientific biology has not found any evidence that would support teleology...All the so-called teleological systems...are actually illustration of teleonomy.”⁵⁴ He “rigidly” restricts *teleonomy* to “systems operating on the basis of a program, a code of information”—a system that may have “apparent purposefulness” of its “organisms and their characteristics” but which has, ultimately, an analyzable physicochemical basis.”⁵⁵ In other words,

[t]he purposive action of an individual, insofar as it is based on the properties of its genetic code, therefore is no more nor less purposive than the actions of a computer that has been programmed to respond appropriately to various inputs. It is, if I may say so, a purely mechanistic purposiveness.⁵⁶

An individual biological organism's behavior is, or may be, in this sense—a sense of freely reacting to the inputs into the body's (including the brain) mechanisms of action from the output signals activated by the programming of one's genetic code and actively physiochemically transmitted, however, always in an internal and external environment with latent noise and unpredictable disturbance. The development of a behavioral activity or reactivity, therefore, may be purposive in this biological sense; natural selection, however, "is definitely not."⁵⁷

The evolutionary biologist's governing question is *Why?* in the strict sense of *How come?* Without *What for?*, however, *Why?* is and can only be a second order question. *Why?* can only be solved in light of the prior solutions to those *How?* problems that the scientist judges relevant to her particular *Why?* problem. All *Why?* problems can only be answered from solutions to *How?* problems. The evolutionary biological problem of *Why?* is a function of and only solvable from the functional biological problem of *How?* and its solutions. *How?* is a purely technical question. As a purely technical question, *How?* is the essence of *what* a problem or a puzzle to be solved *is*. Mayr never mentions the question of *What?*. He never considers *What?*—not even *What is causation?*—even though he has already answered this question *in advance* once and again and again throughout the article and even though *all* of what he explains concerning *How?* and *Why?* is scientifically-epistemologically and common sensible—if these are distinct—in the light of these answers in advance.⁵⁸ Epistemologically-metaphysically and, thereof, scientifically-epistemologically, *What?* is, at best, a third order question—epistemologically metaphysically, however, *What?* is more likely a fifth or sixth order question, after, for example, *Where?*, *When?*, and *Who?*—a fifth or sixth order question, that is, if it is remembered at all and, if remembered, evaluated and valued as a question-*cum*-problem worthy of *posing* at all.

When a functional biologist asks *How?*, to what is the functional biologist attuned and attentive? When a functional biologist asks *How?*, she is attuned and attentive to "the operation and interaction of structural elements, from molecules up to organs and whole organisms." When an evolutionary biologist asks *Why?*, to what is the evolutionary biologist attuned and attentive? When an evolutionary biologist asks *Why?*, an evolutionary biologist is attuned and attentive to "the forces that bring about changes in faunas and floras (as in part documented by paleontology), and he studies the steps by which have evolved the miraculous adaptations so characteristic of every aspect of the organic world." To act, to react, and to interact are to force and to be forced, and vice versa identically. Biologists research the activity, reactivity, and interactivity that *is* the biological world and that *is of, from, and by* the biological world. Biologists research the forces that originate, develop, drive, alter, vary, multiply, make endure, dissipate, and cease the operations, functions, labor, and work upon, of, from, and by biological organisms within themselves; upon, of, from, and by one organism with another; and on, of, from, and by organisms and their environments; and reactively and, thus, interactively vice versa in each case. Biologists research the forces that originate, drive, alter, vary, multiply, make endure, dissipate, and cease the scientifically-epistemologically phenomenal patterns and structures that make up the living world. Epistemologically-metaphysically and, thus, scientifically-epistemologically, work—even the work of art or poetry—is the product of the activity of force and the distance the entity which this force activates moves.⁵⁹ In other words,

work is a scientific-epistemological energy transfer from one entity to another by the action of force.⁶⁰ Work is a *function* of the activity of force. What work an entity does in the world—that is, what an entity effects, or what an entity actualizes by achievement—is a derived *function* of the activity of a force (individual or net) and this force’s forcing the actualization of motion or the change in motion of the entity over a distance in some direction. The origin, or creation, of work is the productive activity of force forcing an entity over some distance in some direction and this entity’s oppositely, existentially simultaneously, equally, and, thus, *scientifically-epistemologically causally indistinguishably* forceful reaction-in-mobilization. This presents Mayr with an epistemological-metaphysical and, thereof, scientific-epistemological problem he does not acknowledge.

Ernest Mayr likely gleaned the distinction between the functional and evolutionary biologist from the introduction of David Lack’s famous book of 1954, *The Natural Regulation of Animal Numbers*. Ultimate factors, Lack writes, are concerned with survival value, while proximate factors are concerned with adaptations in physiology and behavior.⁶¹ Lack does not write of causes. He writes of *factors*. Lack is concerned with *ultimate* factors. He gives notice to his reader that while “several other examples of ultimate and proximate factors will be met later in the book,” “the nature of the ultimate factors concerned is highly relevant to the main theme” but “the nature of proximate factors is not.” “Hence,” he continues, “though proximate factors involve some fascinating biological problems, they are here discussed very briefly.” What does Lack understand *factors* to be? He has already answered this question for his reader:

The approach attempted in this book is factual and analytical, not abstract or mathematical, the facts being organized round the biological concepts of competition, natural selection, and the interaction of predators and parasites with their prey.

Factors are action, reactions, and, thus, interactions. Examples of interactive factors are competition and predation as well as, therefore, the competitors, the predators, and the prey. Factors are, therefore, also actors, reactors, and, thus, interactors. Lack continues directly:

For this reason, the best introduction to the subject is still that given in Chapter 3 of *The Origin of Species*, a chapter which has been greatly neglected in later research, though its position so early in Darwin’s book reflects its importance in the argument for evolution.

Darwin entitled chapter three of *On the Origin of Species* “The Struggle for Existence.” The strugglers for existence that have the faculty and capacity to console themselves may console themselves that “the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply,” where nature is “the aggregate action and product of many natural laws” such as, for example, the “[a]ction of Natural Selection.”⁶² For it is “the action and reaction,” or struggle, “of the innumerable plants and animals which have determined, in the course of centuries, the proportional numbers and kinds” of existent species of biological organisms the world.⁶³ Originating existingly and enduring existingly *are* and, thus, require—ultimately and if nothing else—activity, reactivity, and, thus—as Lack writes—interactivity.

As Lack acknowledged, his predecessor J. R. Baker had already discerned between proximate and ultimate factors in his 1938 article “The evolution of breeding seasons.”⁶⁴ Rather than factors, Baker writes of proximate and ultimate *agencies* that a scientist-epistemologist may

discern, evaluate, examine, test, and thereby explain as a proximate or ultimate cause. Breeding seasons, for example, are likely controlled by the interaction of two or more agencies which the ecologist can scientifically-epistemologically judge to be the causes.⁶⁵ An agency is an action, and vice versa. An agent is an actor, and vice versa. Both *agency* and *activity* are, and speak of and from the Latin *agō* (*agere*).⁶⁶ An agency, as with an activity is, ultimately and if nothing else—forcefully forcing and, interactively, being forced.

More recently, Edward O. Wilson affirms the centrality to the biological sciences of action, reactions, and, thereby, interactions and their differentiations into proximate and ultimate causes: “In biology, how-and-why explanations are routine and expressed as ‘proximate’ and ‘ultimate’ causation of living processes.”⁶⁷ What does Wilson understand proximate and ultimate causes to be? Proximate and ultimate causes are proximate and ultimate actions, reactions, and, thus, interactions scientifically-epistemologically evaluated to be causes. Or, identically, proximate and ultimate causes are proximate and ultimate forces scientifically-epistemologically evaluated to be causes. Wilson writes, for example, of “The Driving Force of Social Evolution,” including eusociality as its effect.⁶⁸ Or, he writes elsewhere, “[w]ithin biology itself, the key to the mystery [of “the real human story”] is the force that lifted prehuman social behavior to the human level,” or again, “a gene for a trait entailing cooperation and other forces of interaction with fellow group members may or may not be subject to individual-level selection...the genes prescribing interactive (hence social) traits are subject to group-level selection.”⁶⁹

Mayr, Lack, Baker, and Wilson each learn from and draw thoroughly upon Darwin’s work in one way or another, directly or indirectly. For Darwin, identifying and explaining proximate and ultimate actions, reactions, and, thus, interactions of speciation by natural selection was the essential center of *On the Origin of Species*.⁷⁰ We need only read the beginning of Charles Darwin’s original title to recognize this: On the origin of species *by means of* natural selection, that is, “On the origin of species by *the ultimate action* that is natural selection.” Numerous other examples can be found in the pages of Darwin’s book. This is the reason why, in his essay “On the Methods of Theoretical Physics,” Ludwig Boltzmann wrote, with great admiration:

The aggregate of these methods [Boltzmann writes here of scientific methods as exemplified since Galileo by physical natural philosophy, or contemporarily, the science of physics] was so productive of results that to explain natural phenomena was defined as the aim of natural science; and what were formerly called the descriptive natural sciences triumphed when Darwin’s hypothesis made it possible, not only to describe the various living forms and phenomena, but also to explain them.⁷¹

To biologically explain is, like in physics, to *first* scientifically-epistemologically reveal and identify actions, reaction, and interactions.

1.4 Methods, social scientific-epistemological

The social scientific-epistemological research method for this respective part of my study was semi-structured, open-ended interviews. Using purposive sampling, I contacted possible informants that met the criteria for key informant subject populations. I sought key informants that were adults (age 18 or older) of male, female, or other genders; of any race or ethnicity; and

that spoke fluent English. The key informants I sought consisted of (1) ecological, biological, physical environmental, or economic scientists that are currently performing dissertation research or that already hold a PhD and (2) staff scientists and personnel of conservation or environmental restoration organizations, such as California Trout or Friends of the Eel River. To contact possible informants, I used only publicly available business or professional contact information, such as a publicly listed business or university office email address or phone number.

Prior to the onset of the Covid-19 pandemic in early 2020, I conducted several of my planned interviews in person at the date, time, and place chosen by the subject. However, after the onset of the Covid-19 pandemic in early 2020, I conducted all of my subsequent interviews by telephone or video chat. The first interview of a participant lasted not more than one hour. If I invited a participant to a follow-up interview, this interview, too, lasted not more than 1 hour. I did not invite participants to more than two interviews. If the participant formally consented to having the interview audio recorded, I did so. The total time commitment for any given interview participant was not more than three (3) hours.

For purposes of snowball sampling further prospective subjects, I provided a study flyer to participants who consented to an interview. The study flyer included an introduction of the student investigator (myself), a brief explanation of my research's purpose, an encouragement to ask any questions about the research, and the researcher's contact information.

I conducted semi-structured interviews—less formal than identical questions and sequence for each interviewee but not without the structural guidance of my questions, both pre-prepared and unforeseen follow-up.⁷² My semi-structured interview guide consisted of 55 possible questions I considered in advance. Before each interview, I researched the interviewee's professional background and training and selectively read publications the interviewee had written, especially those that were of academic research, journalistic, or policy related. With a sense of the interviewee's professional areas of specialty, experience, and knowledge, I would select and mark certain focus questions I judged could be both especially informative to my research and engaging for the interviewee. In other words, I marked questions that could be useful for guiding an interviewee toward themes or subject matters I knew were of especial interest to them as of relevance to my research. In these ways, I “define[d] the areas for exploration” and could “monitor the quality of the material” so that both I and the interviewee could “work together to produce information useful to the research project.”⁷³ I began each interview by introducing myself, my research, and the reason I sought the interviewee out in particular to interview. I also asked if the interviewee had any questions about me, the research, the interview consent forms, the use of their interview data and their name, the security of their data, and so on. After addressing any questions the interviewee had, I would begin with the questions of my interview guide. I began by asking each interviewee the same set of *general* introductory questions. I intended these to help the interviewee relax, to warm us both up to the themes I sought to ask about in the interview, and to help us move towards these thematically-specific *focus* areas.⁷⁴ These questions were:

(1) Could you tell me a little bit about yourself? [If a professional researcher, for example, I would suggest they tell me about their research questions, research, and what drew them to their profession. If a non-profit professional, as another example, I would suggest they tell me about their organization's work, their role in the organization, and why they were drawn to such work. Such structured suggestions helped avoid receiving a person's life story.]

(2) How did you *first* become interested in ecology?

- *If ecology is spoken of as scientific discipline:*
 - (i) What first called your attention to ecology specifically?
 - (ii) How did you first become interested in science generally?
 - (iii) What about science in general first called your attention?
 - (iv) Do you recall your initial motivations for becoming involved in science in general?
- *If ecology is spoken of as world or nature:*
 - (i) What called your attention to ecology?
 - (ii) Do you remember when you first became interested in science?
 - (iii) What about science in general first called your attention?
 - (iv) Do you recall your initial motivations for becoming involved in science?
 - (v) How was your attention first drawn to the science of ecology specifically?
 - (vi) Do you recall your initial motivations for becoming interested in the science of ecology?
- *If ambiguous, or if both senses of ecology are spoken of:*
 - (i) What did you understand ecology to be at that point in your life?
 - (ii) Is this different than your understanding today of what ecology is? How so?
 - (iii) What about science first called your attention?
 - (iv) Do you recall your initial motivations for becoming interested in science in general?
 - (iv) How was your attention first called to the science of ecology specifically?
 - (v) Do you recall your initial motivations for becoming interested in the science of ecology?

(3) Why did freshwater ecology, in particular, call you to pursue studies and a career in this field?

After the interviewee responded to the introductory questions, I began with focus questions. My focus questions were theme specific but phrased to be as open ended as possible.⁷⁵ For example, instead of asking an interviewee what the physics equation is for *power* or *work*, for example, or to qualitatively but rigorously define entropy, I would ask them what they understood energy, work, or entropy to be. If they struggled, I would ask them, for example, what energy was in the ecology of the Eel River. Once I began with focus questions, I would fluidly choose from the questions I have available on my interview protocol. To best of my ability, and when I judged appropriate, I followed the ecology of the Eel River-specific themes of the interviewee's responses beyond the questions I had prepared in advance in my question guide. Most often, however, I was able to select follow up questions from the guide. The guide contained more questions than I could ask an interviewee in two hour-length interviews. I designed this so that I would never be left scrounging for a question and, thus, wasting either the interviewee's time or precious minutes of the hour.

After an interview, and if the interviewee had formally consented to me audio recording the interview, I transcribed the interview. If the interviewee did not consent to be audio recorded, I retained my interview notes. As soon as possible after an interview, I reviewed my notes and—particularly with audio recorded interviews—listened back through sections where the interviewee’s responses had particularly piqued my attention.⁷⁶

To analyze the interview data, I generally followed the interpretative model discussed Ragin and Amoroso and the issue-focused analysis suggested by Weiss.⁷⁷ However, I was never interested in or attempted to give my interviewees voices. Voices they already had.⁷⁸ Analysis involved reading the interviews thoroughly one time through without coding. Then, upon re-reading, I read with my study-specific themes in mind. I used color-coded highlighting in Microsoft Word to identify and mark words, phrases, or discussions relevant to study-pertinent themes. This assisted me to track these themes’ development both within any given interview as well as across interviews of different interviewees.

1.5 *Méthodos* (μέθοδος) – To which I belong, faringly

My method is not that which belongs to me. The method I follow is not mine at all. It is not *my* method at all, nor is it originated, made, or implemented by *me* or any other human being existing in the world. My method is *mine* insofar as I belong to the method. At my best—and I am often not at my best—I give myself with attentive, purposeful awareness over to the method as lawfully and responsibly as I am able. I do so with trust and faith. Without trust and faith, I could not do so with attentive, purposeful awareness of the method at all. Trusting and being faithful is a daily practice—a practice I open and unfold correspondingly as I move along the way opening and unfolding ahead of me, holding me, guiding me, sheltering me in belonging. The moving of which I write is not exclusive of, but is not nearly exhausted by, actively moving and being moved as we understand these in advance contemporarily. The practice of which I write, which *is* my practice, is far from exemplary.

A method is a way to which a human being is given as and upon coming into the world. Each human being given to birth into the world is given to, gathered to, and sheltered in and upon a method. This giving does not demand, much less require, that the human being born into the world be aware of the method beyond what is given lawfully *in* sense and sensibility, *as* sense and sensibility, *to* methodological understanding in advance.

To give oneself to the method to which one belongs and corresponds requires more of us than being given to birth into and, thus, coming to be existing in the world. To give oneself to the method to which one belongs is different. To give oneself to the method to which one belongs requires the utmost trust and, in trust, the practice of faith. Such trust need not be consistently perfect or pure. It must, however, and must ultimately, *trust* with all one’s being.

To give oneself to a method is not, and cannot be, willful. To give oneself to a method with *awareness*, *attention*, and *purpose* requires—*first*—letting the will be, and with and in practice, letting the will be at rest. Awareness, attention, and purpose corresponding to the method *come to* one as the will is let be. As one gives oneself to the method to which he or she belongs, one is given in corresponding to being aware, being attentive, and being purposeful to and along the way of the method. As with the method, this being aware, being attentive, and being purposeful require fully, gather warmly, and safe keep welcomingly oneself as one comes to be existing in the world. They are not, however, *of* or *by* oneself in any essential sense. These, too, are *gifts* being given.

Method speaks of *méthodos* (μέθοδος).⁷⁹ *Méthodos*, in turn, tells of *meta-* (μετα-) and *hodós* (ὁδός). *Meta-* gathers and speaks the senses of *with, in the midst of, among, during, in pursuit of, according to*.⁸⁰ *Hodós* says *way, path, road, a journeying, a travelling, a voyaging*.⁸¹ *Hodós* also gathers and speaks the sense of *threshold*.⁸² To proceed across the threshold and, from then and there, along or upon the way is to come forth from being concealed and, thus, to be standing present. Standing presencingly, then and there, to proceed is to go along or move along the way opening unfolding ahead of one—again including but not nearly exhausted by moving, mobilizing, or motivating as we are given to understand these contemporarily.⁸³ To proceed along a way, whether with awareness or not, is be given over to and, thus, to be ceded to that which gathers, shelters, and governs one in opening the way ahead of one in and through the world.⁸⁴ Human being in the world *fares* the way to which he or she is given, belongs, and in which he or she safely and sensibly abides. Insofar as human being in the world experiences at all, human being in the world is, as we must, *first* be already faring the way of the method to which we belong.

Any particular procedure is of and for proceeding the way of this method, whether or not one is, in any essential sense, aware of, attentive to, and purposefully so proceeding. *Method*, and its corresponding proceedings, includes but is not essentially, nor nearly exhausted by, *technique* and that to which technique, as technique, belongs, is governed by, and serves.

How do I proceed?

The questions to which I respond are not my own. They are not proper to me. Rather, I am proper to them. I belong to the questions. In the world, I am of and in *their* owning. The questions to which I begin to respond in this dissertation are not, then, *my* questions at all. These questions come to presence before me as I am faring along the way in the world to which I am given and to which I belong. They do so *of themselves*. If they do so at all, when, where, and how they do so is not, and cannot be, of my choosing, my doing, my making, or my willing whatsoever. Often I have found, and continue to find, that I have been faring upon the opening way of such a question before I become fully aware of its guiding call *as a question at all*. The questions of which I write, and to which I respond, are essential *questions*. They are not problems or puzzles to which correspond solving, resolving, dissolving, or otherwise fixing.

To respond requires, nonetheless, that I am being-aware, being-attentive to, and being purposeful both to the way and to my proceeding along it. In responding to the questions with awareness, attentiveness, and purpose, I am corresponding to *them*, in practice, as lawfully as I am able. In responding, I give myself back in thinking, faithfully and trustingly, to the questions. Thinking lawfully, as called for by the questions themselves, I give thanks, I am thanking. What am I thanking? I am thanking that toward which, and for which, and of which I am not only thinking, but faring along the way to which I am given through the world.

In responding, then, I am pouring myself, faithfully and trustingly, out towards that which comes to sense from ahead of me in meeting. In responding, I am pouring myself out towards and lawfully for the giving source. The giving-source gives not only the questions themselves that they may call us or come to presence before us; the giving source gives not only the way openingly unfolding in sense ahead of us through the world; the giving source gives law, the world itself, and our very birthing into and being existingly in the world. To respond, I neither pose nor lay down requests, pleas, solicitations, or entreaties—including for ground, traction, or knowledge of the way that comes to meet me, opening before me from ahead of me as I am existing *here* and *now*. To respond, after all, is to practice. It is not to act.

Practice begins in earnest when we begin, thoughtfully and thankfully, to let the will be. Let be, the will begins, as it may, to come to rest. We let the will be with genuine appreciation and thankfulness, and with love, of and for what the will is, as it is, and for why and how it is given to us as we exist in the world and for our faring along the way of existing. Even when the will rests, we give thanks for the gift that is our capacity, faculty, and capability to *thoughtfully* will in the world. To let the will be, and to let the will come to rest, is not to will not to will. The latter—to will not to will—would be to act. The former—to let be—is to practice.

To be sure, it is not necessary that human beings in the world hear, much less again listen, much less again respond to such questions with awareness, attention, or purpose. Nevertheless, such questions always call us. And such questions, as essential questions, are always already answered for us in the understanding in advance to which we are given sensibly, and in which we are, at least in the beginning of our existing, carried in and through the world. We begin responding, and can only begin responding to the call of these questions, when the answers given for us themselves become questionable, and thus no longer understood, as we are given to understanding, in advance.

In this dissertation, I respond to the questions that have come, and continue to come and remain, before me. In so doing, I offer my human voice to them—to *their* gathering and guiding call and to *their* saying and speaking. In so doing, I give my human voice to them—to *their* gathering and guiding call and to *their* saying and speaking. Through writing, I offer and give a re-presentation of my human voice, once again, to the gathering and guiding call and the saying and speaking of the questions *themselves*. To offer my voice and thus pour out my voice in this way is to lawfully disclose for our human communing in sense—with human voicing, through and in language—the questions, their call, and their speaking and saying. I offer my voice to disclose only insofar as the questions themselves have already come openingly to presencing and, thus, have already disclosed *themselves*. They give themselves over to further disclosure. At their asking as I come before them, and as far as I am capable with the voice that I have been given, I speak and write disclosingly and as lawfully, in faithful correspondence, as I am able. I do speak and write, of course. Yet the possibility of giving voice to such questions, again, is not *of or by*—whatsoever—my choosing, my doing, my making, or my willing. The capacity to give voice humanly belongs to language, as being of and from language as we are given to abide in language. This is, however, incomprehensibly far from exhausting what language is, of what it speaks, and whence it comes.

As I proceed along the way to which I have been given and to which I belong, what is essential is that I listen to the call of the questions that come to presence before me, that I give myself over lawfully to these questions and the way their opening guidance, that I respond to these questions thoughtfully and thankfully, and that, above all else, I fare along the way with trust and faith. In other words, the questions call *me* to listen and to respond to *them*. To do so, I must give myself over to the *questions* as *essential* questions. Responding *is* the way to which I belong and along which I journey. Responding is an ongoing practice. The quiet, opening, listening; the lawfully, respondingly thinking and thanking—that is, the pouring out of myself, in trust and in faith, for and toward the giving of what comes to existing and is existing, in obligation to the way giving itself to me openingly ahead of time—*this* practice is imperfectly my practice. This practice, as governed and guided by the way and the call of questions, does not merely, in turn, govern and guide me. This practice *must* govern and guide me, and above all else, my acts—*if*, and if called for at all, then the when, the where, and the how I act appropriately—that is, the when, where, and how I act *as proper to*, because always already

belonging to, the way and the thinking and thanking correspondence of the practice of faring along this way always and everywhere governing and guiding any and all of my acts.

Along this way, what is *never* essential and, indeed, what is most often not even important, is to attend to *who* says what in lawful response to the call and claim of essential questions.' Much, much less important—or rather, not at all important—is the various and multiple *who* that are saying what *about* the *who* that says what in response to the question's call *itself*. *What* is essential, and of the *utmost* importance; what is *obligatory*, regardless of whether or not one decides to respond, is the *questions themselves*. Unless one listens and decides to give oneself correspondingly to the questions *themselves*, and in this way taking the questions' call and opening up into thinking and thanking *as their own*, one remains immeasurably distant from what is essential to my practice—however imperfect it undoubtedly is—and to what comes before *us* in this dissertation.

This dissertation, and all that has brought me and prepared me to write responsibly, as responding in thinking and thankfulness to the questions that have come before me, is *only* and at every step *responding* to the questions *themselves*, as lawfully and faithfully, as thinkingly and thankfully, as I am able.

This dissertation is, and can only be, a beginning, and a beginning again, and again, and again. This dissertation is only of me and my doing in a very limited sense—in the sense of me giving myself to the questions, in thankfulness and appreciation, and to that which is the source and this giving of what and who exists, of the world, and of existing itself. This dissertation is *never* an answer or a ground. This dissertation is not, and cannot be, a grounding or the product of willful acts of grounding and such a ground's securement and defense. There is no purchase or traction to be secured, by the writer or the reader. Much less is this dissertation a claiming, a positing, an act of attempting to convince, a positioning, a framing, a framework, a perspective, an evaluating or valuating, or a worldview. It is *only*, and only *merely*, a responding—a beginning response that must begin again, and again, and again.

There is nothing to stake out! There is nothing to secure and defend! This is *much less* than what is conventionally expected—for there is little, if any, metaphysical or epistemological metaphysical knowledge and its corresponding offensive and defensive bulwarks to be found here within. Insofar as they are found, what is here in these pages has already been—not at all misunderstood, and not at all understood incorrectly—but understood from an understanding in advance that lawfully carries us, in sense and sensibility, in and through the world. There is nothing wrong or erroneous with this understanding in advance; it is not lacking or faulty; it is not false or incorrect; it is not untrue. There is nothing—*nothing*—that needs to be solved, or resolved, managed, monitored, or otherwise fixed in or about an essential understanding in advance. Such an understanding in advance is *itself* a gift being given that helps disclose the world and our being in it, gather us there and then, here and now, and orient us upon our way in the world. Such an understanding in advance is not, and indeed cannot be, overcome; overthrown; rejected; opposed; or otherwise acted upon or against and reacted to or against, and thus interacted with or metaphysically related to.⁸⁵ Such an understanding in advance *can*, and often does for many if not all of us, continue throughout our lives to gather, orient, and carry us from ahead of time and, thus, remain *in advance*—though not necessarily without the possibility of *our* coming to notice, be aware of, attend to, question gently but honestly, and befriend it as what it is. If we befriend it, we let it be as and what it is, and ourselves as belonging to it. In letting it be, we may, *perhaps*, be freed—though never by *our* willing or acting—of it as *in advance*, and thus, come to not only to sense it here and now, there and then, and think beyond it

in practice lawfully, but also to understand it no longer in advance, but here and now *as we are* in our being in the world. We belong to our understanding in advance; it holds us, gently but firmly, and carries us into and through the world. In this, it is a gift to us and for us as we are existing, that is, as we are being in the world.

Such an understanding in advance is one to which each of us is, without exception, destined and given to in the world, one into and with which we are gathered in the world, and one which *can* destiny us throughout the world. Whether or not it does so, however, *does* depend in degrees upon *us*. Such an understanding in advance does not, and cannot, *determine* the ways we walk or how we travel the ways we do. To destiny is *of* and *about* existing and gives a beginning place and time to the *purpose* with which exist. To destiny is to give and, in giving, to gently send one to standing up and out into presencing in the world, in the world lawfully opened and revealed as *the* world. In coming to exist, we are always already gathered, held, and sheltered; and we always already belong *here, now*, as we are given to be existing—that is, as we are in the world. We *are* bound to begin and, thus, limited to begin where and when we begin in the world. Never- and nonetheless, once standing out in the world, as we are, we proceed to walk forth from where and when we begin. We are *given* to so journey, to *fare* along the ways of the world. *This* is our destiny, a destining that is *never* a determining. We walk forth, then, as we must, upon the ways opening ahead of our time and place, here and now, or there and then, and, thus, that open ahead of our being-existing along these ways in and through the world, from out of the horizon of dawn toward that of dusk.

Of course, I do not—nor could I if I cared to—*forcefully* determine (or simply, determine) *how* one reads or understands or forcefully *make* (or simply, *make*) one read or understand in one manner or another. But if the questions *themselves* are not taken up responsibly as one's own, the writer and the reader remain only distant from what comes and what guides what is written in this dissertation's pages: the questions themselves, and, thus, that which *gives* the questions to being in the world and, therefrom, to come before *us* in their presencing along our ways through the world.

I am not what is *essential* here. Nor is the fact or form of my writing and the faults and foibles of style, even while these can detract or even detour in interpretation from what I write. What is essential, and thus essentially important, is whether or not what I respond is truthful—that is, whether or not what I respond is *of truth* and thus belongs *to truth*, lawfully and faithfully, and thereby whether or not I respond to the questions lawfully and truthfully. Whether or not one agrees or disagrees, in judgement, with what I respond comes from—as guided and governed by—the practice of responding to the questions *themselves*.

Chapter 2 Looking for (what) the ecology of the Eel River (does)

Many a book has borne the title "Theory of Machines", but it usually contains information about mechanical things, about levers and cogs. Cybernetics, too, is a "theory of machines", but it treats, not things but ways of behaving. It does not ask "what is this thing?" but "what does it do?" Thus it is very interested in such a statement as "this variable is undergoing a simple harmonic oscillation", and is much less concerned with whether the variable is the position of a point on a wheel, or a potential in an electric circuit. It is thus essentially functional and behaviouristic.

-W. Ross Ashby, *An Introduction to Cybernetics*

2.1 Research

I wrote this chapter with the understanding of what ecology is that I outlined in the first chapter. As I wrote then, I was just beginning to become sensitive to and aware of the question *What is x?* as a question worthy of response. Herein, I analyze archival documents from a number of state and federal agencies whose engineers, scientists, technicians, planners, and managers surveyed, researched, evaluated, examined, and, in three cases, built infrastructures into the Eel River (Scott Dam, Cape Horn Dam and diversion tunnel, and Benbow Dam). I also analyze any formal scientific-epistemological research undertaken on the river or its basin through 1980 that culminated in a published document. From this array of documents, I attempt to discern what the ecology of the Eel River has done during the twentieth century; how ecology has functioned such that it has done and achieved what it has in my research system; what ecology has been utilized to achieve in this system, who has utilized it, and why; how the Eel River has been rendered as ecology or as ecological; how ecology and ecologists have ecologically constituted or otherwise ecologically made the river and its surrounding environment; and when and where any or all of this occurred. I search for when, where, and how ecology came to prevail over the Eel River and its basin *as* the ecology of the Eel River and, thus, *as* the ecological food webs of the Eel River. With one noteworthy exception in the late 1920s and 1930s, I find that it was not until around 1959 that any formally-trained, academically-credentialed, scientific-epistemological research biologist or ecologist arrived to the Eel River basin. This early series of studies, for which a first report was published in 1959, focused on the redwood trees along the South Fork of the Eel River. Nearly 30 years would pass before another formal academic ecological research program was set up and consistently sustained to study the Eel River and its basin.

Before beginning the research for this chapter, I had already begun responding to the questions *What is the ecological food web of the Eel River?*, and thus *What is the ecology of the Eel River?*, and, therefore, *What is ecology?* I understood that the ecology of the Eel River would be scientifically-empirically observable. What I needed to do was scour archival documents to find its arrival to the river's basin, where it arrived, when it arrived, how and, perhaps, why it arrived. I understood that what I needed to search for was evidence of what work the ecology of the Eel River was doing, how it was doing this, who was utilizing it, with what power and expertise, for whose end-goals, and disempowering or even exploiting or harming who and what as means to these objectives in the service of which the technical apparatus of ecological government functioned valuably. The more I read and analyzed, however, the more difficulty I had distinguishing—beyond empirical superficialities, or the facades of the phenomenological dynamic, complex structures and patterns I scientifically-epistemologically encountered—*what* the difference *was* between ecology, as I understood it at the time—and the engineering, political economic, demographic, natural resource policy, and

natural resource management surveys, studies, evaluations and assessments, propositions, and plans that I was reading.

As I began the research, I was still largely under the spell of the understanding that to slow, stop, rest, and openingly and thoughtfully attend to the question, *What is ecology?*, was still, at best, useless. Responding to such a question offered very little of value or purchase (on the material ground, for example; or, at least, on conscious experience) to my social scientific research project. Further along the spectrum, genuinely responding to the question *What is x?* was an act—*my* act, by the power of my will, even if my will and my act were underdetermined but thoroughly driven by my contextually specific existing. Responding to this question, as well as the logic and reasoning *inherent* in responding, would constitute an act of complicity in the problem itself, a problem *tout court*, not relative or historically and geographically specific to my frame of reference and situatedly enframed perspective; an act of complicity in the larger, beyond-individual activity of reproducing and reconstituting the problem, its logic, its reason, its material instantiations and activations, and its power and force; an act of complicity, too, in the activity of projecting the imperial claim of the problem upon the future of all—human, post-human, and other than human alike—that had the misfortune of suffering the real logical, conceptual, and material consequences, i.e. effects, of my act. The world has already suffered more than enough epistemological god-tricks.

And yet, if I was to ask *What work does it do in the world?*, for example, should I be able to say or write or think, however tentatively, what this *it* is? Otherwise, scientific-epistemological empirical research is impossible. Asking *How?* is asking *how it functions, works, produces, constitutes, et al.* The question *What is x?* has already been answered, if only in advance. *It* is, at least, an *it*—*a* being-presencing or *a* being-existing in the world—in the world as we are given to the world's senses and the ways of understanding these senses lawfully open before us and to which they gather us. The same can be said for the question, *Why?*

As I researched this chapter, the charged spell of inutility and problematic complicity of the question *What is x?* slowly began to let me go *as I began to let go*, including letting go of *what* I knew I understood.

2.2 Looking for the ecology of the Eel River, 1900 – 1960

California was the 31st state to be legally delineated, codified, and, in 1850, admitted to the United States. Unitedstatesians and other immigrants to the United States have increasingly lived in and used the Eel River of northern California and its basin since at least the 1870s.⁸⁶ In the two decades prior 1870, gold miners and, subsequently, homesteaders migrated into the basin, especially toward the lower (i.e. northern most) reaches of the Eel River and the river's estuary into the Pacific Ocean. This estuary lies immediately northwest of the city of Ferndale. Redwood timber quickly came to rival gold during this period as the primary extractable resource. Early homesteaders would continue to arrive, settle, and claim lands across the basin as late as the first years of the 1900s. As early as the 1850s, a salmon canning industry was burgeoning on the lower Eel and its estuary. By the 1870s, the early developments of what would become a century-long saga of basin-wide logging and its related timber industries were well underway.⁸⁷ Beginning in 1884, the Eel River and Eureka Railroad transported salted and canned fish, lumber, and conserved dairy (butter and casein, principally) to Humboldt Bay for export by ship to San Francisco markets, or further afield.⁸⁸ Salmon from the region was shipped to markets as far away as New York and Australia.⁸⁹ The period between 1865 and 1904 was

also one of intensive ranching, grazing, and overgrazing.⁹⁰ Herds in some parts of the Eel River Basin are estimated to have been much larger than those of today. While ranching was concentrated towards the lower Eel River and its estuary, large herds of sheep and cattle could be found as far upstream as the North Fork Eel River.⁹¹ At one point during this time, Fenton's Ranch along the North Fork Eel was estimated to have had as many as 30,000 sheep.⁹² In 1914 the Northwestern Pacific Railroad connected basin industries directly to San Francisco and the national railroad network.⁹³ By the early 1900s the industrial fisheries of the lower Eel River had begun a rapid decline due to overexploitation and the siltation of river and tributary stream beds from erosion of the basin's logged hillsides and canyons.⁹⁴ The wanton devastation of salmon and steelhead fisheries led to a banning of commercial fishing on the river in 1926, at which time the industry transferred to the Pacific Ocean.⁹⁵ Industrial logging continued in widening swaths to provide lumber as a primary regional export from the basin, and continues as such today with increasing awareness of its harmful consequences for the river.⁹⁶

With Euro-American settlement, land and water use, land claims, and private enterprises also came increasing municipal, state, and federal attention. Water resource engineers in the San Francisco Bay area, for instance, had the Eel River in their sites from as early as 1900.⁹⁷ In 1905, for instance, W.W. Van Arsdale of San Francisco began the project that is today known as the Potter Valley Project and continues in operation.⁹⁸ He envisioned the project providing the city of Ukiah and surrounding areas with electricity and Potter Valley on the East Russian River with diverted Eel River water for agricultural irrigation. Van Arsdale formed the Eel River Power and Irrigation Company to construct what would be named the Cape Horn Dam, functional by 1908. In 1906 the Eel River Power and Irrigation Company was reorganized as the Snow Mountain Water and Power Company. In 1908 plans were studied for building a second, larger dam up river. The dam would store water in a reservoir with which to augment summer releases, assuring thereby consistent power generation and water irrigation supply in Potter Valley. To these ends, the Snow Mountain Water and Power Company began construction on the Scott Dam in 1920, forming Lake Pillsbury twelve miles upstream from the Van Arsdale Reservoir.⁹⁹ Also during the 1920s, the city of Oakland gave serious consideration to bringing Eel River water to its taps. Though bringing the Eel's water at least 150 miles south seemed even then entirely within the scope of technical possibilities, it didn't happen. There were other options, like flooding Hetch Hetchy Valley.¹⁰⁰

Eel River-specific U.S. federal resource accounting, evaluation, and planning dates from the 1880s, if not earlier. In 1889, the United States Army Corps of Engineers (USACE) submitted the report "Proposal to Improve the Eel River Entrance for Navigation" to the first session of the 51st United States Congress.¹⁰¹ From this time until the Flood Control Act of 1936, the USACE periodically sent its officers north from its San Francisco District Office to pursue its reconnaissance of the lower Eel River and its estuary. A second visit occurred in 1909 for purposes of assessing the physical and financial feasibility of, as the reports says, improving the river's estuary and lower reaches for national and international shipping. Thus, in compliance with a clause of the River and Harbor Act of March 3, 1909, John Biddle, Lieutenant Colonel of the USACE, oversaw topographic and hydrographic surveys of the region from the lower Eel River at its estuary to Humboldt Bay, and production of the corresponding maps.¹⁰² His report to the House of Representatives includes a statistical survey of the economy of southern Humboldt County with a focus on the character and quantity of exports, imports, and their monetary values. The impetus of the U.S. House of Representative's concern appears to have been the difficulty experienced by the local and regional enterprises along the Eel River of

transporting their products north to port in Eureka, and only then being able to ship them out to markets in San Francisco, nationally, or internationally. The sheer, almost inconceivable magnitude of the estimated quantity of timber resources (in board feet, etc.) pouring out of the basin, as documented in Biddle's report, surely served to attract further federal attention spurred by the U.S. House of Representatives. Even so, at this time the costs of construction and maintenance of the proposed intercoastal waterway was not deemed warrantable in light of the state of development of these same industries.

In 1916, authorized by an updated Congressional River and Harbor Act of the same year, the USACE returned to the river for further examination and evaluation.¹⁰³ At this time, like its prior visit, federal interest was in the physical and financial feasibility of improving the river so as to open it for shipping from its mouth at the Pacific Ocean thirteen miles upstream to the confluence of the Van Duzen River. The local Eel River Protective Association urged their Congressmen to insert an authorization for a new USACE study into the River and Harbor Act. As before, the report is largely technical, involving depth and distance measurements, physical descriptions of the river, and geographic description of surrounding lands and land-use. The magnitudes of local agriculture, industry, and other commerce receives special attention, in measures of weight and dollars. Railroad freight costs per pound of cargo are also assessed. In short, after a review of these criteria, the acting engineer for the USACE submits an unfavorable report, judging there to be "no questions of water power, terminal facilities, or other related subjects that can be coordinated with any method of improvement for navigation...the Eel River, Cal. is not worthy of improvement by the United States at the present time." Notable is the merely peripheral interest in hydropower generation, and even more minor consideration of flood control and river bank preservation.

By 1933, the peripheral status of these two considerations had shifted poles. So too had the degree and scope of the USACE's reconnaissance.¹⁰⁴ The River and Harbor Act of January 21, 1927, provided the authority and justification for these changes, calling for "examinations, surveys, and other investigations of those navigable streams of the United States and their tributaries whereupon power development appears feasible and practicable."¹⁰⁵ The act couples projects of improvement of streams and rivers for commercial navigation with feasibility studies for hydroelectric power, flood control, and irrigation projects. In the intervening years between 1927 and 1933 – the year when the USACE submitted their latest report on the Eel River to the U.S. House of Representatives' Committee on Rivers and Harbors – they had achieved extending their technical gaze and future projections over the totality of the Eel River Basin. Submitted by the USACE to Congress in 1933, this report marks the first time the Eel River and its basin in its entirety, now as a regional unit, received both thorough state and federal technical scrutiny and evaluation.

The Eel River Basin, considered rich in resources, was officially a resource unit, legible from its southern to its northern reaches. In the report, the USACE comprehensively gathers and compiles data on the Eel River that had previously been scattered between private enterprises and state and federal agencies: rainfall and temperature data from the U.S. Weather Bureau; rainfall records from the Northwestern Pacific Railroad Company; run-off records and geological surveys from the U.S. Geological Survey; water supply measurements from the East Bay Municipal Utility District; rainfall data, stream-flow measurements, water supply studies, and possible dams sites from the California Bureau of Public Works; soil surveys from the USDA; demographical data from the 1930 United States national census; numbers of population, resources, and income from the California Chamber of Commerce; evaporation studies from the

U.S. Bureau of Reclamation; lumber companies' reports and statistics; Federal Power Commission reports; maps from the US Forest Service; and so on. By 1933, the USACE could propose thirteen dam sites and a handful of water transport tunnels for further feasibility studies – even while concluding that if coupled to navigation, no projects for hydroelectric power generation, flood control, or irrigation supply could be justified financially or economically as federal projects. These dam sites were dispersed over the entire river basin, bringing each of the Eel's three forks and its main stem into realm of technical state and federal intervention, including scientific and engineering examination and evaluation.

Congressional passage of the Flood Control Act of 1936 officially recognized the USACE as the federal agency charged with flood control nationally.¹⁰⁶ This act immediately authorized the USACE to conduct a new survey of the Eel River and the Mad River in Humboldt County, including the Eel's delta with the Pacific Ocean. By 5 August 1939 they had a green light from the Committee on Flood Control of the U.S. House of Representatives to perform a review survey of the Eel River in Mendocino County, thus expanding the survey comprehensively, spanning the river from its northernmost departure into the Pacific to its southernmost reaches in Mendocino County.¹⁰⁷ A large flood in the winter of early 1940 provided sufficient impetus for the Chief of Engineers to move forward quickly on the Committee's approval, implementing the survey of the entire Eel River Basin.¹⁰⁸ These new authorizations from Congress are significant, though they seem at first to alter little in the manner the USACE began to ratchet up the intensity of its attention and activities on the Eel River after 1927. The authorization allowed the USACE to decouple justifications for river control and water storage projects from navigational concerns and water supply for irrigation. The new mandate of the Flood Control Act also implicitly distinguished the USACE from its federal rival, the Bureau of Reclamation of the U.S. Department of the Interior. The two agencies' responsibilities, and the character of their justifications for federal appropriations to fund freshwater ways improvement and development projects, were divided: put simply, the USACE's justification and appropriation territory for rivers and streams was flood control and water storage for this end, while the Bureau's was water supply and irrigation, as well as water storage for these uses. Both agencies could propose, plan, and conduct hydroelectric projects in connection with their respective mandates. Likewise, both agencies would cite their water projects as providing key public recreation opportunities. Yet, despite the 1940 flood and its new federal mandate, the USACE could not conceive of a project on the Eel River, whether levees in the northern delta region or dams further upstream, whose costs could be justified in Congress.¹⁰⁹ This would change in the 1950s.

The Bureau of Reclamation (the Bureau), like the USACE, was no stranger to California. Both agencies, for example, played key early roles in the design, construction, and management of the Central Valley Project (CVP). The USACE first proposed a comprehensive plan for the Central Valley in a report of 1873 on irrigation in the San Joaquin Valley, Sacramento Valley, and Tulare Basin.¹¹⁰ The Bureau was founded in 1902 with the passage of the Reclamation Act. At the time, irrigation projects across the west were called "reclamation projects," with the understanding that irrigation would allow the reclamation of lands for human use.¹¹¹ Unlike the USACE, the Bureau's sole area of operations were the seventeen states west of and including North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas.¹¹² California, and interstate water to be supplied to California, was pivotal project and appropriations territory for the Bureau. The River and Harbors Act of 1935 directed the takeover of the CVP by the federal government from the state of California. Under federal direction, the USACE received

authorization for construction of the initial features of the project. With Congressional reauthorization of the River and Harbors Act of 1937, however, the authorization shifted, and the Bureau gained what would become one of the jewels of its crown: construction and operation of the CVP.¹¹³ Yet, despite the Bureau's entrenched involvement from 1902 forward in California water supply, agricultural irrigation, hydroelectricity production, and water politics, no evidence of interest from the Bureau in the Eel River appears until the early 1950s. This may be due to the relatively minor economic and commercial status of agricultural concerns across the Eel River Basin and the lack of demand for irrigation.¹¹⁴ Historically, as today, agricultural areas in the basin are few, disbursed widely in patches of relatively small areas, with the two largest being the Eel River Valley and Round Valley. With ample annual precipitation in the Eel River Valley, and cattle and dairying as the primary agricultural enterprises, there was little need for irrigation development and regulation. The was also true of Round Valley, where agriculturalists principally dedicated themselves to beef cattle, dairying, and cattle feed production.¹¹⁵

In January of 1951, the Bureau issued a report, "United Western Investigation Interim Report on Reconnaissance – California Section."¹¹⁶ In this report, the Bureau appears to give documented attention to the Eel River Basin for the first time. The report envisions the "long distance transportation of water from north to south across the western United States...to serve the needs of the swelling populations in the arid Southwest by moving water otherwise destined to remain surplus and to waste into the ocean."¹¹⁷ As photographs in the report evidence, a significant portion of the Bureau's vision entailed channeling irrigation waters so as to turn arid scrub lands to blossoming agricultural fields. The Eel River finds its place in this report as one of six northern California rivers that could supply water to southern regions of the state; the largest after the Klamath, it appears exemplary in its "surplus" waters and their "waste into the ocean." The river is conceived as a supplier within a general plan, the Northern California Diversion. In conjunction with a 500-foot dam and a 43.5 mile tunnel near the confluence of the main stem and the North Fork Eel, an "exportable annual yield" of the river's waters could be stored and diverted to the Sacramento River, and thus southward toward the Sacramento-San Joaquin Delta, and from there to the Central Valley.

Following on the heels of the 1951 report, the Bureau began investigations in 1952 of the natural resources of northwestern California, extending from the state's border with Oregon south to the Russian River. These investigations focused on water resources. By 1956, the Bureau had issued a progress report of their investigations with the final, comprehensive report of the study was scheduled for publication in 1960.¹¹⁸ The character and scope of this progress report is reminiscent of that of the USACE's 1933 report to Congress, yet its technical detail and the comprehensiveness of its reconnaissance far surpass that of the USACE's twenty years prior. The Bureau describes the region as "a rugged undeveloped area offering a wealth of economic and recreational opportunity in its natural resources."¹¹⁹ By the end of fiscal year 1956, the USGS had published up-to-date maps covering 46 percent of the northwestern region under study. Maps, as "essential to an inventory of land resources" for the agency, would cover 95 percent of the region within two years.¹²⁰ Review of the table of contents suffices to reveal the vast sweep of the Bureau's investigatory activities: climate records; physical features; general economy and principal industries; population demographics; transportation; soils and rural and urban land-uses; land classifications; topography; public and private domains; surface water dynamics and records (precipitation, run-off, annual water loss, etc.); ground water; water quality and chemical composition; suspended sediment measures; geology; mineral commodities and mineral industries; forest areas and timber reserves; timber harvests past, present, and projected;

fish and wildlife resources; recreation resources; “Indians and Their Resources,” including lands, agriculture, and economic conditions; and so on. In the Bureau’s estimation, these resources made northwestern California a “vital factor in the State’s future growth.”¹²¹ The scope of the investigation, the knowledge amassed, the incisiveness of the Bureau’s gaze, and the resulting federal legibility of the entire northwestern region opens it, its resources, its economy, and its populations, human or otherwise, to future Bureau of Reclamation interventions in the region’s rivers, streams, and terrestrial environments. In a way, the report itself, and the reasoning and correlate activity the report represents, sets up and disposes the region as municipal, county, state, and federal environmental and human resources; as local and regional economy; as examinable, evaluable, analyzable, and conductible both in the detail of its individual specificities and particularities as well as in the normality and pathology of its populational activities and trends; and as knowable, as orderable, and, thus, as governable.¹²² The purpose, as stated, was the growth and health of the state of California and its population, which was understood to extend indeterminably, encompassing all areas treated in the report.

State agencies of California, too, conducted their own reconnaissance of the Eel River and its resources with increasing scope and intensity during the first third of the twentieth century. These agencies’ goals included, broadly, the evaluation, codification, accounting, planning, regulating, and management of resources, resource utilization (including conservation and recreation), and this utilization’s correlate environmental and economic activities. An exemplary case dates from the 1930s. During the middle and late years of the decade, Leo Shapovalov of Stanford University led an intensive survey of the Eel River and its game fishes on behalf of the State of California Division of Fish and Game. He formally reported his findings to the state legislature in 1938, and the reports were published in 1939 along with the proceedings of the corresponding legislative session. The purpose of Shapovalov’s studies, and of his formal report, was to provide the legislature and the appropriate state bureaucracies baseline, expert knowledge with which to fashion a natural resources management program for the Eel River watershed. His surveys and studies focused especially on the river’s game fish, salmon and steelhead, and the effects of siltation from logging, grazing, and road building on their migration patterns, spawning rates and locations, and survival. In light of his findings, he also lays out a suggested program of game fish rescue, hatchery development, fisheries management and regulation, and stream bed improvement work for the Eel River Basin.

Notably, Shapovalov recognizes and names most of the environmental problems related to the Eel River that have since become canonical, yet almost a century later remain contentious, unsolved, and intensively researched by scientists in the private, state, non-profit, and university sectors: over fishing, dams and diversions blocking fish passage and altering the river channel upstream and down, agricultural and industrial pollution, dewatering during periods crucial for the survival and reproduction of game fish, and massive siltation of the river channel and its tributaries resulting from erosion of the exhaustively logged and often steep hillsides and canyons of the Eel River Basin, and so on. Shapovalov studied the river and its tributary streams taxonomically, biologically, and economically. He understood the river and its tributaries to be producers. Their product, along with fresh water, is game fish and other undesirable fish, called “rough fish.” His surveys took stock, as he writes, of the inventory of game fish, their migratory numbers, and egg clutches. He emphasized the importance of quantitative data, direct observation, and facts over qualitative data and interpretation for purposes of rational management. He regretted expressly that—because of the lack of prior survey inventories and the adequate personnel and time for his own studies—he has had to recur to the recollections of

“old residents” to judge declines or increases in fish numbers. Shapovalov pursues what Robert Kohler calls scientific natural history, a natural history whose scientific rigor is evaluated by the extent of the quantification of its study objects: taking topographical and demographical surveys; counting individual specimens of targeted species; aggregating numbers into populations; and classifying, documenting, and describing habitat types, their constituent species populations, their conditions, and evidence of the measurable extent of their alteration or degradation.¹²³ As Kohler explains, scientific natural history is a necessarily part of but distinct from the science of ecology. Scientific ecologists, Kohler understands, in addition to their scientific natural historical activities, began to distinguish themselves in the early 1900s from mere scientific natural historians through their utilization of methodologically sequential scientific hypothesis positing, hypothesis testing by means of manipulation or controlled experimentation, and the subsequent formulation of explanations for experimental outcomes. Distinctly, scientific natural historians did not undertake methodologically-governed hypothesis positing, testing, and the explanation of experimental results. Nonetheless, Shapovalov’s scientific natural historical labors helped make the Eel River, its species populations, and its terrestrial surrounds legible, increasingly predictable, and quantitatively knowable to federal and state bureaucrats (including engineers) and representatives.

From the early 1950s through the 1970s, a veritable spate of federal and state reports appeared dealing with the Eel River, its three forks (South, Middle, and North), and the future of the basin’s water-resource development. With the exception of the Porter Valley Project and of the USACE’s ongoing evaluations and examinations of the lower Eel River and its delta, the remoteness and the steep, rugged, and often geologically unstable topography of the basin had until this time dampened the attention of federal, state, and private parties in Sacramento, San Francisco, the Central Valley, Los Angeles, and Washington, D.C.¹²⁴ By the early 1950s, however, the California Water Plan was on the horizon. In 1956, Governor Goodwin Knight combined the Division of Water Resources, the Department of Public Works, and the State Engineer’s Office into the California Department of Water Resources. The newly formed Department of Water Resources (CDWR) published Bulletin No. 3 the following year, colloquially known as the California Water Plan (CWP).¹²⁵ The Eel River flood of 1955, the largest on record dating back to 1910, occurred just in time, with more than sufficient damage to lives and property, for the CDWR to further justify their proposal of four future dams on the Eel.¹²⁶

In July of 1958, the CDWR initiated what it called the North Coastal Area Investigation.¹²⁷ It did so under “the necessity” to “define major multipurpose projects to follow the [State Water Facilities project of the CWP], and the Central Valley Project, and to establish their logical sequence of development.”¹²⁸ The over-arching objective of this investigation was “to formulate plans for the optimum development of the water resources of the region, considering all potential uses, including anticipated local and export water supply needs; preservation and enhancement of fish and wildlife resources; development of hydroelectric power and water-associated recreation potential; and protection against floods.”¹²⁹ The date set for completion and publication of the final report of the investigation was July 1964 as CDWR Bulletin No. 136. The investigation, however, was not restricted to investigation, but also included preliminary planning and feasibility-level proposals for the extension to the North Coastal region of the California Water Plan and its facilities.

Parallel to the 1958 launch of the North Coastal Area Investigation, the California Department of Water Resources also formalized the State-Federal Interagency Group. The

members were the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, and the U.S. Soil Conservation Service (of the U.S. Department of Agriculture). the State-Federal Interagency Group's declared purpose was to minimize "duplication of effort and for achieving a more effective program for planning relative to water resources development for the North Coastal California Basins."¹³⁰ These members were to develop and maintain a "data pool" as the study progressed, with information gathered, generated, and stocked in the following fields: project formulation, hydrology, geology, designs and cost estimates of alternatives, physical features, in-basin water requirements, recreational potential, fisheries preservation and enhancement measures including flow requirements, and benefit evaluations.¹³¹ Each agency was to "draw upon this common information to make its planning evaluations within its prescribed legal framework."¹³² Hence, the agreement assigned primary functional responsibilities to each of the comprising agencies. For the Bureau, this was water supply for irrigation and hydroelectric power planning; for the USACE, flood control on the main stem Eel and its tributaries.¹³³

In 1956, to provide for the "full development and utilization of the water resources of the state," the California legislature passed Water Code section 232.¹³⁴ Section 232 authorized CDWR to investigate so as to determine the magnitude of water resources of state watersheds which could be made available for export without depriving those watersheds of the water "necessary for beneficial uses therein."¹³⁵ CDWR was requested to report back specifically on five points: (a) the boundaries of the specific watersheds of the state and the quantities of the water originating therein, (b) the quantities of water reasonably required in each watershed for ultimate beneficial use, (c) the quantities of water available for export from each watershed, if any, (d) the areas which can be served by the exported water, and (e) the present uses of water within each watershed and the apparent claims to water rights.¹³⁶ The spirit and understanding of authorization 232 and the ensuing reports is patently instrumental and utilitarian. Water is resource. The end-goals of water-resource development and utilization are growth: growth of industry, growth of economy, growth of populations, growth of the security of these, and growth of the state, understood to be and encompass all the aforementioned. The means to conduct water-resources and watersheds, or resources and populations therein, is intervention into the environment as medium for such conduct. The goal is regulation, control, and management. The means are both the individualizing and aggregative surveillance and knowledge of individuals, populations, and resources that make these possible, and the entrainment of each of the latter that, in turn, makes conducting possible. Delineation of boundaries is primary so as to ascertain origination of water. Delineation, or bounding, into systems is necessary for, and prior to, the quantification by measurement and accounting of resources, whether water, human, or otherwise. Quantification necessarily follows reduction and equalization as individual quantitative units. Quantitative units, in their formal equality ($1=1=1$, etc.), are fungible, substitutable, exchangeable, and calculable. A population is, fundamentally, the quantitative, averaged aggregate of enumerated individua.

In order to conduct the investigations mandated by section 232, the CDWR divided the state (a bounded unit) into twelve major hydrographic areas.¹³⁷ Each of these twelve areas was, in turn, subdivided into hydrographic units comprising watersheds of individual rivers. Each hydrographic unit was surveyed extensively. Correlating aerial and field observations of water diversion locations, land uses, and land classifications surveyed allowed these to be plotted using a system of annotations onto aerial photographs of a scale of about 1:20,000.¹³⁸ The data plotted onto aerial photographs was then transferred to copies of U.S. Geological Survey quadrangle

maps of a standardized scale of 1:24,000.¹³⁹ This technique was necessary to bring the delineated areas to a common scale (or unit measure) for accurate determination of acreage. Land and surface area was made synonymous and interchangeable. By means of this sequential technique, CDWR rendered the Eel River Basin as the Eel River Hydrographic Unit, a total resource evaluated and disposed as means to develop, improve, utilize, stimulate, and regulate growth.

In 1963, the CDWR published the results of their investigations in Bulletin series 94. Bulletin No. 94-8, entitled "Land and Water Use in the Eel River Hydrographic Unit," consists of three volumes. Volume one is a comprehensive report that extends over the hydrographic unit's history, economic development, natural features and climate, urban and rural land uses and land classifications, and private and public water rights. Volumes two and three consist each of 45 color-coded map plates: volume 2 of plates delineating the locations of water diversion systems and all land-uses in the unit, and volume 3 of plates delineating the taxonomic classes of land across the unit.

The Eel River Christmas Flood of 1964 galvanized state and federal agencies to, as quickly as possible, intervene in order to tame the northwestern region's rivers and streams, developing them so as to utilize their water resources.¹⁴⁰ By the USACE's own statistical calculations, the 1964 flood qualified as a 100-year flood, a flood magnitude whose likelihood of occurrence is once in 100 years.¹⁴¹ Governor Edmund Brown declared 34 counties disaster areas, though Mendocino and Humboldt counties were among the six most seriously affected.¹⁴² Vivid memories of the flood of 1955 were reinvigorated. These, together with the devastation and loss of lives again in 1964, prompted the CDWR to shift its primary emphasis. Any investigations, project proposals, or designs for water infrastructures on the Eel River Basin would prioritize flood control, as well as local water requirements and water export to the State Water Project via the Sacramento River. The CDWR crowned its six-year North Coastal Area Investigation in September 1964 with publication of the Bulletin No. 136.¹⁴³ The exhaustive, encyclopedic report, with its supplements, six appendices, and office reports, totaled well over two thousand pages, the publication of which would span the following two years.¹⁴⁴ The program of investigation of which the report was comprised "covered all aspects of development, control, and conveyance of water."¹⁴⁵ Investigators performed fieldwork and "office studies" for each of the fourteen hydrographic units of the North Coastal Area in the categories of "watershed management, hydrology and meteorology, geology, surveys and topographic mapping, land and water use, water quality, economics, property appraisal, and fisheries and recreation evaluation."¹⁴⁶ Operation studies investigated conservation yields, hydroelectric capability, flood control potential, structure design and project cost estimates, and other factors relevant to prospective dam-reservoir projects and their corresponding water export systems on rivers and streams in each of the hydrographic units. The tomes teem with written text, data charts, maps, photographs, and quantitative graphs of various types conveying outcomes of calculations and data collection.

The physical dimensions of the report alone activate a formidable force upon any person to encounter it, a force that exudes a staggering air of technical triumph and conquest chilling to any interested reader, lay or otherwise, much less a counter claimant or critic. Represented in its pages is the capacity of the California Department of Water Resources, and with it, the aligned politicians, business interests, and state bureaucrats comprising the institutional aspect of the State of California to marshal an overwhelming apparatus of varied character and vast extent: of far-reaching political influence, monetary resources, technical and scientific expertise,

calculative power, investigatory incursion and scope of reconnaissance, physical and intellectual labor, and simultaneously individualizing and aggregative surveillance of resources, their number, their use, and their users. The report – its physical dimensions, as well as its technical and scientific scope – marks the sovereignty of the state in the equivalent of a ceremonial parade, an expression of power and the legitimacy of rule. Each personnel involved in the investigations comprising the report marches in this parade, from those cloistered in cubicles of an CDWR office calculating and writing, to the U.S. Geological Survey’s placement and identificatory marking of a stream gauge, to the surveyor photographing or arriving with state-generated credentials on individuals’ properties to taxonomize land use, resources, land types, and record acreages. The report demonstrates the sovereignty of the State of California and its bureaucratic apparatus.

Upon formal completion of the North Coastal Area Investigation in July 1964, CDWR confined its efforts to two planning programs. The first program was an advanced planning investigation of what came to be called the Upper Eel River Development. Its objective was the final, feasibility-level (higher than the reconnaissance-level of Bulletin 136) formulation of a project to meet the requirements for additional facilities of the State Water Resource Development System. The second study, of intermediate intensity, was the continuation of the area-wide investigation of the remainder of the North Coastal Area, including the lower Eel River and its delta.¹⁴⁷ The Dos Rios dam and reservoir – planned for the Middle Fork Eel River three miles upstream from its confluence with the main stem – became the most important feature in the entire Upper Eel River Development, and thus in the basin.¹⁴⁸ It became and remained the guaranteed center piece common to all proposals and alternative routings investigated and proposed by the members of the Interagency Group over the subsequent decade. This emphasis shifted the USACE into position as the predominant federal agency of the State-Federal Interagency Group, over the Bureau. This shift was codified in 1966. Under the leadership of the CDWR, the Interagency Group assigned the Bureau of Reclamation primary responsibility for the functions of “irrigation water supply developed at major projects and power planning pertaining to federal power transmission and marketing, including integration into the Central Valley Project.”¹⁴⁹ The USACE was assigned primary responsibility for flood control of the main stem Eel and its tributaries. Accordingly, the basin was parceled into territories of project oversight and investigatory responsibility, each corresponding to a given agency. The Upper Eel River above the Middle Fork was assigned to the Bureau. The Upper Eel contained the English Ridge Unit, a dam and reservoir component of the Upper Eel River Development that was the primary prerogative of the Bureau and had been, formerly, a competing priority with the USACE’s Dos Rios proposal. The USACE, together with the California Department of Water Resources, was assigned the Middle Fork Eel River, and with it the jewel of the Upper Eel River Development, the Dos Rios dam and reservoir project.¹⁵⁰

Appendix C of Bulletin No. 136 was published in April of 1965, entitled “Fish and Wildlife.” The California Department of Fish and Game (CDFG) carried out the studies comprising Appendix C, as well as the writing of the report itself, in interagency agreement with CDWR.¹⁵¹ The objectives of CDFG for the studies are enlisted in the first pages of the report, and include, for example, (i) to describe and inventory the fish and wildlife resources of the hydrographic units, (ii) “to estimate minimum streamflows required at each hydrographic subunit boundary to maintain existing fish and wildlife at their historical average abundance,” (iii) to estimate enhancement flows for streams that possess potential for increased production of economically important fish and wildlife,” (iv) “to make preliminary evaluations of the effects of

possible projects on fish and wildlife.”¹⁵² Following the objectives come conclusions and recommendations, each in bullet-point form. Here the appendix differs from the numerous reports of the investigations of prior decades. In the fourth general conclusion, the authors acknowledge that “our present knowledge is far from complete, and further study will be necessary before final recommendations can be made for the protection of fish and wildlife resources of the North Coastal Area.”¹⁵³ This seems common enough for researchers to say. Yet, as one proceeds past the general conclusions to CDFG’s recommendations, the concluding sentence of the general conclusions offered takes on a different light. The recommendations are prefaced by directing the reader to Chapter XVI, the very last chapter of the report, where specific problems requiring further study are outlined. In the meantime, preliminary recommendations are advanced. These total eight short points, summarized here:

- (1) a more precise inventory of fish and wildlife resources...should be obtained,
- (2) adequate streamflow releases to support fish and wildlife below all proposed projects should be more adequately determined,
- (3) detailed water quality studies of the streams affected by the proposed developments should be initiated,
- (4) planning for suitable artificial propagation facilities to replace lost spawning and nursery areas of anadromous fish should be initiated,
- (5) fishery enhancement possibilities suggested in the report should be given further study,
- (6) comprehensive wildlife studies are needed to more accurately evaluate wildlife losses, select mitigation sites for these losses, and evaluate enhancement possibilities;
- (7) each project would destroy many miles of inland sport fishing, and
- (8) a study should be initiated to determine the feasibility of improving the fisheries of small coastal streams by construction of streamflow maintenance dams.¹⁵⁴

The sense of peculiarity redoubles: The recommendations belie the fact that, even after the studies comprising the report, very little is known about fisheries or wildlife throughout the North Coastal Area. As the authors admit, the studies’ are disproportionately confined in their focus to the project of greatest priority, Dos Rios, and the respective project’s site on the Middle Fork Eel River – a minute portion of the Eel River Basin, much less the North Coastal Area.¹⁵⁵ Furthermore, one wonders how flow suitability rates for anadromous fishes’ spawning patterns, egg survivability, and up- and down-stream migrations can be calculated when “[m]any of the streams of the North Coast have never been studied accurately to obtain accurate estimates of anadromous fish populations.”¹⁵⁶ Flow suitability rate criteria, as problematic as they are in themselves, require, ideally, both historical flow averages recorded in representative locations over the course of one or more years and studies of fish counts, spawning patterns and available spawning habitat, egg development and survivability, and migration. As the peculiarities of the report inadvertently suggest, such studies in the North Coastal Area appear to be few and far between as of 1965.

When one continues past Appendix C’s first chapter, one encounters calculation parameters and study assumptions distributed with general consistency throughout that call into question the suitability of the report of the North Coastal Area and its rivers. For example, in the “Wildlife Studies” section of Chapter II, the CDFG states that their attention during the studies “was focused on principal wildlife game species,” that “no attempts were made to estimate

wildlife and/or wildlife densities except in the proposed reservoir sites being studied,” and that “furbearers and predators will be discussed briefly...but no surveys were made to evaluate project effects on this resource.”¹⁵⁷ Or, in the “Water Requirements Studies” section, the admission that

[t]he selection of a valid method of determining streamflows necessary for maintenance or enhancement of fish and wildlife populations over a large geographical area is controlled by many factors, not the least of which is the available time within which answers much be provided. Ideally, field measurements should be made for a number of representative stations on each stream involved over a several-year period, and should cover all life history phases of the species concerned. Such a study, of course, would require much time and manpower. In the present study, both time and manpower were extremely limited.¹⁵⁸

This limitation is repeated with emphasis in Chapter XVI, the final chapter of the report, along with the general dearth of scientific and, as such, institutionally legible data on North Coastal Area fisheries and wildlife. As a consequence, “much of the information” considered and applied in estimates and calculations in CDFG’s report are “based on an extensive literature review pertaining to fish and wildlife in the North Coastal area of California,” not field studies.¹⁵⁹ The literature reviewed includes predominately the federal and state reports for the North Coastal Area and its rivers of prior years. Appendix C, “Fish and Wildlife,” evidences the general dearth of both scientific natural historical data on and scientifically-generated explanations about fish, wildlife, and their physical environmental conditions as of 1965 – all of which most ecologists today would consider of fundamentally indispensable to ecological science and ecologically informed management.

2.3 Looking for the ecology of the Eel River, 1960s

Scientifically trained, academically credentialed ecological scientists, or ecologists, may have first arrived at the Eel River between 1959 and 1965, largely unnoticed amongst the activities of the State-Federal Interagency Group and CDWR’s North Coastal Area Investigation. As Appendix C of Bulletin No. 136 corroborates, their arrival to the Eel River Basin was initially incremental and without municipal, state, or federal fanfare. The ecologists who first arrived did not scientifically research the Eel River but rather the redwood trees towering over its banks. They came from their research programs at the University of California, Berkeley, more than 220 miles away. It appears, then, that the formal, academically legible science of ecology’s first positioning along the Eel River “came from the desire of [scientifically-trained, academically credentialed] Americans [Unitedstatesians] to [scientifically-epistemologically] understand, predict, and control living processes, so as to improve the ways in which humans were moving into and adapting to new lands,” and the lands to them.¹⁶⁰ These were *new* lands only to those human beings newly immigrating in from other parts of the world—they were not new whatsoever for those human beings that had lived on, with, and from these lands already for thousands of years. These ecological scientists arrive for the first time along the Eel motivated in no small part by worry, fear, and foreboding of adverse changes pushing these trees beyond the limits of their adaptability. These motivations are noteworthy, for change, process, disturbance, balance, stability, equilibrium, non-equilibrium, new and old, native and invasive,

static and dynamic, historical or ahistorical are the keywords in many problems and perennial debates at throughout the history ecological science through the present.

In all but two of the publications comprising the final reports of the North Coastal Area Investigation, published between 1964 and 1966, the science of ecology of the North Coastal Area and, thereof, the Eel River, is not mentioned. There is one exception in the tomes of Bulletin No. 136. In Appendix A, "Watershed Management in the Eel River Basin," published in 1966, the authors speak of "recent research in redwood ecology" performed by the University of California. The research referenced by the CDWR authors in Appendix A was published in a report entitled "Redwood Ecology Project – Annual Report."¹⁶¹ While CDWR cites only the 1960 annual report, the scientists responsible published five annual reports between 1960 and 1967.¹⁶² These reports have little immediately to do with the Eel River, with one exception (mentioned below). The researchers' study sites, nonetheless, are in close proximity to the active channels of the South Fork Eel, the mainstem, and several tributary creeks. Though sites ranged over elevation gradients, many are well within the valley-confined flood plains (i.e. on the alluvial flats beyond bankfull channels) along both the South Fork Eel and the mainstem Eel River just north and south of the confluence at the Dyerville Bar. Research sites included, for example, Williams Grove, Founders Grove, Rockefeller Forest (through which runs Rockefeller Loop), and stretches along the tributary Bull Creek, all within what was then, and remains today, Humboldt Redwoods State Park. Not until 1964 do the authors discuss the initial prompt or their motivation for undertaking the Redwood Ecology Project. Historically, they say, the general consensus among park managers and the interested public was that "vegetation, when set aside for recreational use, will remain unchanged provided it is protected from fire, loggers, and the indiscriminate camper."¹⁶³ Changes were, nonetheless, taking place "in redwood plant communities," of two general categories. On one hand, unnoticed changes could occur "because [a redwood plant community] is not a climax community in the classical sense and plant succession continues to grind...onward." Or, the park manager himself "by his very acts of protection is continually modifying the natural environment" in subtle ways. On the other hand, some changes are "so striking that they cannot help but be noticed." In these cases, however, such as crown-dieback, the changes are not noticed until they are acute, and are often quickly forgotten because they too occur at relatively slow rates.¹⁶⁴ After the winter floods of 1955-56, the vegetation growing along the alluvial flats throughout the redwood corridors along the Eel and its tributaries evidenced changes that were both sudden and spectacular. Hundreds of trees were swept away, many died, and deposits of silt and gravel buried much of the herbaceous cover.¹⁶⁵ Coupled to concerns about the impact of highway construction on adjacent redwood groves, the State Division of Beaches and Parks sought the expertise of "vegetation specialists at the University of California."¹⁶⁶ Could redwoods survive "under the concurrent impact of flooding, highway development, and recreational use"?¹⁶⁷

There were four principal investigators of the Redwood Ecology Project, two professors of botany (Baker, Major) and two of forestry (Stone, Zinke). As they embarked on a project to address the Division of Beaches and Parks' question, it soon became

apparent that little of ecological significance was known about redwood. An accurate list of what plants occur in the redwood region was not available, plant communities that occur in the redwood region had not been identified, nothing was known about the environmental gradients that are important in determining species content and their

relative performance in these plant communities, and nothing was known about the physiological potential of redwood and associated species.¹⁶⁸

The redwoods were then, as they are today, a predominant tree species of the Eel River Basin, particularly at lower, wetter elevations. The difficulty encountered by these ecologists to find anything “of ecological significance” concerning the trees, including basic information informative of environmental gradients, does seem to point to the recency of the arrival of the science of ecology at the river’s banks. Given the lacunae they faced, much of these ecologists’ work during the first year of field research involved establishing scientific natural historical knowledge of the biological species present and the physiochemical characteristics of their environment. Surveys to identify plant taxa were undertaken immediately, and a “check list” of over 600 species prepared by the end of the first year. Likewise they developed a classification system for vegetational cover, consisting of ten site types arranged more or less sequentially over a decreasing moisture gradient. The scientists, to some degree, evidence awareness of the means-to-ends relation from which they begin: Although, they acknowledge, “no two areas may be identical, for management purposes arbitrary boundaries must be drawn around environments which, within a narrow range, are similar.” “The essence of all vegetation manipulations,” they explain, “lies...in the recognition of these arbitrarily defined ‘site types’, within which response to either man-made or natural action (wind, fire, flooding) can be predicted.”¹⁶⁹ Prediction, in this case, entailed statistical calculation, which even if unacknowledged necessitated bounding, defining, and assuming equality of units. By the end of the summer of 1959, over 100 detailed plots had been laid, sampled, and categorized within one of the ten site types. Population samples of all vascular plants found within these ten types were recorded. Figures for species presence and relative abundance were produced, though the investigators felt “more samples must still be taken before any confidence can be expressed in the frequency figures.”¹⁷⁰ There were now, in other words, populations of plants.

Energy and matter of the redwoods and the environment were also to be measured, classified, evaluated, and inventoried. “The essential environmental factors determining the sites upon which a species may become established, grow, and reproduce are moisture, nutrients, light, and heat,” while occasionally the effect of wind, flood, and substrate instability may be of consequence.¹⁷¹ The scientists laid the necessary plans, to be carried out in summer of 1961, so as to classify the vegetational communities as well as individual plants according to their arrangement along moisture, nutrient, light, and heat gradients. These plans included “light measurements with a photo-sensitive chemical (anthracene), soil sampling for nutrient analyses and moisture contents, collection of minimum-maximum temperature data, and a detailed vegetation survey of the thirty stands,” as well as the correlate “laboratory work, green house experiments, and analysis of all data” generated.¹⁷² Anthracene forms a precipitate (dianthracene) when exposed to light. This “photochemical reaction can be used for measuring light energy received over any particular time period per unit area.”¹⁷³ From the light data obtained with anthracene, the scientists could then “assign a calculated optimum and minimum light intensity for all species of trees, shrubs, and ground cover” with which to investigate “the interrelationship of basal area, crown cover, and understory density.”¹⁷⁴

In conjunction with the above, the scientists’ activities during the 1959-60 year included focused studies of the physiology and vigor of “old [redwood] trees,” involving experimental manipulations at the field sites, and studies of sedimentation, soils, and micro-climates. The physiological studies of redwood vigor examined “the physiological response of these trees to

flooding root growth characteristics under relatively undisturbed conditions, under normal flooding and deposition, under abnormal flooding and deposition, and under experimental conditions.”¹⁷⁵ Experimentally controlled conditions, they hoped, would provide “a quicker understanding of the root behavior and its relationship to tree ‘vigor.’”¹⁷⁶ The studies of sedimentation, soils, and micro-climates would involve “the analysis of chemical properties of the soils” in “relation to the growth of old redwood groves.”¹⁷⁷ The objective was to determine “what can be considered normal properties associated with redwood groves in good condition.”¹⁷⁸ Zinke planned to make collections of leaf litter in various groves for chemical analysis, as well as record the amount of litter, time of year collected, and weight of composition of leaves, cones, and seeds. Along with generating soil type and chemical composition profiles, temperature and humidity profiles “will be made vertically in the groves and contrasted with conditions in nearby openings” in order to “evaluate the effect of artificial openings on the micro-climate of...the groves.”¹⁷⁹ Finally, examination, analysis, and evaluation of the age and chemical composition of “particular parts of the redwood” would be carried out, including tree ring samples and a foliage analysis with samples obtained from different heights along the trees.¹⁸⁰ Conjointly, these studies would elucidate the “overall element balance for the forest-soil ecosystem” and “the correlation of specific chemical properties in the trees with those in the soil.”¹⁸¹ Application of such information, Zinke assures, would include fertilizer treatments, “the use of analyses of parts of the tree to indicate nutrient deficiencies, and in assessing the trend of fertility in a redwood forest.”¹⁸² Each of the three main areas outlined above would form the core of the project through publication of its final annual report in 1967. Energy, matter, and population are brought together under examination, analysis, experimentation, and evaluation as means to formulate explanations of a problem, or problem set, within a total organism-environment system. In other words, these ecologists, as ecologists, had begun research the ecology of the Eel River Basin.

The ecology of the Eel River is noted once again in 1965 in similar circumstances to the CDWR’s reference to the Redwood Ecology Project. In February 1965, CDWR published Bulletin No. 92, “Branscomb Project Investigation.”¹⁸³ The investigation examines “the engineering feasibility and partial economic justification of the construction of a dam and reservoir northwest of Branscomb on the South Fork Eel River.”¹⁸⁴ The dam and reservoir were not proposed for the usual reasons – water supply, flood control, or electric power generation – but so as to improve the existing fishery by controlling water releases below the dam, and for water-oriented recreation. Ecology is not mentioned in the report itself. It is, however, mentioned once in the report’s Appendix B, “Comments of the Department of Parks and Recreation, Division of Beaches and Parks, On the Branscomb Project.” The entirety of the appendix is a one-page letter from the Chief of the Division of Beaches and Parks, Edward F. Dolder, addressed to a Mr. John Haley of the North Branch of the CDWR. The letter is dated June 18, 1962. The relevant paragraph reads:

We have noticed a deterioration of the stream in the past decade. As early as June, streamflows are meager. This results in loss of good swimming areas, fishing areas, scenic values and a consequent loss of economic values to locally-situated enterprises. Continued low flows may possibly adversely affect the entire ecology of the Redwood forest in the parks along the Eel River...We believe that these values should receive more study and be related against the value of ‘on-site’ recreation...”¹⁸⁵

Ecology is understood to be at least two things in Dolder's letter. Ecology is the South Fork Eel River itself, and perhaps the Eel River Basin: "the entire ecology of the Redwood forest..." Second, ecology is a value. Whatever is a value, is a value in that it is subject to human estimation and evaluation. Ecology, as the Eel River or the Eel River Basin itself, is valued as resource for human ends. Ecology is the river and its basin standing by for our utilization. Ecology, then, as the South Fork Eel River, is investigated, examined, and evaluated for its recreational utility for the state of California and its human populations. This evaluation is an economic calculus parsed in the units of the United States dollar.

With the prioritization of the Dos Rios project assured by the CDWR's North Costal Area Investigation report and the State-Federal Interagency Group's agreement of 1966, the USACE engineers, along with concerned federal and state agencies, once again scoured the river's length from south to north. Just three years later, in December 1967, the USACE, San Francisco District, released its own comprehensive report, entitled "Eel River Basin: Interim Report on Water Resources Development for Middle Fork Eel River."¹⁸⁶ As the title suggests, unlike CDWR's Bulletin No. 136, the USACE's report focused solely on the Middle Fork Eel, and there, most closely on the proposed project site of the Dos Rios Dam and Reservoir. This report gives one a sense for the weighty political and, especially, technical clout the USACE wielded of its own account. With around 570 pages – including text, plates, fold-out maps, graphs, charts, tables, and design blue prints – the scope of scientific and engineering reconnaissance of the Eel River Basin represented, the detail of analysis, the coolness of its technical prowess, and the seemingly inexorable finality of its arguments and conclusions cannot but impress themselves upon the reader.

Released during full fervor of the nascent environmental movements of the 1960s and 70s, maybe it is not surprising that the USACE do not mention ecology. By 1967 the science of ecology was making waves in popular understandings, where its findings and basic explanations were increasingly brought to bear by progressive environmental movements. Or, on the other hand, perhaps there were no ecologists available of the requisite expertise with whom the USACE's San Francisco Division could consult. These are only speculations, however, and possibly misleading. It is the case, for example, that by this time prominent ecologists also provided equally technical, equally quantitative explanations as those of the USACE's report, carried over with little alteration from physics, chemistry, and engineering.¹⁸⁷ This was ecosystem ecology. Ecosystem ecology was, in large part, the basis for the bloom in popular understandings of the science of ecology and of the world as ecology during these years which, in turn, thoroughly infused worldwide environmental movements from those of the 1960s through the present.¹⁸⁸ As with CDWR's reports, the scope of the USACE's reach is expansive: hydrology, hydraulics, topography, geography, climatology, geology, pedology, taxonomic botany ("Vegetation"), zoology ("Fish and Wildlife Resources"), forest management, human demography, agriculture, and economics.¹⁸⁹ The Middle Fork Eel River, including Round Valley and the city of Covelo, is rendered legible and translatable to outside, expert eyes. It is, as before in the CDWR's numerous prior reports, rendered comparable with other project proposals. This comparability is part and parcel of the scientific, technical nature of the report's content and the scientific and engineering studies that inform it. Standardization, including most importantly all quantitative methods and measures, must be initial and foundational for such levels of comparability, encompassing and traversing expanses of time and space to be possible at all. This is a foundational, uniting element, both within the fields of expertise present as well as between them. Standardization, quantitative or qualitative, neither sets itself up or conveys

itself to us through observation, examination, or discovery of the world, or nature – we must conceive, designed, and extend it, and we must also police and enforce its conception, design, extension, adoption, proper comprehension, and legitimate utilization.

Following the publication of Bulletin No. 136, CDWR divided continuing studies of the North Coastal Area into two phases: (1) major water development projects of priority, such as the Upper Eel River Development complex, and (2) local project studies to identify possible developments to supply the needs of areas that would not be served by major projects elsewhere. The South Fork Eel River was the first sub-basin to be surveyed as part of the second phase.¹⁹⁰ CDWR released the results of the study as Bulletin No. 173, “North Coastal Area Investigation: South Fork Eel River Study.” This bulletin’s objective, accordingly, was the analysis of possible water development projects on the South Fork Eel for purposes of local water supply, flood control, recreation, and “fisheries enhancement.”¹⁹¹ As before, ecology receives only a passing mention and not found within the body of the report itself. Yet for this it is not less noteworthy; perhaps it is more so. In the report’s bibliography a source cited from 1967 is entitled “The Ecology of the Coastal Redwood Forest and the Impact of the 1964 Floods Upon Vegetation.”¹⁹² Though the report’s general topic of redwood forest ecology in relation to a specific, historical flood event is manifest, the scope of the author’s research, the methods, the apparatuses, measures, and calculi, and the character and foci of the analyses is broad. Becking’s science is unmistakably ecological. His field sites are within Humboldt Redwoods State Park, as well as other sites along the mainstem and South Fork Eel River. Matter, energy, and populations are set up, surveyed, measured, recorded, calculated, inventoried, manipulated, and evaluated so as to explain possible solutions to posed problems. Unfortunately, what CDWR takes specifically from this report for their own bulletin is not evident.

Ecology is also spoken of in Appendix B, written by the California Department of Parks and Recreation (CDPR). In this appendix, CDPR performs a cost/benefit analysis of recreational resources resulting from or enhanced by the three dam and reservoir projects evaluated in CDWR’s main report. Its authors inform the reader that “some of [CDPR’s proposals] are the culmination of many years of planning effort and recognition of the unique ecology of the redwood forest environment of the north coast of California.”¹⁹³ The unique ecology of the redwood forest is distinguished as a characteristic or set of characteristics of the redwood forest environment. Ecology appears to be understood as a property of the redwood forest environment. Ecology is a property of environment. What this property is, or what kind of property it is, is not readily apparent. Neither is what the authors understand environment to be readily apparent.

In 1968, the California State-Federal Interagency Group produced its “Eel and Mad River Basins Master Plan: Plan of Study.”¹⁹⁴ The report presented the joint general objectives of the group and outlined the work program by which the group’s members were to proceed in their studies so as to meet the objectives in “the most efficient and economic manner.”¹⁹⁵ The end of the program was to “to develop a master plan for the Eel and Mad River Basins.”¹⁹⁶ The objectives aligned with the mandates of the members, including: flood control, local water supply provision and security, water export for the California water project, recreation, watershed management, hydroelectric power, preservation and enhancement of “fish populations and angler utilization,” and the preservation and enhancement of “wildlife populations and public utilization of these resources.”¹⁹⁷ The members were to give especial consideration to “measures needed to preserve and enhance fish and wildlife values.”¹⁹⁸ Wildlife, fishery, and environmental resources are understood to be subject to enhancement, here as in other reports, by

means of technical intervention and expert manipulation, regulation, and management. These objectives, however, were only conceived as means to achieve a further end-goal. They are themselves resources whose utilization is means to actualize by achievement “the essential objective of a water and related land resource development plan for the Eel and Mad River Basins.”¹⁹⁹ This objective is “to provide a better living for people by improving the physical and ecological environment and increasing their economic and social opportunities.”²⁰⁰ The objective, that is, is the biopolitical project of the “optimum development of water and related resources of the Eel and Mad River Basins...for California’s growing population.”²⁰¹

With the Upper Eel River Development authorized by CDWR in March 1964 as the first additional facility of the State Water Project, CDWR and the Interagency Group initiated advanced planning studies on the development in July 1964. Organized in two phases, the first phase of the advanced planning was a three-year investigation of the alternative routes to convey surplus water from the Dos Rios project on the Middle Fork Eel River to the Sacramento-San Joaquin Delta. The second phase would be the development of a definite project based on this investigation. Bulletin No. 171 of 1967 presents the results of the three-years’ investigation.²⁰² One route considered was a southerly route through the Bureau of Reclamation’s proposed English Ridge Reservoir. The other, easterly route passed through the proposed Glenn Reservoir Complex in Tehama and Glenn counties, whose planning, construction, and operation would be the responsibility of both the CDWR and the Bureau. On the basis of their investigation, CDWR concluded that the Glenn Reservoir Complex was the more favorable of the two conveyance routes. Bulletin No. 171 includes the Interagency Group members acknowledgement and agreement with this conclusion. It then presents meticulously detailed discussions of relevant historical background of the State Water Project and Eel River projects under consideration, the authorizations and interagency coordination required, engineering and economically relevant physical characteristics of both alternatives, and these alternative routes respective costs and benefits. Ecology is mentioned once in the entirety of the report, and only in passing: “While the importation of Eel River water will bring little change in Clear Lake, routing it through an enlarged Lake Berryessa could bring widespread changes to the lake’s present ecology.” No elaboration is given, nor external source cited, except to say that warmer temperatures could be expected with the water import, thereby creating possible conditions for an algal problem that could affect the lake’s cold water trout fishery.²⁰³

In another, closely related office report published by CDWR the following year, ecology, ecosystem, or, for that matter, environment are not spoken of at all.²⁰⁴ This trend appears to have continued, generally, through 1969. On August 1 of this year, for example, in Monterey, California, Gordon W. Dukleth presented a progress report on additional studies of the Eel River Basin development alternatives to the California Water Commission.²⁰⁵ Dukleth was the Northern District Engineer of the CDWR. He did not write explicitly of ecology in his report or presentation. The closest he gets is a brief discussion of the work of personnel from the California Department of Fish and Game (CDFG). These personnel had supposedly established preliminary fish and wildlife requirements for all major reservoirs included in the study. These requirements included downstream release requirements, game fish hatchery sizes and costs, wildlife mitigation measures, and land requirements and costs. Flow suitability criteria for game fish populations is Dukleth’s closest explicit approximation.

This said, there is another example. The Eel River itself is only tangentially considered. Rather, the relevant aspect of this example’s concern is the possible effects on Clear Lake upon reception of water exported from the proposed Dos Rios Reservoir on the Middle Fork Eel River.

Without the proposed Elk Creek Tunnel (8.25 mi) and Garrett Tunnel (12.4 mi) – a total of 20.65 miles of underground tunnel that would be necessary to convey water from Dos Rios and the Middle Fork Eel to Clear Lake and, eventually, to the Sacramento River – Clear Lake lies outside the Eel River Basin. With this caveat in mind, in 1968, Kaiser Engineers of Oakland, California, submitted Report No. 68-2-RE to the Lake County Flood Control and Water Conservation District (LCD).²⁰⁶ LCD authorized the report in late-1967 with the objective to obtain an independent engineering and economic review of the then-current plans for the Upper Eel River Development project and the adjacent watersheds this project would likely impact. Of particular focus in the Kaiser Engineers' review were the plans presented in CDWR's Bulletin No. 171, the USACE's 1967 Interim Report on the Middle Fork Eel River, public hearings dealing with the Dos Rios dam and reservoir, and the Bureau of Reclamation's English Ridge Project. The report is based on the High [version] Dos Rios Dam and Reservoir, as was proposed at the time by the USACE. The Kaiser Engineers' report presents their review's findings. To evaluate and compare the plans of these agencies, they worked "from the standpoint of optimum utilization and comprehensive long-range planning." For each plan, Kaiser Engineers' Task Force (KETF) arrived at a confirmation or determination, at reconnaissance level (below feasibility level), of "(1) the amount and cost of water to be supplied the State Water Project; (2) the amount of water which would be available for regional supply and the economic benefits which would accrue; and (3) the effect each development is likely to have on the algae and quality of water in Clear Lake."²⁰⁷

The KETF comprised engineers of relevant specialties, economists, geologists, estimators, and other specialized consultants, including a chemist and a water resource planner. Ecology is not spoken of in the report in any sense. Yet it is not possible to conclude that ecology is not present. Ecology, as science, plays key and notably prominent role in the Kaiser Engineers' analysis and conclusions. The KETF mathematically model, and thus calculate under a variety of parameters, Algal Growth Potential (AGP). AGP is a phrase

used to describe that quantity of algae that will grow in a given water when no factor other than nutrient limits growth...Factors such as light, temperature, and the species of algae are eliminated from consideration, and only the concentration of substances such as carbon, nitrogen, phosphorus, magnesium, potassium, iron, manganese, molybdenum, other elements, growth factors, vitamins, and so on, are involved in growth limitations.²⁰⁸

The KETF do not stop with AGP, however. Besides AGP, their analysis of interactions between the hypothetical physical alterations of Clear Lake (import of Eel River Water via the English Ridge Reservoir) and the hypothetically resulting algal and bacterial, or biotic, content of the lake account for temperature variation; light penetration and absorption; surface wind-mixing; hyporheic zone, benthic zone, and water-column dissolved oxygen content; alkalinity; turbidity; mineral content; and phosphorus and nitrogen levels. Biological productivity rates as a function of abiotic environmental variables are calculated. The KETF develop a "systems concept" for the lake, which entails calculating a hydraulic balance of gross inflow, an estimate of evaporation in relation to precipitation, and net outflow. It also includes brief consideration of the materials balance, even if "in the studies under review there has been no endeavor to treat Clear Lake as an isolated system, balancing material inputs and outputs."²⁰⁹ All of the essential elements of the science of ecology are here. "Research in the area of algae proliferation or eutrophication in natural bodies," they clarify, "has only recently been undertaken on a national scale, and much of

the information pertinent to the decisions involved in the upper Eel River study has not yet been elaborated on or generally disseminated.”²¹⁰ I am hesitant as to whether or not this can be said for such studies nationally, especially in consideration of the work of limnologists by the 1960s from such universities as the University of Wisconsin, Madison or Yale University. This notwithstanding, if such formally ecological research had been done on the Eel River previously, or in its basin, it is likely that the KETF would have found it.

2.4 Ecological food webs of the Eel River?

There is an aspect of the KETF’s analysis that is especially noteworthy. *Food web* and *trophic level*, both essential to the ecology of the Eel River basin and indispensable to the science of ecology’s explanations, are discussed for the first time regarding the Eel River and its tributaries.²¹¹ “Whenever algae grow in a body of water,” the KETF begins, “they serve as the base of a food web for which at least several trophic levels are involved.” They illustrate with an example: “...algae are attacked by Rotifera, Cladocera, and Daphnia and the larvae of several types of gnats. These, in turn, are attacked by small fish and predaceous insects, which in turn are attacked by larger fish and other vertebrates.”²¹² “From this,” they conclude in an exemplary ecological register, “it may be seen that a certain concentration of algae is essential to support the wild life within the lake.”²¹³ The report then proceeds to elaborate calculative outcomes for the efficiencies of conversion of energy from one trophic level to another, and the resulting “yield of fish.”

In 1966, by interagency agreement, CDWR and CDFG undertook wildlife studies for the Dos Rios Project, under the auspices of CDFG.²¹⁴ The Davis-Dolwig Act of 1961 required the agencies to “determine effective methods to preserve wildlife” that would be affected by the project.²¹⁵ CDFG retained a private contractor to “interpret and report upon the ecological implications” of the data these studies had generated.²¹⁶ This contractor was wildlife consultant Philip H. Arend of Wildlife Associates. CDWR considered the report he authored, dated June 1969, preliminary information with which to further develop “preservation plans for the wildlife resources of the Middle Fork Eel River Basin” in light of the Dos Rios dam and reservoir proposals.²¹⁷ At the time of publication, the height of the dam had not been decided, much less approved. For this reason, Arend works with three hypothetical elevations (1300, 1600, or 1700 feet), which could each determine, in their turns, a different surface area of the reservoir as well as, the extent to which the Middle Fork Eel and the surrounding land would be inundated. Arend’s report and recommendations appear as an addendum, bookended by CDFG’s own foreword, summary, conclusions, recommendations, and page specific commentary on the consultant’s report serving as the reader’s gateway. The CDFG report, including Arend’s addendum, was prepared under the direction of John M. Hayes (Senior Fishery Biologist) of the CDFG’s Contract Services Section. One Edward S. Smith (Associate Wildlife Manager, Biologist) authored the CDFG’s prefatory sections, commentaries, and addendum errata to Arend’s report.

Arend’s report is as noteworthy as that of the Kaiser Engineers. Unlike Kaiser Engineers’ review, however, Arend’s focus is on the Middle Fork Eel River specifically and the surrounding lands to be flooded by the Dos Rios Reservoir. “The impact of the Dos Rios Dam and Reservoir,” Arend states,

on the fish and wildlife ecology of the project area and environs has been intensively studied by the Fish and Game Contract Services. The study has included surveys of the wildlife resources of the area. This impact report, independently contracted, collates information derived from these surveys, as well as from other sources, to evaluate the ecological impact upon the existing site of the project and the project-affected environment, upstream and down.²¹⁸

But CDFG, for their part, makes cautiously few references to ecology in their sections. In their short foreword to Arend's report, for example, CDFG's emphasis is on wildlife resources, with the one mention of "ecological implications" being a direct reference to Arend's own work. Arend titled his report "The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California." For the cover of the official CDFG document, CDFG struck out "Ecology" and replaced it with "Resources." They also replaced "impact" with "effects," perhaps so as to provide a less disastrous intonation. Within, however, Arend's title remains unaltered. Likewise, in the brief CDFG-authored sections encasing Arend's report, ecology is used only in reference to the latter's findings and recommendations. CDFG's official concern at this time is with wildlife resources.

Arend opened his report's introduction by qualifying the character of the river: "The Eel River of northern California," he begins, "is one of the few 'wild' rivers remaining along the California coast."²¹⁹ Categorized as one of the few remaining rivers of its kind, Arend infuses a sense of urgency into the entirety of his report: rivers of its kind are being lost, disappearing, or being irrevocably altered. Of what kind is the Eel River? The river is "wild." Arend places quotation marks around *wild*: "wild." Why? Perhaps he wanted to disassociate the Eel River as wild in a sense of undisturbed wilderness from the manner it was portrayed as wild by state and federal agencies, politicians, and those affected directly by such ravaging floods as those of 1955 and 1964.²²⁰ Wild, in the sense of these latter groups, is untamed, uncultured, unrestrained, uncontrolled, unregulated, and as a result, not only unproductive but at times counterproductive. The river thwarts our will in its unpredictable fits of tempestuousness. It becomes inscrutable to us as resource. But Arend could have opted not to write *wild* at all. Instead, he did write it. It seems he wanted his reader to consider the river as wild in a different sense. What sense he intended can be glimpsed, perhaps, in juxtapositions within the second sentence of the report: "The magnificent river gorges and sheer canyons, and millions of acre-feet of annual runoff, have brought this river to figure prominently in the plans of federal and state water agencies, seeking to fulfill their development schedules for southern California."²²¹

Magnificent gorges and sheer canyons are reduced, degradingly, to acre-feet of annual runoff. The awing magnificence and sheer wilderness of the river, when left to pursue its path in undisturbed, unregulated freedom from human intervention, can *remain* wild, protected in its freedom, pure in balance and health, and generative and full of life. This magnificence is threatened with irrevocable ruination by the servile banality of federal and state water agencies' developmental planning, entrained as these bureaucracies are to the urban and agricultural interests of central and southern California that seek to appropriate northern California's water for their own end-goals. If this was Arend's assessment, it was not at all off base.²²² For Arend, it seems, wildness is not a disreputable, unruly object to be wrested under control for productive goals by centralized bureaucratic experts. It is, instead, permitting the river to pursue its course free of unnecessary interventions or impeding and, thus, disturbing regulations. We value such rivers and their surrounds, Arend seems to understand, for the magnificence of their unimpeded

and, thus, free, unregulated wildness. For example, Arend finds that “these sites, i.e. woodland-chaparral, upland woodland-grass, and pine-fir-chaparral habitat types have fair to medium value for wildlife.”²²³ Ecology, wildness, and liberal *laissez faire* freedom toe off against centralized state planning and utilitarian, welfare-securing intervention in the first two sentences of Arend’s report: the former scientifically enlightened as ecology, the latter enshrouded in the fog of dated productivist, state planned, engineering-centric impediments that threaten the self-balancing, self-regulating ecosystematic health of wild nature, of wildlife populations, and even of the economy and human populations of the state’s north coast. It is not surprising that, in their “Comments on the Consultant’s Report,” CDFG clarifies: “The Eel River was described as a ‘wild river’. This was a personal judgement by the consultant, and does not necessarily reflect the opinion of the Department of Fish and Game.”²²⁴

After a review of the physiography, climate, and soils of the Middle Fork Eel River basin, Arend offers an “Ecological Resumé [sic] for the Eel Drainage Basin.” In it, he speaks of the entirety of the Eel River Basin, for the “Dos Rios Project area, the Middle Fork Eel drainage, and the Eel drainage basin,” as “ecologically interacting, interdependent ecotones,” “cannot be disassociated.”²²⁵ How, then, would one proceed with scientific analysis, which necessitates just such disassociation? He does not ask this question. Referring to the ecology of the entire river basin, he warns that the “total area is extremely complex and has never been studied for ecological detail.”²²⁶ Lest this detract from his ecological analysis, he rejoins that despite “logging, cultivation, fire, and grazing in the recent past, and [that] many of the plant and animal communities” of the basin are in a “seral rather than climax” stage, “an examination of the general shape and lay of the land and its rivers offers evidence of the interwoven ecological interdependence” of “the total area.”²²⁷ What is that of which Arend writes, what is that which is “ecologically interacting, interdependent...[and] intergraded” of or in this total area?²²⁸

To try to discern the answer, we may notice that among the first pages ecology itself is not spoken of directly, but rather adjectivally, describing what does not otherwise need an adjective. For example, “ecological impact” or “ecological detail” do not require “ecological.” Yet Arend purposefully writes “ecological.” What is the ecology of which *ecological* speaks its senses? In these first sections, Arend does not write of the river or its basin as ecology itself. But he does begin explain how this ecology functions or, as is commonly said, how it works. The Eel and its canyons and valleys are not merely “physical troughs down which water slides to serve as highways for fish.”²²⁹ The opposite of physical troughs must be life, biologically understood: Rivers are “ecological arteries for flows of living energy, upstream as well as down.”²³⁰ The river basin is the “re-cycle” of “the endless web of living matter.”²³¹ Competition and colonization of “competition-free sites” too both *are* and *compose* this ecology. “These are dynamic processes,” he explains, which “in the trellised network of this river system,” one can observe “how the energy generated from living matter in the Dos Rios Project area can find pathways to be transmitted not only to the delta of the Eel, but up to headwaters of all its forks and tributaries.”²³² The total area of the Eel River Basin is understood as or similar to a biological organism. As a biological organism, it is a system of networked functions and interactivities, such as arteries for the transmission of matter-generated energy. Referring to “the energy generated from living matter in the Dos Rios Project area,” Arend informs the reader that the “quantity and rate of energy flow of this nature have never been assessed, since ecology is a very young science.”²³³ The scientists of ecology must begin to fill our gaps in knowledge, for “a quantitative estimate of the impact of Dos Rios on the balance of the river system cannot now be made.”²³⁴ To fill a gap in knowledge, which Arend seems suggest we suffer, is sensible if

scientific progress towards a total, completed knowledge is possible. Here the author writes directly what he understands ecology to be: it is the science of ecology; that is, the science that scientifically researches the ecological interactions of the world so as to explain these by means of explaining the ecology of dynamic, spatiotemporally particular cases. He distinguishes this young science, in other words, from what this science studies: the world is ecology. This other understanding of what ecology, as I have said, is evidenced adjectivally throughout his report. The science of ecology must study the world, i.e. ecology. This “must” expresses a desire, not a need: Arend’s goal is to protect, as much as possible, the wildness and, thus, the wilderness of the Middle Fork Eel River drainage and the Eel River Basin more broadly. Ecology the science is a technical means to achieve, or at least to make progress towards actualizing, this goal. In the meantime, however, “the fact...is incontrovertible that the Dos Rios Project will have an impact on the entire river system.”

Arend makes do with the data that prior CDFG studies have provided him. Section 6.0 is entitled “Wildlife Inventory of the Dos Rios Project Area.” To take an inventory is to take account of stock, i.e. to count the quantity of stock standing by, or available, presently. Stock is that which stands in reserve ready for (deployment into) utilization at our will. Arend acknowledges the “accurate and voluminously adequate” population data the CDFG’s field research personnel have compiled for the black-tailed deer of the project area.²³⁵ Yet this data is insufficient for Arend’s goals, and perhaps even misleading. With their emphasis primarily on deer, with some additional study of other important games species, “no quantitative attention could be given to wildlife species of lesser importance as ‘game animals.’”²³⁶ “The over-emphasis,” Arend observes, “on the study of game animals is typical of every game or habitat management agency confronted with an ecological problem involving wildlife habitat.” We find here again that Arend speaks not of ecology as science, but through an unnecessary and therefore especially noteworthy adjective, of the world or nature as ecology – including, of course, game animals, non-game animals, wildlife habitat, and their material and energetic interactions. What is habitat?

Though we speak often of habitat, we do not as often ask what we understand it to be. Arend eventually bumps against this realization. With twenty or so pages behind him, he clarifies in a footnote with “[o]versimplified but useful definitions”: “habitat – an organism’s ‘address’.”²³⁷ Why the scare quotes? It seems that Arend suggests habitat is an address insofar as the address belongs to the addressee and the addressee to it. Insofar as habitat is an organism’s address, we may ask: What is an address? An address is a code of numbers and letters that identifies and locates an individual or, typically, a family group. The code is issued, regulated, and enforced by local (street address, city), state or provincial (state or province), and federal (postal or zip code) governments. It is often required of every governmental subject. Or if not, at least required of any legal governmental subject to be granted institutional recognition for provision of services or even recognition and thereby conferral of rights. Address is a technology for conducting people into and about an ordered, planned field of legible places, each place corresponding to the individual or group to whom it is assigned. The address codifies this place, and therewith the individual or group, into a standardized, enumerated and thus legible habitat, neighborhood, area, or region. This codification by standardization serializes both place and the individual or group identified with the legally codified place. Each place and the individual or group corresponding to a respective place are units. One unit is comparable to and even substitutable with another. Measurement is possible, and with it, the application of metric norms and the discernment thereby of irregularities, abnormalities, pathologies, ineffectiveness,

or inefficiency. Accounting, surveying, censusing, inventorying, and similar techniques, are facilitated among many other governmental exercises and functions. The taking stock of inventory becomes possible. Thus, as each unit and its component sub-units – or individuals – are made knowable to municipal, state, and federal governmental powers, they are for the corresponding arts of government no longer an amorphous, inscrutable, and therefore dangerous or useless mass of humans or wildlife. What, then, is a habitat management agency? Arend indicates that such an agency is concerned both with habitat *and* wildlife. Yet this is not exhaustive. It is of utmost importance that we ask what ecology is, for a bureaucratic, governmental habitat management agency is confronted with *ecological* problems. Ecological must, if Arend is correct, entail both the environment and the organism or organisms, individual and population. While we can suppose that humans are not included as wildlife, the management of habitat unavoidably entails the legibility, accounting for, regulation and enforcement, and thus management of humans, individually or as population, as part of the ecological problem itself (and thus as ecology itself), or as utilizers of ecology, i.e. of wildlife, game animals, non-game animals, and habitat as resource.

Where Arend offers the definition of habitat as “an organism’s ‘address,’” he also inadvertently provides a second understanding of what habitat is: vegetative types.²³⁸ Vegetative types, and therefore habitats, he says, are represented by circles in a schematic food web diagram included in the appendix as Table II. He also names vegetative types as habitat types. The reader can visualize, using the diagram, “how removal of even one habitat type from this ecological web will snap many life-lines.” What is a vegetative type, or habitat type, and therefore a habitat? It is a type. What is a type? In section 5.0, Arend provides a “Wildlife Habitat Type Inventory,” elaborated from field research data compiled by two professionally titled “wildlife manager-biologists” of CDFG. A type originates in methods, not in among the plants and animals to be typed.²³⁹ The methods used are used to “inventory the vegetation of the Dos Rios Project area,” and “are based on vegetative-soil maps of Mendocino County, prepared by the California Forest and Range Experimental Survey of 1952.” A map, in turn, is a superimposition onto a Cartesian plane of standardized types, measures, and representations, adhering to topographic formalities, methodological conventions, and other rules that assure both legibility and intelligibility. The map used to fabricate types was produced by professional civil servants of the local and provincial state governments and scientific personnel (...Forest and Range Experimental...). The acreage of each vegetative type of the proposed Dos Rios Project area was “calculated by the ‘cut and weigh’ planimetric survey method in standard use by the California Department of Water Resources.”²⁴⁰ Wildlife-use surveys were conducted in the district, though “detailed surveys and studies were limited to the few major game species.” Even these were limited: for “a definitive ecological survey” of the black bear, for instance, “requires a sizable investment in a team of big game specialists and months or years of arduous field work.”²⁴¹ “Valuable game” of the “wildlife-use surveys were stratified by vegetative type and were correlated with permanent [survey] plots.” Three random survey sites were established in the reservoir pool area, and three survey areas also established off-site. Survey field data of the following categories were entered on punch-sort cards as collected: (a) ground cover type, (b) pellet counts, (c) slope exposure at plot, (d) wildlife and/or major livestock use, (d) wildlife seen along survey line, (e) logging, (f) land condition, and (g) notes and miscellaneous observations. Once compiled, analyzed, and correlated with the “cut and weigh” vegetative type surveys, “these data provided the factual field information for delineating the wildlife habitat types of the Dos Rios Project area and the wildlife-use estimates, by area.”²⁴² By these methods, ten different

habitat types were “ascertained” for the project area. The “classification system follows that outline by Jensen and is now in standard use by the California Department of Fish and Game.”²⁴³ A type, then, is the classificatory sub-unit of the classification system. Each of the above methods functions within this system towards, i.e. so as to fabricate habitat types, and thus habitat. Habitat, insofar as it is type, entails an element of systematic, systematized circularity. Habitat as type, however, illustrates very clearly habitat as address: habitat is of and by technique, scientific and governmental, if such a distinction can be made. Yet it remains unclear in Arend’s report whether human individuals and populations are, too, in and of such a habitat, even if only as disturbing or destructive factors, actors, or agents.

Total habitat as a system of functional, classificatory habitat- or vegetative sub-types not only *is* ecology, and thereby ecological, but of value to ecologists, which is to say, to the science of ecology. Again, Arend seems to understand ecology and the science of ecology to be universal and ageless and very young, respectively. These two, world and science, are too much the same to say even that they are inextricable.

Section 4.3 is entitled “The Impact of Human Activities on the Wildlife Ecology of the Project Area.” Arend opens the section, as follows:

The pioneer who first drove his cattle and ploughed the first furrow in the Round Valley area did not record the variety or abundance of vegetation or wildlife that lay before his eyes...Save for a few food items the natives, animal and vegetable alike, were vermin or nuisances; or, in some cases, deadly threats...to be warded off or wiped out. The Grizzly bear and the untamed Indian were such threats. The trees were meant to be cut, the animals to be destroyed, and the land to be drained, cleared, and sown to familiar plants...judging from the evidence of the land...ecological impact there has been.²⁴⁴

What is ecological impact? Arend writes of the world as ecology. What, then, is *impact* of *ecological impact*? Newton’s first law states: “That every body perseveres in its state or resting, or of moving uniformly in a right line, as far as it is not compelled to change that state by external forces impressed upon it.”²⁴⁵ Here, ecological refers for its sense to ecology understood as the world or as nature itself. Yet human activity *impacts* the wildlife ecology of the project area. What might Arend understand such that this writing this title is sensible? Perhaps he understands ecology as an ecological system, or ecosystem, of Newtonian bodies in dynamic motion and writes of this totality of dynamically moving bodies as, simply, (wildlife) ecology. The pioneer too is a Newtonian body. As Newtonian bodies within an ecological system, ecology and pioneer are *inert* – in the sense of inertia, not absence of motion. They move at a constant rate in a straight line-direction through universally uniform planes of Cartesian space. As such, their motion entails the distance travelled between one spatial at some time point and another spatial point at some other time. Such points are radically commensurable, infinitely substitutable places in uniform space. No body belongs in any original or essential way to any point at some time. Rather, they belong to no place and thus all places uniformly and equally, with perfect commensurability and exchangeability, and are of themselves incapable of tending towards any specific place at some particular time. Furthermore, the capacity for motion or change does not lie in the nature of any of these bodies.²⁴⁶ These bodies’ natural inertia – their unchanging velocity and straight-line trajectory – is an equilibrium state. Each body in and of itself is unchanging. Each body, of itself, is incapable of change, alteration, annulment, or even persistence of motion and velocity without an initial force having acted on it, activating or

mobilizing it, putting it into motion. An external, foreign force is that which, acting, i.e. *impacting* a body, makes (the reaction) in the body deviate from its rectilinear, uniform motion at a constant velocity. The impact of pioneer body upon the wildlife ecology of the project are—that is, upon the ecological system of Newtonian bodies in motion of the project area, results in the latter's deviation from its undisturbed, stable equilibrium state of rectilinear, uniform motion. This is ecology's fall from its pristine state, as Arend later indicates. The deprecatory irony with which Arend describes the pioneer body suggests that this body is already defiled and thereby fallen into a deviant trajectory; deviant, that is, from its original state of intended, harmonious, *stable* rectilinear uniform motion. Its impact can only result in ecology's own deviation, its own instability, its own fall into a desecrated trajectory. Judgment of the evidence of the land is evaluation. Ecology as the world itself, or nature itself, is the *prior* evaluative determination such that impact upon it can, in turn, be judged at all. Judgement and evaluation of ecological impact is only then possible. Judgement and evaluation are of the same ecology as that of ecological impact. Ecology as it arrives to the Eel River Basin with Arend is profoundly moral, and thoroughly normative.

The pioneer Arend has in mind, one would guess, is European-derived and white. This pioneer brings development. Indications of development, Arend understands, are, for example, the canonical techniques and technologies of civilization and culture utilized to open and tame the wilderness into supple material for the pioneer's goals: the plow, domesticated animals, domesticated plants. "The natives, animal or vegetal alike" were nuisances or deadly threats for this pioneer. Arend draws an evaluative line: What was before the pioneer was not development, nor made developments. In this prehistoric time, there were only native plants and animals. Indians for these pioneers were akin to animals, classified by Arend's pioneer with the Grizzly bear. Yet, somehow for Arend, these animals and plants, Indians included, were morally innocent, untainted, undisturbed. They were wild, of and in the wilderness, unimpeded and unregulated by the dams and conduits of state development, and thus free. The pioneer, however, brings with him disturbance, degradation, and irrevocable devastation of this moral state, manifested in his reprehensible exploitation and thereby devastation of the correlate physical-biological state. The ecological impact, then, is not physical or biological. Nor is it human and moral. Ecology, and thus ecological, is neither one nor the other because such distinction is too distanced from the start. There is, though, no such distance to be had, or gained.

Arend continues in a register of alarm, urgency, and even horror: The virgin timber is gone; brushfields are more prevalent now than they "could have been under a climax canopy of conifers or hardwoods;" native grasses have changed or been grazed to extinction, replaced by "exotic annual grasses;" each "exotic brings with it...a micro-environment filled with micro-organisms...different from what was in the soil before;" the land has been drained, which has in turn modified Valley vegetation; land has been cleared, burnt over, graded, built-over with houses or barns, office buildings and stores, and linked with sidewalks and roadways; erosion has accelerated; and so on.²⁴⁷ The ecology of the climax canopy, native and exotic species, even change itself, is moral evaluation. "Not least in ecological impact," he adds, "are ubiquitous hosts of commensals that always accompany western man, even today...Old World cattle, horses, pigs, sheep, dogs, cats...domestic ducks and geese...assorted fleas and lice to match them all...Italian and Caucasian bees, house flies..." As he says, his list is long.²⁴⁸ It is here, however, that Arend finally gives indication as to whether human individuals and populations are an ecological problem, and thus, of, within, and by ecology itself, while also utiliziers of ecology

(as nature, or the world) as resource. “All these [commensal] organisms,” he laments, “have joined with man in making an impact on the pristine environment, by usurping a filled niche or occupying a vacancy.” Immediately he seeks to reaffirm ecological, which is to say, scientific neutrality in his evaluation:

A moral judgement is not made; there have been no “good” impacts nor “bad.” There have been severe, moderate, or slight impacts, evaluated by the modification they have induced in the observed balance of the ecosystem. No quantitative evaluation of man’s impact on the Project area can be made without precise and exhaustive research data; a qualitative evaluation would add only tedious detail...²⁴⁹

Severe, moderate, or slight impacts will return to our attention in chapter 2 as strong and weak interactions, evaluated by the modifications the actors and reactors, or interactors, make in the observed conditions of the ecological community. For Arend, “impact on a pristine environment” that veers away from pristine can only tend in one direction, and only be understood as caused by one type of causal agent: the impure, the (ecologically) unknowledgeable, the unfree, the morally debased. How is such deviation to be discovered, discerned, examined, and evaluated from the evidence of the land? How is it to be judged as deviation at all? Habitat, ecology, and ecological – that is, the world and as the science that studies it wholistically – are the means whereby such scientific moral evaluation and subsequent judgement can be passed with unblemished scientific neutrality. Impact upon the pristine environment, which is to say, the total habitat, “is evaluated by the modification they have induced in the observed balance of the ecosystem.” The ecosystem is a quantitative, mathematical model which, as different factors and variables are calculated, varies interactively, i.e. dynamically about a *norm*. Irrevocable deviation from this average destroys the norm, the balance, as is thereby pathological. Total habitat, itself, is a system of functional, classificatory habitat- or vegetative sub-types, accountable in the manner of inventoried stock. It is exquisitely amenable to the calculative evaluation and judgement of the ecosystem. Ecology, Arend understands, is both the world and the scientists that research it ecologically, subjecting the world to evaluation, examination, analysis, experimentation, and explanation as means to actualize their end-goals by achievement, even if these be filling in glaring gaps in the ecological knowledge. Ecologists, it would seem, in this way, are also pioneers: scientific pioneers, colonizers, and utilitarian, however good—understood as valuable—they judge their intentions, means, and end-goals.

With the moral support of scientific ecological explanation and, thereof, scientific knowledge of how the Eel River basin ecosystem functions and interacts inter- and intra-dependently, Arend is quite bold in his criticisms, especially considering his employer and his forum. Habitat and wildlife management agencies, in response to legislatures and the general public, cannot but go the direction in which the latter’s interests lie.²⁵⁰ This can be unfortunate, such as in the case of their prolonged overemphasis on game animals in research. Even so, he acknowledges that there are “valid social, economic, and political justifications for this tacit acceptance of direction.”²⁵¹ Given this, he continues, “it is vitally imperative...for an agency faced by that ecological problem to understand that intensive study of only one or two organisms, abstracted from the complex ecological web, can not [sic] give a truly complete picture, not even for the favored study animal.”²⁵² The intensive study of only one or two organisms, abstracted from the complex ecological web, in the case of a river and its lives, are

often called suitability studies. Suitability studies produce suitability criteria, and more often than not, historically as well as today, they go hand-in-hand with the engineering and regulation of rivers and streams. In each and every governmental agency report I have spoken of until now – from at least Shapovalov forward – consideration of environment, organism, or population has taken the form of suitability studies, and the resulting criteria. Arend offers, therefore, both admonishment informed by an enlightened ecological science, and an urgent ecological warning to management bureaucracy. A “truly complete picture” is possible – i.e. a truly complete knowledge, where knowledge is re-presentation of the world itself in essence apart from this world – and it is possible only if the complex ecological web is accounted for. Here again Arend understands ecology to be nature or the world itself. The science of ecology subsequently comes along, discovers, examines, evaluates, and explains this ecology, including of course ecological webs – but only subsequently, for the science of ecology, let us recall, is very young; ecology itself is ageless.²⁵³ The science of ecology is *necessarily totalizing*, because ecology itself is *total*, it is all that is, insofar as what is is what is actual:

The total environmental must be studied; even an [sic] shallow total environment study will supply more effect management information than an intense study of a single organism isolated from its environment. The agency must not only understand this; it must, as agency policy, try to acquaint its guiding entities with this simple reality. [Arend’s underlining]²⁵⁴

The total environment must be studied. This total environment, which entails all living and non-living, or biotic and abiotic existing-existences, is ecology. It follows that the science of ecology is the appropriate science. *This* must not only be understood by the management agency, which is to say, by agency personnel, but the agency must acquaint its guiding entities with this reality. Ecology, ecological, and ecological webs as total environment: this is reality. Ecological science as science of this total environment: this science and its scientists reveal reality for common sense. Who are the guiding entities of such a wildlife or habitat management agency? Arend has already answered this: legislatures and general publics, which is to say, everyone, or at least everyone within the territorial borders of California and the United States. Arend, then, fires a thinly veiled warning shot to an otherwise dim bureaucratic state management complex entrained to a less-than-enlightened dictatorship of private and public interests. With more than a little irony, he calls simultaneously for the total, and thus totalizing, ecological research necessarily to produce the total ecological knowledge of the study area in question. This total ecological study and its resultant total knowledge should provide an accounting inventory of all habitat types, their living beings, and their material and energy interactions; that is to say, an quantitative inventory of stock. These accounts would be taken and kept by ecologists and related teams of scientific experts. These scientists can, in turn, guide the formulation of management policy based upon the product of their research, total ecological knowledge, such that freedoms, the unfettered wildness, and the unregulated wilderness of the Eel River basin ecosystem’s ecological balance is scientifically guarded and protected. This system, if humans allow it to run its course, will deviate and return once and again to a proper ecological equilibrium if unregulated, unimpeded, and undammed, cycling *laissez faire* in ecological freedom of operative material and energetic interactivity.

For Arend, ecology is unceasingly active material and energy flows and the supervening webs of interdependent, functional individuals, populations, and their trophic interactions such

activity autonomously structures, self-regulates, and re-structures. Rivers such as the Middle Fork Eel are, as quoted above, ecological arteries through which pulses living energy. Understood to be material and energy interactions, both the river and its related trophic webs are scientifically explainable and quantitatively accountable. One can scientifically explain “how the energy generated from living matter” in the Dos Rios Project area travels up or downstream, thereby making, structuring, transubstantiating, and thereby again, constantly, with absolutely exceptionless contextual specificity, dynamically transforming “the ecological food web of the Dos Rios Project,” i.e. the ecological food web of the ecology of the Middle Fork Eel River and, thus, the Eel River basin ecosystem in its entirety.²⁵⁵

2.5 The ecology of the Eel River, 1970 – 1990

Arend’s report evidences the increased dissemination and case-specific applications of the science of ecology and its ecological explanations – particularly ecosystem ecology – in popular understanding by 1969. During the decade of the 1970s, this science gradually infused, with ecological knowledge, municipal, state, and federal office blocks; subsequent volumes of public agency reports; contemporary methods of field work; and ongoing governmental-scientific analysis whose predecessor activities and agents had kept the Eel River and its basin in their gaze since at least the turn of the twentieth century.

In 1972, the Federal Power Commission of the U.S. Bureau of Power issued a report intended to provide information which the Commission could consider in evaluation of the Potter Valley Project for hydroelectric relicensing.²⁵⁶ Much of the basic material used in the report was taken from previous reports of federal, state, or local entities. Many of the reports discussed above are among these. Overtly environmental considerations are limited to less than two pages at the end of the report. The Commission notes that the Eel River was considered for protection under the U.S. Wild and Scenic Rivers Act of 1968, but that it had not as of yet been included (and would not be so until 1981).²⁵⁷ Other environmental considerations restrict themselves to recreational utility evaluation in which sport fishing of iconic species still figured prominently. In general, the report concludes,

[s]ince the [Potter Valley] project has been in existence for about 50 years, its environmental impact is generally established. The project and its operation are favorable to the environment in many respects such as providing power, municipal water supply, irrigation, fish and wildlife enhancement, and recreation.²⁵⁸

For the community and food web ecologists who would arrive to Eel River in the 1980s, declarations of such character would typify little more than hasty overconfidence, far afield from meticulously hewn ecological knowledge. Yet such a dichotomy of empirical, evidence-bound ecological scientists over and against empirical, evidence-bound bureaucratic government technicians is misleading. The science of ecology for any and every ecological case could not progress without, first, for example, a baseline of scientific natural historical knowledge. The activities, as well as the techniques and technologies utilized in such activities, of the UCACE’s, the Bureau’s, the CDWR’s, or CDFG’s technicians, calculators, and analysts are often similar, if not the same, as those of a scientific ecologist composing the scientific natural history of his or her case site. Or, for example, if the Commission’s working assumption in the above passage is that the Potter Valley Project is favorable to the improvement, intervention into, and thus rational

government, or biopolitical management, of the environment as resource for human populations, its arguments and premises might not be agreed to by ecologists, or gaps in knowledge could be cited, but ecologists could not very easily scientifically evidentially contest such positions—they might contest *how* or *why* the Potter Valley Project is managed and regulated, or even its continued operation, but could not scientifically-empirically contest that it is or is not favorable to and for the management and regulation of the Eel River and its surrounds for end-goals of the average health and wellbeing of California’s human populations. Rather than clarity, we find ourselves mired in the dissonance of flipping between two sides of a same coin as if each side were, rather, individual standing opposites. There is, for example, the perennial question in ecology: What is the ecological baseline, the original normal state, multiple states, and variability of the health and wellbeing of an ecosystem, ecological community, ecological food web, or ecological population, and what *should* this state, these states, and these variations be, against which to evaluate the system the ecologist researches in order to—as the ecologist’s most immediate goal—scientifically explain?

By the early-1970s, the increasing prevalence of ecological explanations of the Eel River was notable through its institutional uptake. In March 1972, the Region 2 Division of the Bureau of Reclamation released a feasibility-level report on the English Ridge Unit (ERU).²⁵⁹ With its projected construction on the mainstem Eel River about thirty-one miles below Scott Dam and Lake Pillsbury, the ERU would comprise a rolled earthfilled dam 553 feet high whose reservoir would flood the Van Arsdale Reservoir of the Potter Valley Project twenty-one miles upstream.²⁶⁰ Though construction of the ERU was not recommended at the time of the report’s release, the ERU was nonetheless a central element of CDWR’s Upper Eel River Development, second in priority only to the USACE’s Dos Rios Project.²⁶¹ Under the control of the Bureau of Reclamation, the ERU’s primary function would be to supply water for agricultural irrigation in Solano County as well as for both agricultural irrigation and industrial and municipal use in five separate areas of Mendocino, Lake, and Napa counties. Additionally, its economic justifications included recreation, fisheries “enhancement” – with a fish hatchery, fishery releases, stream habitat management, and a proposed wildlife management area – and, finally, a modicum of flood control.²⁶² There are three aspects of this report that are noteworthy. These aspects distinguish it from prior reports concerning the Eel River published individually or jointly by the members of the State-Federal Interagency Group. First, the Bureau’s report dedicates one entire chapter to “Environment and Ecological Aspects” of the ERU project. The Bureau opens the chapter in a remarkable manner: “The environmental impact of the English Ridge Unit has been evaluated in compliance with the National Environmental Policy Act (P.L. 91-190) [NEPA].”²⁶³ This is the first time a federal agency concerned with the Eel River development had evaluated an “environmental impact” under federal law. Effective as of January 1, 1970, the Congressional statement of purpose, set forth in NEPA’s preamble, reads:

To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.²⁶⁴

Ecological systems and their natural resources are important to the nation—to the nation’s national policy; to the productivity of and harmony between man and his environment; to the

prevention or elimination of damages to the environment and biosphere; and to stimulate the health and welfare of man. The means to these goals are the enrichment of understanding, or knowledge, of the ecological systems and natural resources important to the Nation. The science of ecology is, at least in this instance, endowed with a wide authority and recognition of the promise of its burgeoning scientific expertise.

The Bureau's chapter "Environment and Ecological Aspects" gives careful, analytical consideration to water quality (temperature, turbidity, nutrients, and control measures), streamflow regimen, pollution, fish and wildlife populations, recreation, flood control, land inundation and use, historical and archaeological sites, and – as named – the human environment.²⁶⁵ Strikingly, human activity and history are understood as ecology or, at least, as an aspect thereof. Thus, all of the topics of the chapter are bound within what is ecological. This is to say, all of these topics, including human history and the human environment, are understood to be in or of ecology, and thus ecological. Of course, the familiar ambiguity between environment and ecology appears here, as well – as it has elsewhere – making it difficult to discern in detail what ecology is understood to be. Is it science? Is it the world? The latter seems almost certainly understood: whatever else it may be, ecology is the world and its constitutive activities which ecological scientists study. What also noticeable is that environment and ecology are understood to be united pair. Together if not each individually, they are a totality – indeed, the totality – of that which is human and non-human, living and non-living, biotic and abiotic, static and dynamic, and material and energetic, and so on. Environment and ecology *are* everything and every being, and as such all is susceptible to scientific knowledge and thereby the view, conduction, and control of scientifically-guided governmental rationality and enforcement. "The net effect," concludes the Bureau,

of the English Ridge Unit...on the environmental and ecological aspects of northern California counties of Mendocino, Lake, Napa, Solano, and Humboldt should result in overall enhancement and improvement. Any construction could change or destroy certain environmental, ecological, aesthetic, and human interest values, and at the same time create new ones, achieving a balanced exchange of these values, without destroying the important and highly prized natural resources of the environment.²⁶⁶

As I said above, environment and ecology, or "ecological," are redundant, naming the same: both are a totality of values, and as such, radically commensurable, and thereby radically calculable. As values, or even if only as evaluable and, thereby, potentially valuable, both environment and ecology are standing-reserve—which is to say, resources and means, even if only resources and means for filling the gap in our scientific knowledge.²⁶⁷ Both ecology and environment, therefore, are readily amenable to rational, biopolitical governmental intervention, conduction, and control so as to achieve enhancement and improvement, whether by bureaucratic engineers, technicians, and administrators or ecologists conducting research in order to explain the ecology of that which they research.

Among other documents, the Bureau includes as appendices one independently published report and one report specific to its own.²⁶⁸ These are the second and third noteworthy distinctions of the Bureau's report from those prior. The second distinction is a report detailing studies undertaken by the Federal Water Pollution Control Administration (FWPCA), which – as the Bureau notes – as of December 1970 became the Environmental Protection Agency.²⁶⁹ The third distinction is a report submitted to the Bureau by the Fish and Wildlife Service of the U.S.

Bureau of Sport Fisheries and Wildlife.²⁷⁰ The latter report broadens the extent and thickens the coverage with which the Bureau of Reclamation concerns itself with “environmental and ecological aspects.” Similar to Arend’s evaluation, that authors note on the first page of the Bureau of Sport Fisheries and Wildlife’s report that, as of 1972, “[t]here is insufficient information available to permit a complete appraisal of all important effects [on sport fisheries and wildlife], particularly on the Eel River below English Ridge Dam, and on the conveyance [sic] routes, storage reservoirs, and service areas outside of the Eel River drainage.”²⁷¹ The remainder of the report analyses effects anticipated from the construction and operation of the ERU on fish and wildlife, “to the extent that they can be predicted.”²⁷² The report’s content is primarily concerned with game fish, the massive destruction of steelhead trout and salmon migration routes and spawning habitat, the fish hatchery production quanta necessary to sustain population numbers, and the optimized conditions for each respective game fish population’s survival, reproduction, and enhancement. For example, “although precise information on distribution and abundance of anadromous fish is presently unavailable,” the authors estimate that an average of 9,000 fallrun chinook salmon and 12,000 steelhead trout spawn annually in the Eel River and tributaries upstream of the ERU. With their loss, an average annual sport angler-use “of these resources” of 50,000 angler-days would also disappear.²⁷³ The Bureau pays most attention to the decreased numbers and variety of wildlife, which is to say, principal macrofaunal terrestrial species. In either case, however, it calculates numerical predictions of individuals of each species displaced and likely lost, of the correlated hunter-use days or angler-use days, and animal-use days (use days of, for example, black-tailed deer, steelhead trout, etc.) lost each year. For example, about 1,300,000 black-tailed deer use-days are estimated annually to be lost, resulting in to loss of an annual average of projected hunter use expended on these deer of 9,500 hunter-days.²⁷⁴

The FWPCA’s report is of a similar register, perhaps indistinguishably economical and ecological.²⁷⁵ The report covers two study areas to be affected by the ERU project, the Eel River Basin and the Putah-Cache Creek Basin, with one chapter dedicated to each. The FWPCA begins each of these study areas’ respective chapters with an overview of the region’s economy before proceeding into the science of water quality. The overarching purpose of the report is “to describe (1) the need for and value of reservoir storage for streamflow regulation for water quality control, and (2) the potential impact of the project on water quality.”²⁷⁶ To achieve this for both study areas, the Administration acknowledged several difficulties, ecological in character:

the impact of [ERU] development upon the waters of the Eel River...requires projection based on judgment and analysis involving many different scientific and socio-economic disciplines. The problem is one of projecting the future environmental quality produced by the development and routing schemes, interpreting the biological and human reactions to the altered water quality, and evaluating this reaction in monetary terms.²⁷⁷

Predicting the future of the Eel River Basin and all of its living and non-living beings is the goal to be achieved. The control and regulation of water quality is a means to the goal of a futurity in which environmental value and ecological value, the harmony between man and his environment, and man’s health, welfare, and economic productivity are the key parameters.

To progress towards such a goal for the Eel River Basin, the FWPCA develops a methodology. Predictive calculations “were made of future water quality throughout the study

area with and without the English Ridge Project for various waste treatment and disposals schemes.”²⁷⁸ A digital computer performed these calculations utilizing “a mathematical model of the Eel River and Putah-Cache Creek Basins.” The model’s parameters were chemical content per unit volume of nitrogen, phosphorus, total dissolved solids, and boron. The model’s structure “allowed investigation of the effects of waste discharges from towns, industries, recreation and irrigation areas, and of reservoir operation and water resource management practices on the hydrological and quality characteristics of the stream.”²⁷⁹ To verify input data and model operation, “computer runs” included both existing conditions and predicted future conditions under estimated reservoir releases and waste discharge schedules. FWPCA enumerated the steps of its methodology in the following manner:

For each study, the system was first described by (1) its natural, unimpaired hydrologic regime, (2) evaporation and seepage conditions, and (3) its ambient water quality. A management plan was then imposed on this system consisting of (1) geometric locations of reservoirs, waste inputs and water uses, (2) a schedule of waste loadings from towns, industries, and irrigation districts, (3) a table of the capacities, downstream release and export schedules for the reservoirs, (4) water quality objectives, and (5) flow requirements and diversions.²⁸⁰

Each of the parameters mentioned above is the product of prior quantitative evaluation and specification. Doing so – recall, a in widely acknowledged lacunae of “insufficient information to complete a complete appraisal” – was given this form:

Dissolved oxygen (DO) concentrations used in this study as objectives for the evaluation of future flow requirements in the Eel River are 9 mg/l during November-April and 7 mg/l from May-October...The higher DO level used in this study reflects results of laboratory experiments with salmon embryo and the need for a safety margin to allow for DO fluctuations associated with the variability of natural runoff, indirect waste discharges and respiration of aquatic life...Maximum nutrient levels believed appropriate for the Eel River are 1.0 mg/l total nitrogen and 0.1 mg/l total phosphorus.²⁸¹

Total is written here in the sense of “for the entire Eel River,” a river and its tributaries stretching hundreds of miles. For this total the FWPCA provides average, normal chemical suitability criteria and future objectives to be achieved based on quantified measures which account for the respiration, for example, of all the Eel River’s biological organisms. Each of these quantitative parameters was, in turn, based on scientific studies cited in the report’s bibliography—studies conducted elsewhere than the Eel River Basin, imported, and applied to an innumerable number of spatiotemporally specific points within the Eel River and its tributaries. With this radical commensurability and quantitative substitutability actualized in advance, the computer model designed could be programmed to calculate the futurity of the Eel River Basin – a system, certainly ever more ecological – under a variety of variable parameter-bound conditions. This is the science of ecology of the Eel River and its basin: the prediction and control of the future of – both by means of and in order to scientifically regulate and manage – the Eel River, its basin, and all that these comprise.

Concern with ecology and its scientific study are evidenced in another report the Bureau of Reclamation first published 1972 (and revised in 1974), in which ecology is mentioned

twice.²⁸² Notably both instances occur within identical phrasing. The first instance explains that the “emergence of environmental awareness has generated many questions about the ecological and environmental impact of water resources projects, some of which without further studies and additional technical knowledge, are presently unanswerable.”²⁸³ There are several things of note. First, the questions referenced concern ecological and environmental impacts. Physically, an impact is one or more actions and reactions, or what is the same, interactions. Second, the authors understand that the increasing environmental awareness of the 1970s generated questions about ecological and environmental impacts, i.e. ecological and environmental interactions. Environmental awareness is awareness of ecological and environmental interactions or, at least, questions regarding these interactions. Third, ecology is differentiated from environment. Both appear in adjectival form, modifying the impact of water resources projects. What ecology is taken to be, then, is difficult to guess. What is clear is that water resources projects – human activities that alter the Eel River and its basin more broadly – impact *upon* environment and ecology. There is an implicit, initial separation between the three, each somehow exclusive of the other two. It is only thus that impact between the three – water resource projects, ecology, and environment – is possible. In the second mention of ecology in the Bureau’s report, the authors indicate that, indeed, the uptake and dissemination of ecology in popular form as lay common sense, explanation, judgement, and justification had indeed already reached the banks of the Eel River: “At the present time there are strong objections from several sources to the plans for dams and reservoirs in the Eel River Basin because of their possible ecological and environmental impact.”²⁸⁴ As in the first instance, dams and reservoirs are understood to disturb or disequilibrate ecology or an ecological system.

The Bureau published a revised edition of this report in January of 1974.²⁸⁵ They were obligated to do so in lieu of the state of California’s 1972 enactment of its own Wild and Scenic Rivers Act, or Senate Bill 107.²⁸⁶ It prohibited construction of any new dams, reservoirs, or other water impoundments on the Eel River for twelve years, at which time the state legislature was to hold public hearings to determine if continued protection under the act was warranted. With the revised edition, the Bureau decided officially to redirect its study of the river, deferring further investigations of Eel River water storage and diversion developments until more certainty could be had regarding its future status under California’s Wild and Scenic Rivers Act. In the meantime, the Bureau states, “study efforts should be directed toward problems such as fish, wildlife, and sedimentation, where much of the basic data and understanding that is now lacking is needed regardless of the future development concept for the Eel River Basin.”²⁸⁷ The Bureau also includes a copy of a letter signed by Richard Wilson on behalf of the Citizen’s Environmental Advisory Committee. Richard Wilson—a Dartmouth-educated, first-generation cattle rancher in Round Valley from a prominent, well-to-do family in Los Angeles—was the primary organizer and popular movement leader that went toe-to-toe with the USACE’s plans for the Dos Rios dam and the consequent flooding of Round Valley.²⁸⁸ In his letter, Wilson states that the Advisory Committee fully concurs and supports the Bureau’s redirected objectives, especially towards a “thorough and complete investigation of all the ecological and environmental effects of dams on the Eel River[...].”²⁸⁹ It is reasonable to assume that, had ecologists studied the Eel River prior to the composition of Wilson’s letter, the Citizens Environmental Advisory Committee – a fervent defender of Round Valley and Dos Rios against the USACE’s and the CDWR’s Dos Rios Project – would have discovered and cited it. Instead, the Advisory Committee “agree[s] that there are many questions about the ecological and environmental impact that are presently unanswerable because of the lack of studies and

technical knowledge.”²⁹⁰ As of 1972, professional, academically credentialed ecologists had not yet researched the ecology of the Eel River and its aquatic ecological food webs.

Two reports from the state of California likewise reflect both the growing technical and popular concerns with the ecology of the Eel River during the 1970s. CDFG published a report in 1974 that exemplifies a mixture of preservation-inspired, conservation-oriented utilitarian scientific natural history and scientific ecology.²⁹¹ The first stated purpose of the report is “to document the natural resources of the Eel River Delta”²⁹² of Humboldt County. The resources are to be surveyed, described, quantified and counted, and in this way, formally documented. These are resources of the Eel River Delta, which is in turn *of* Humboldt County, a unit of the state of California. The subsequent, related purposes of the report are “to outline and evaluate the problems and conflicts of use that effect those resources” and “to recommend measures that will protect and enhance the Delta and its environs.”²⁹³ To recommend measures is to formulate policy proposals. Policy is the calculation and positing of a system of enforceable rules so as to achieve desired effect on and in a human population and, in this case, its environment. CDFG initiated this “high priority, statewide inventory,” including of the Eel River Delta, because of “the importance of coastal wetland ecosystems” to the health and wealth of the institutions of the state, the state’s population, and its resources.²⁹⁴ What is to be inventoried are systems and their constituent, functional parts. These parts are functions, both as functional parts of ecosystems and as functions of the mechanisms of evolution by which “all living things have developed morphological and physiological characteristics which enable them to survive under certain environmental conditions.”²⁹⁵ Evolution is also, therefore, a system whose progressive production is of biunits whose progressive or regressive degree of fitness determines adeptness for survival. These are a particular class of system: ecological systems, or ecosystems. Such a system, as such, is perfectly amenable to taking inventory of stock, as it is to the conduction or operations by means of policy and the ensuing management, e.g. environmental or natural resource policy and management.

The CDFG authors understand that food chains structure the ecological system, thereby “supporting the higher forms of bird and animal life within the ecosystem.” Food chains link and structure the system’s functional parts toward productive outputs.²⁹⁶ As with any open or closed system, certain mechanisms function to regulate and control its operation. In the Eel delta, reptiles and amphibians, for example, “help to control populations of prey species within these ecosystem.”²⁹⁷ Likewise, “any substantial change in either the physical or biological environment can disrupt the entire system”: when functions alter, operation is disrupted.²⁹⁸ Notably, when the natural system’s operation changes, biological resources are profoundly affected.²⁹⁹ That which is to be evaluated is already understood to be values. As values, they are the result of prior, perhaps more primordial and conditioning evaluation: “The fish and wildlife values of the delta are high because of the variety and interspersion of habitat types. An inventory of habitats in the delta includes” thirteen habitat types, or taxonomic classifications that constitute habitat.³⁰⁰ To quantify and enumerate, habitats must be defined and delineated. A habitat type, then, is a taxonomic unit susceptible to quantification and enumeration. The existence or not of any given living being is a function of habitat type: “The amount of each habitat type...determines the number of individual organisms of any given species that can exist.”³⁰¹ As factors, i.e. values, habitat-type units are radically commensurable, interchangeable, substitutable, and reproducibly manufactured: “Unless new habitat is created elsewhere, the displaced animals are lost in proportion to the amount of habitat lost.” Habitat and corresponding speciated individuals are susceptible to our calculation. They are, also,

standing in reserve for disposal at our will: “The key to preservation of fish and wildlife thus becomes the ability and willingness of all people to preserve sufficient quantities and qualities of habitat to insure the existence of all living forms.”³⁰² We will the existence and this existence’s security of all living beings by means of preserving sufficient quantity (number) and quality (type) of habitat. The world is systematized into a functional taxonomic hierarchy. Below habitat types are taxonomic species. *All* such species units and their constituent parts – from macro fauna and flora to invertebrate life of which “not much is known” – *are* natural resources.³⁰³ The calculable, taxonomic hierarchy of natural resources is determined as such in advance, regardless of its particular, spatiotemporally contingent constitutive parts. Appendices A through E of the report evidence this taxonomic hierarchy. Occupying a total of 18 pages, each appendix pertains to a class of macroscopic organism present in the delta region. Each organism is listed by common name and then-current Latin taxonomic nomenclature. There are usually between 30 to 50 organisms per page: common plants, birds, mammals, and fishes. Species-specific avian populations emerge as avian individuals of various species are counted and aggregated by month into a chart. Even the streams and sloughs tributary to the Eel River Delta are enlisted, classified by total mileage of fresh and brackish waters. What is to be recommended by the authors for the delta’s protection and enhancement are *measures*: regardless of whether they are qualitative or quantitative, such measures, as measures, can only be calculative of taxonomized and thereby legible resource units revealed as and taken up as values. The delta in its entirety is value, useful and utilizable for our goals and purposes: “particularly valuable for the study of natural history, ecology, fish and wildlife, and related subjects. High schools and elementary schools also utilize the delta...and scientific use of the area is also made by government agencies, independent research foundations and private industry.”³⁰⁴

In this last quote, ecology is a scientific study. Elsewhere throughout the report, however, ecosystems and ecology are understood to be the world, constituted as the world is by evaluable values. This ambiguity pervades the report. The authors dedicate a chapter to ecology, entitled “Ecology.” They begin by writing what ecology is: “ecology is the study of the interrelations between living organisms and their environment.”³⁰⁵ “A given area in which these interrelations occur,” they continue, “large or small, is described as an ecosystem. The Eel River Delta is such an ecosystem.” The scientific epistemological tacking at will, or perhaps without awareness of so doing, between what is (“the Eel River Delta is...an ecosystem” [i.e. an ecological system]) and what is instrumental, operationalized description is also present in this report. Continuing, the authors do *not* write directly what the Eel River delta is, but rather how it *should* be viewed: “...the delta should be viewed as many smaller individual ecosystems which form a composite that gives its particular character.” What the delta is, however, as the authors understand it, can begin to be discerned nonetheless, for they could not speak of the delta or write of the delta without, at least, understanding in advance *what* it is. The delta is that which human beings can choose how to view depending upon—i.e. relative to—what their end-goals are, i.e. what one human being or a group of human beings wills to achieve. The world is a supermarket of perspectives that human beings shop for, choose, try on, return, or discard at will relative to what our end-goals are. The value or lack of value of a perspective is the utility, including the effectivity and efficiency, the human perspective-shopper evaluates, i.e. judges the perspective to have relative to his or her or their end-goals. In the authors’ view, the delta should be viewed as an ecological hierarchy of ecological systems—an ecosystem of sub-ecosystems that, together, operate functionally, valuably, and wholistically. This perspective, however, is a perspective. What the Eel River delta is and can be, as far as human beings are concerned, is a

perspective chosen willfully among perspectives, a frame selected at will among frames, the selection of which and the utility of which, and thus value of which, are, in origin and end, relative to the viewer's willed end-goals. In this perspective, the world is ecology is ecosystems from beginning to end, spatiotemporally absolutely—perspectives of perspectives, enframings of frames upon frames, relative from beginning to end to the human viewer. The authors further construct their perspectival enframing of what the Eel River delta is: “And, as an ecological unit, the Eel River Delta is also a part of a much larger system, the coastal wetlands of California.”³⁰⁶ The Eel River Delta, as ecology, is an ecological unit. This ecological unit is a part of a larger ecological system, the coastal wetlands of California. The authors write of the United States *state* of California. Whether or not this another perspective or enframing they constitute as a means to their end-goals they do not write. The question again arises: *What is ecology?* And: *What is the ecology of the Eel River?*

Species-populations are fundamental to the scientific natural history and ecology of the CDFG's report—both ecology as the world and the science of ecology. These, recall, are perspectives or frames the viewer can willfully choose to utilize, evaluate, and accept or reject relative to his, her, or their end-goals. Scientific energy and scientific matter are, and can only be, the same. What scientific energy and scientific matter are—if we follow the authors' understanding—are enframings, frameworks, perspectives to be accepted or rejected at will according to their value relative to the willed end-goals of the human viewer. Scientific energy and scientific matter are perspectives, frameworks, frames created, or what seems to be understood indistinguishably, made or produced by human beings relative to their end-goals. That is, these perspectives, or frameworks, are *engineered* by human beings—whether individually, collectively, or both, diachronically and dynamically—relative to our biological needs and willed end-goals and, thus, valuable to us in order to view the world relative to our will and thus valuably or not relative to this or that perspective or frameworks effectivity and efficiency. The authors also understand, however—with no explicit, normative perspectival enframing by the authors—that scientific energy is simultaneously, equally, and identically the actor, the self-enacted enacting activity, and the acted upon reactor; or what is epistemologically metaphysically the same, and thereof, scientifically-epistemologically the same, the efficient creator, efficient creation, and efficiently created creature; and what is epistemologically metaphysically and, thereof, scientifically-epistemologically the same again: scientific energy is the efficient producer, efficient production, and efficiently produced product. In this framework, scientific energy is a product, the result of production.³⁰⁷ Any given area (a quantitative mathematical unit, or value) of earth or water, or habitat, can increase or decrease production based upon the variable inputs fueling the operating of the habitat function. For example, it is the Eel River's floodwater “that continues to lay down rich soils and sediments, increasing productivity in the area.”³⁰⁸ “This productivity,” in turn, “is the basis for all life,” and correspondingly, “the richer the soils and water the greater is the production of living beings.”³⁰⁹ Accordingly, “[a]ll life subsists on energy.” This energy “originates only in plants.” Here we have the miraculous scientific-epistemological transubstantiation of scientific energy to scientific matter, or perhaps vice versa. “Plants manufacture organic nutrients,” the authors continue. Having taken the form of fats, carbohydrates, and proteins,

these nutrients are passed from organism to organism through a complex food chain. The energy is thus used and re-used by each organism, including man, within the system. The

energy is returned to the system by bacteria which aid decomposition of the tissues of dead organisms and return them to their basic organic and inorganic components.³¹⁰

What is noticeable is that the authors no longer write of evaluatively judging, choosing, accepting, or rejecting perspectives, frames, or frameworks. They do *not* write, for example: “Plants should be viewed as manufacturing organic nutrients” or “energy is a perspective and should be utilized to further choose the perspective that all life subsists on energy and to accept or reject the framework, or view, or perspective that plants make nutrients from energy, where both nutrients and energy and plants are all further perspectives that humans beings make, can shop among, choosing, testing and experimenting with, evaluatively judging, and accepting or rejecting, all relative to his, her, or their end-goals and worldviews, world enframings, perspectival perspective worlds. Instead, the authors write baldly: energy originates in plants; or, this productivity is the basis of life; or plants manufacture organic nutrients; or, these nutrients are passed from organism to organism through a complex food chain; or, the energy is thus used and re-used by each organism, including man, within the system; and so on. They write nothing, *here*, of these being perspectives that the reader should, minimally, experiment with and evaluate for his, her, their, or our end-goals. A plant, then, is a manufacturing unit, a production unit, a workshop whose functional operation is making scientific matter from the raw inputs of energy resources or energy values. Production’s input is scientific energy. The product is scientific matter, or elemental and molecular nutrients. Nutrients – fats, carbohydrates, and proteins – are the economic currency that both, simultaneously and identically, makes and is biological life itself and each and every biological organism. This matter circulates among organisms through chains of production and exchange, also called food chains. That man is an energy utilizer *within* this system requires special note, emphasizing implicitly the contested nature of this opinion. The conservation of matter, or energy, is maintained, ultimately: any outstanding material or energy debt not paid prior to an organism’s demise is, nevertheless, re-appropriated and thereby returned to the system by bacteria. Within the system, conservation of energy presupposes what is scientifically called “work”: an organism necessarily, endlessly unendingly biologically labors in exchange for the matter to continue making, or producing, or efficiently creating its own biological life. An ecosystem is not only one of production, labor, and exchange, but of payment and debt, wealth and poverty, accumulation and loss, appropriation and dispossession. In this manner, the system’s functions are balanced even in the face of variability, and its operation continues inexorably: productivity and, perhaps, progress are also conserved. As an example, the authors choose “the life cycle of one of the river’s most important residents—the king salmon.”³¹¹ Any given king salmon’s life, and thereby all king salmon, are functions of the ecosystem and its sub-ecosystems’ operations. Each and every king salmon is both a constituter and and—simultaneously, equally, and identically—constituted by the ecosystem of ecosystems. The salmon is both part and function of these systems, as well as all things that interact with the salmon during its life. The world, in its entirety, is an ecosystem of ecological systems. The world is ecology. The science of ecology is the wholistic, case-based science that evaluates, examines, analyses, and operates upon or experiments upon in order to explain the world, that is, ecology.

The CDWR also published another report on the Eel River basin during the same year, 1974.³¹² As we have seen, until this time CDWR had exercised great caution and circumspection when writing (or not writing) of ecology, or of ecosystems, or when referencing the science of ecology and ecological knowledge, regardless of whether this scientific knowledge was wielded

or levied by scientists or scientifically educated lay persons. The agency's prefatory remarks to Arend's report demonstrate this caution and, perhaps, wariness as late as 1969. This report, we recall, was researched and written by interagency agreement between CDWR and CDFG, under the auspices of CDFG for the purposes of satisfying the legal requirements imposed by the Davis-Dolwig Act upon CDWR's plans for its Upper Eel River Development complex. Prior to Arend's report, if ecology was referenced by CDWR at all, it was done so tangentially in adjectival form – "ecological" – and only in passing. This had changed by 1974.

The report CDWR issued in December of this year is a progress report dedicated *specifically* to environmental studies of the Eel River Basin. In light of the CDWR's prior studies and publications about the river and its basin, this purposive specificity is anomalous: No report prior to this date issued by any of the State-Federal Interagency Group members *themselves*, including CDWR, had been strictly and entirely devoted to an "environmental study." Environmental studies, largely scientific natural historical in character, had been significant parts of all State-Interagency Group members' reports since the early 1900s. In these, however, the technicians' and agencies' environmental studies were overtly instrumental as reconnaissance to evaluate the feasibility of infrastructural projects—e.g. dams, reservoirs, conduits, tunnels, etc.—proposed for the Eel River and its basin. Such reports were, at best, contributory chapters, but more often sub-sections, asides, or appendices bounded within a larger report concerned entirely and explicitly not with ecological or environmental populations and interactions, but rather with the engineering and economic feasibility, benefits, costs, effects and efficiencies of one or another water resource infrastructure project. With the possible exception of Arend's CDFG-commissioned report, a report dedicated entirely and explicitly to progress in "environmental studies" was unprecedented.

The reasons for the shift are readily gathered. As Northern District CDWR engineer Albert Dolcini explains in his foreword to the report, the California legislature passed the California Wild and Scenic Rivers Act in December 1972. The act became state statute in March 1973. Among many other enactments, it prohibited water development on the Eel River for an initial period of 12 years.³¹³ During this period from 1973 to 1985, CDWR "studies on the upper Eel River will be directed primarily toward analyzing environmentally oriented problems and accomplishments associated with the possible construction and operation of a large-scale water project" after 1985.³¹⁴ The 1974 report's content presents the results after the first 18 months of studies on sediment deposition and transport, effects of landslides, water quality, recreation, and fish and wildlife preservation and enhancement possibilities.³¹⁵ Its chapter titles include: "Channel Description and Sediment Studies," "Geology," "Water Quality," and "Fish and Wildlife." A common, unifying purpose to predict the futurity of the Eel River appears among all of the studies and as well as the chapters that report on them. Chapter two, for example, contains summaries of engineering studies on cross-section surveys of the Eel River channel, sediment load and riverbed material studies, and an evaluation of channel degradation immediately below dams. Such knowledge and understanding as these studies and research produce "should make it possible to predict and control" problems related to these topics on the Eel River.³¹⁶ Chapter four, on water quality, considers water quality studies on the Eel River undertaken since 1964 toward the goal of "obtaining information on the upper reaches of the river system so that predictions could be made concerning the effect of development of the stream system..."³¹⁷ Likewise, the studies of Chapter V concerning fish and wildlife were undertaken in order to "provide basic information on the fish and wildlife resources of the Eel River Basin so that the potential impact of water development can be incorporated into any

plan...”³¹⁸ Scientific research and related studies of the Eel River itself and its basin are directed in advance by the goals to be achieved: prediction, regulation, management and rational planning, control. As of 1974, this includes with evermore prevalence the science of ecology ecological explanation, and ecological prediction.

Chapter four, “Water Quality,” is exemplary of the novel purposeful and explicit deference to and uptake of the science of ecology of the Eel River, including this science’s necessary elaboration of site-specific scientific natural histories. Prior to 1972, water quality studies undertaken by CDWR centered on defining the physical environment and limnology of Clear Lake so as to predict the plausibility and extent of possible reactions to (or effects of) importing Eel River water as part of the Upper Eel River Development complex. Since CDWR’s general shift in orientation regarding the Eel River since 1972, studies sought “better definition of the characteristics of the water quality of the entire Eel River system.”³¹⁹ That the Eel River system is a operating system, and as such, is amenable to the positing of functionally operationalizable definitions is understood in advance. CDWR-related studies focused on two key areas: (1) “the natural temperature regime throughout the main stem Eel River,” and (2) “defining the present biological health of the system by obtaining a better definition of the population of aquatic organisms and the diversity of species at specific locations through the stream system.”³²⁰ To record the temperature of the entire Eel River system, five electronic “mercury-filled thermal system[s], portable type” were installed in the main stem Eel River to complement the two temperature recorders maintained by the U.S. Geological Survey at Fort Seward and Scotia.³²¹ These five new recorders were “calibrated and maintained on a biweekly basis during 1973 from the first part of May until the end of October.”³²² The temperature regime of the entire Eel River system is calculated from these seven sampling stations at which daily water temperatures are measured and recorded. From these, average maximum and minimum temperatures per unit time can be derived.

The second key area of water quality studies concerned the definition of the “biological health of the [Eel River] system.”³²³ What biological health was understood to be is not stated. One can, perhaps, nevertheless, infer what biological health was from the activities of technicians and scientists in order to define and evaluate health, as well as inferred from what is understood to be healthy or unhealthy, normal or abnormal. What is it that is either healthy or unhealthy, normal or abnormal, equilibrated or disequilibrated, stable or disturbed? This is perfectly clear: a hierarchical ecological system of internally operating ecological systems. There is, for example, the river system. Then there are the component parts: each “freshwater stream is a complex ecosystem.” As with the Eel River system’s temperature regime, “to determine the present biological health of the main stream, aquatic invertebrate samples were collected at three locations during May and August of 1972, and at five locations during May, July, and September of 1973.” The biological health of the river ecological system as a whole, and of each of its sub-ecosystems, is revealed through the techniques of invertebrate sampling, with samples collected at eight spatiotemporal point locations in the system. As a measurable entity, ecological system health cannot not be known without a normalized base-line against which to evaluate, examine, analyze, and explain survey and sample data. Taxonomic definition is a necessary precondition for the very possibility statistical evaluation and explanation, and thus all subsequent examination and evaluation of statistical data generated and utilized. The authors do readily admit that two years’ of data do not provide sufficient “information to identify trends developing with the system.”³²⁴ Sampling studies, taxonomic identification and statistically evaluation, aggregation, calculation, and analysis necessary to achieve base-line

normal states or conditions had not been performed as of 1973. The studies of 1972 and 1973 were understood to *begin* to provide this base-line data, and then only for a very specific category of animal in a very specific aquatic habitat type: “The data do provide, however, important baseline information on most of the aquatic invertebrates in a riffle environment of the Eel River.”³²⁵ Absent a statistical baseline for evaluation and “for comparison, it would be difficult to substantiate any changes. Consequently,” the authors continue, in this case addressing game fishes as they had aquatic invertebrates, “it is important that the sport fishery is defined and that a base line is established for future comparisons.”³²⁶

One method to measure and evaluate the stream’s health is to identify the different bottom-dwelling species at one or more points in the stream. A stream is, in advance, taken to be a series of empirically or rationally determinable mathematical points.³²⁷ Yet identification is not enough. “In conducting a benthic survey of a stream to determine its biological health...some information of the number of relative abundance of each species is required as well as the way the various species interact.”³²⁸ Data should include “the total number of living organisms and their biomass (mass of living matter) per unit area or unit volume of water, and the numbers and biomass of each individual species per unit area and unit volume.”³²⁹ Quantitative values are necessary for the subsequent comparison of any two samples, rather from the exact same place at different times (which is the only possibility – two samples cannot be taken at the *identical* place at the *identical* time) or from different places and times. As quantitative values, the contents of samples are commensurable, interchangeable, exchangeable, and substitutable. They are exquisitely functional and exquisitely operationalizable. Uniformity is necessarily presupposed: $1=1=1$, *ad infinitum*. They can, as such, be calculated. Any such quantification first requires definition. There are numerable technical, and also epistemological, problems impeding the progress of such collection, evaluation, and statistical calculation. For example, the authors note that “it is extremely difficult to obtain quantitative data on the benthic organisms of a stream. Researchers have reported that more than 100 samples have to be collected from an area before a valid statistical evaluation can be made.” In the face of such a formidable and expensive challenge, the authors seemed relieved to report that “many observers have concluded that a fair picture of the abundance of benthic organisms can be obtained if several samples are obtained at different times throughout the year.”³³⁰ This is, perhaps, a scientific-epistemological work-around to an unsolvable, or at least unwieldy, technical problem. But there is more technical difficulty: To reduce biological data to “a few concise meaningful terms, different evaluation techniques have been proposed” and each, in its turn, must be evaluated and judged, and then accepted and implemented or rejected and discarded according to some standardizing methodology already agreed upon as valid and, thereby, validated. Not only this, but the collection techniques’ effectiveness is wholly dependent upon “the skill and experience of the individual collector, and the results of one investigator may be difficult to compare with those of another.”³³¹ The science of ecology’s problem of induction requires an expert to be scientifically navigated and statistically side-stepped or operationally overcome (without necessary any solution at all that can be agreed upon generally by the technicians and scientists involved) so as to remain, at least as far as scientific rigor is concerned, commensurable and calculable and, thereby, progressing towards the goal or goals of a more completed ecological knowledge with less gaps.

The authors of the report select (on what grounds and by method of validation, they do not say) one such statistical technique, called “the diversity index.” The diversity index is itself a tool to be utilized in the evaluation of the health of a stream, but is “by no means the total

answer.”³³² What is sought is a total answer. To understand knowledge is such that what is not yet cannot explained constitutes a gap presupposes a total, and thereby totalizing, knowledge towards which we can and do make progress. As a small step to actualize this goal, utilization of this tool – the diversity index – “usually requires a trained, experienced biologist and extensive study of more than one group of organisms...to adequately define the health of a complex river system.”³³³ The diversity technique presupposes that “relatively undisturbed environments support communities having large numbers of species with no species present in overwhelming abundance.” Furthermore, it is presupposed that “generally, an environmental change that causes a stress to aquatic invertebrates tends to reduce the diversity of the invertebrates.” Health, in at least one of its aspects for the report’s authors, is: quantitatively evaluable species diversity. What is diversity such that it is amenable to such indexing and accounting? Diversity is a multiplicity of taxonomized quantities. The character of the data gathered must, in the first place and most often implicitly, be restricted to that which is quantifiable and thereby satisfies the requirements of the logical rules of this index’s computational technique. The evaluation of this data is “made by computing the ‘mean species diversity index’ (*d*) and the ‘equitability measure’ (*e*).” The equitability measure, for example, is “calculated as the ratio between *d* and a hypothetical maximum *d* based on the distribution obtained using a statistical approach called the MacArthur broken stick model. The MacArthur model results in a distribution frequently observed in nature.”³³⁴ The distribution referred to as observed in nature frequently is a statistical curve. A statistical distribution is *never* directly—that is, without defining, evaluating, and calculating mediation—observed directly in nature, or at all for that matter prior to quantitative technical intervention and manipulation. The MacArthur model referenced is a mathematical model still well known among ecologists today, if only anecdotally, developed by Robert H. MacArthur and published in 1957.³³⁵ Notably, in response to errors found in the model, MacArthur formally renounced it in 1966, asking that the “obsolete approach to community ecology” not draw ecologists’ further attention, thus allowing the model “to die a natural death.”³³⁶ Eight years later CDWR personnel were still using the model to formulate their diversity indexes. All of this said, however, by 1976, the CDWR could still publish reports on the (now patently hypothetical) Upper Eel River Development in which formal ecological explanations were excluded, even where one would most expect to find them based the agency’s own prior reports in which the science of ecology was, at least, mentioned.³³⁷

In 1980, the USACE published another massive report, “Eel River Basin Resource Analysis,” comparable in its authority, finality, and comprehensiveness to that of 1968.³³⁸ At over 600 pages, the report surveys the history, present economic status, and economic values projections of most prominent industries in the basin, including forestry and timber production, recreation, fisheries, crop and animal agriculture, and mining. The USACE investigated county and municipal water purveyance, water use, and waste water production and processing; erosion and sedimentation; human resources; and municipal and county “growth policies.” Perhaps in light of the successful opposition to the Dos Rios Project in the 1960s and 70s, by 1980 the USACE even deemed special interest groups of enough concern to merit a chapter’s worth of attention. Prominent environmental conservation organizations the USACE discusses included the California Forest Protective Association, California Trout, Save-The-Redwoods League, The Northwest Environmental Center, and The Sierra Club are described, as well as the Western Timber Association. By the 1980s, it is very likely that each of these organizations increasingly deferred to the science of ecology to help direct and, perhaps in some cases, even determine their advocacy positions, their activities, and their justifications thereof. This is, if anything could be,

indicative of the still increasing prevalence of the science's of ecology and its ecologists' ecological research and resulting explanations and, thus, ecological knowledge of the Eel River basin—that is, of the ecology of the Eel River. Along with the aforementioned others, The Nature Conservancy was also a prominent environmental conservation organization active in the Eel River basin by 1980—an organization with a pivotal role for the future trajectory of the science of the ecology of the Eel River.

2.6 The Northern California Coast Range Preserve: A laboratory for the scientific-epistemological study the ecology of the Eel River

Since the mid-1960s, the Northern California Coast Range Preserve (NCCRP) has provided a research facility for the advancement of the science of ecology in the Eel River Basin. In 1931, Heath and Marjorie Angelo arrived at what would, years later, become the NCCRP. They had left behind their previous lives in the San Francisco Bay Area.³³⁹ Heath Angelo owned a business in the Bay Area that he could manage *in absentia*. This, in part, allowed the Angelos to buy property on the South Fork Eel River and relocate in order to homestead the property with a vision of a “self-sufficient, pioneer-type lifestyle.”³⁴⁰ They began with the purchase of what was known as the Elder Homestead, encompassing the confluence of Elder Creek and the South Fork Eel River. They built their house and outbuildings, and developed their orchard, gardens, and moderate grain fields near this confluence, where the partially-renovated physical structures continue in use today. Over the subsequent 25 years the Angelos purchased surrounding properties as neighboring homesteaders left for opportunities elsewhere. By the mid-1950s, they had amassed nearly 3,000 acres.³⁴¹ Part of the impetus for purchasing these properties was to preserve them. The Angelos objected to the increasing scale, industrialization, and encroachment of the logging operations in the Branscomb area of Mendocino County during the 1940s and 50s.³⁴² Following World War II, these operations utilized Caterpillar tractors, logging trucks, and chain saws. The Angelos had, and continued to, protect their properties from any such logging, though they did harvest timber for their own modest use (firewood, mainly).³⁴³ In the early 1950s, however, property tax on forested parcels included an *ad valorem* tax for the property's estimated timber value.³⁴⁴ The Angelos found themselves with a heavier tax burden than they could afford.

In 1956, looking for a conservator of their properties, they contacted The Nature Conservancy, a then little-known national non-profit conservation organization. Negotiations for the transfer of the properties' ownership began shortly thereafter.³⁴⁵ In 1959, the Angelos transferred ownership to The Nature Conservancy, becoming the largest land-trust deal in the conservancy's brief history, and its first preserve in the western United States.³⁴⁶ With the additional purchase of property rights adjacent to the Angelos' (those of Camp Adventure and all timber rights along Fox Creek), the conservancy established the NCCRP. In following years, the U.S. Bureau of Land Management designated 3,500 acres of land adjacent to the NCCRP an Area of Critical Environmental Concern (ACEC), and in 1984 both the ACEC and the NCCRP were designated a Biosphere Reserve under the UNESCO Man and the Biosphere program.³⁴⁷ The University of California signed a management and use agreement with The Nature Conservancy in 1989. In 1994, the University accepted the land transfer from the conservancy and the Bureau of Land Management, and incorporated all 7,660 acres into its University of California Natural Reserve System, to be administered by the University of California, Berkeley

Office of the Vice Chancellor for Research.³⁴⁸ The NCCRP was renamed the University of California Heath and Marjorie Angelo Coast Range Reserve (ACRR).

By the late 1980s, the NCCRP had become a locus of scientific research on the Eel River and its terrestrial surrounds. A decisive turn occurred with the purchase of the Angelo's properties by The Nature Conservancy. The Nature Conservancy is an offshoot of the Ecological Society of America (ESA).³⁴⁹ From ESA's founding in 1915 forward, there was disagreement among members as to its principle objectives: should the society only support ecologists and publish research, or should it also pursue the preservation of natural areas? Despite these incipient disagreements, the ESA nonetheless prepared a list of areas within North America that were either, in its words, already preserved or preservable, and urged the protection of those under threat.³⁵⁰ In 1917 the ESA formed the Committee on Preservation of Natural Conditions for Ecological Study, chaired by ESA's first president, ecologist Victor Shelford.³⁵¹ Shelford was both an exceptional natural historian and an outspoken proponent of pushing the young field of ecology towards its realization as an experimental science.³⁵² In years following 1917, Shelford and the committee strengthened their advocacy position for preservation, resulting in conflict with subsequent leadership of ESA who wanted the organization to remain science-oriented and politically neutral.³⁵³ Amidst acrimonious disagreement, the ESA finally dissolved Shelford's committee in 1945.³⁵⁴ In lieu of the committee's demise, Shelford and colleagues founded the Ecologists' Union in 1946, an organization that combined ecological research, land preservation advocacy, and "opportunistically" buying properties "that had obvious natural values" for preservation purposes.³⁵⁵ In 1951 they renamed the union The Nature Conservancy and incorporated the organization as a non-profit in the District of Columbia. The modern and contemporary European colonial history and imperial character of such preservation and conservation efforts has been widely and rightly critiqued, and the interpretation of, solidity, orientation, and circumscribed access to its successes questioned.³⁵⁶

As early as the 1960s The Nature Conservancy was permitting university researchers access to the NCCRP. Heath Angelo had kept records of precipitation, temperature, and fires over the years, and had excellent working knowledge of plants and animals of the region.³⁵⁷ The earliest formal scientific research project at the NCCRP, however, was performed in 1964 by Peter Black, acting as a consultant to the Bureau of Land Management and The Nature Conservancy, and almost certainly in close consultation with Heath and Marjorie Angelo.³⁵⁸ Black's study investigated characteristics of the Elder and Fox creek watersheds and provided a list of woody vegetative species in the Elder Creek watershed. No publication resulted.³⁵⁹ The first research publication documented by today's ACRR during this period is a master's thesis from Humboldt State University student Darwin L. Richards, entitled "Pilot Calibration of the Elder Creek Watershed."³⁶⁰ At least two questions immediately present themselves: what is calibration, and what is a watershed understood to be such that it is unquestionably amenable to calibration? Richards does not ask either. After a conclusive survey of "The Area," including ownership, history, climate, geology, soils, vegetation, topography, and hydrology, Richards arrives at the core of his thesis, divided in two phases: (i) weather research and (ii) soil moisture research.

Richards begins with objectives, or goals to achieve, of the first phase of calibration: (1) the establishment of long term weather stations and (2) the design, construction, and establishment of several storage precipitation gauges.³⁶¹ He proceeds subsequently to a justification of his objectives. "Quantitative knowledge," he begins, "of the relationship within the hydrologic cycle is necessary for any form of effective watershed management [...]"³⁶² "The

uses of these quantitative relationships,” Richards notes, “are many and varied.”³⁶³ Examples include developing equations for predicting annual runoff and monthly water loss in terms of runoff and climatic variables; the calculation of return periods of storms of varying intensities, durations, and volumes; or the use of precipitation and runoff records to estimate soil moisture storage capacities of the soil under selected conditions.³⁶⁴ To accomplish weather stations capable of generating continuous records of precipitation, temperature, and relative humidity, Richards methods revolve around the design, construction, testing, calibration, and results of instrumentation.³⁶⁵ This is to say, his methods, whatever else they may be, are calculative of quantitative values.³⁶⁶ Similarly, considerations of the following character become fundamental for success of Richards’ calibration of the watershed: “The whole system of measurement of area depends on dimensions within a horizontal plane, and disregards the excess acreage actually exposed on pronounced slopes...in order to reduce all results back to the horizontal plane, time-consuming problems in trigonometry would need to be solved”³⁶⁷ Evaluation is not just quantification, or quantification at all. It is, prior to this, judgement of what is useful and utilizable for solving problems we set up and will to solve, of what meets our criteria for such utilization, and of the exclusion of that which does not. That which does not is evaluated, here, as excess. Excess can be disposed of as nothing of value – valueless for our goals and the activity requisite to actualize such goals by progressive achievements. Quantitative evaluation is a technique to measure and calculate the value that of which is given to us in epistemological metaphysical sense and sensibility.³⁶⁸ That which is not epistemologically metaphysically sensible, much less evaluable, as well as that which may be epistemologically metaphysically sensible but is valueless, is or is tantamount to nothing at all.

Richards’ likewise opens phase two of his thesis, soil moisture research, with objectives: (i) to determine the variability of the soil moisture within a given soil-vegetation type using the nuclear method and (ii) using this measure of soil variability to determine future soil moisture sampling designs.³⁶⁹ Agriculturalists, foresters, and engineers, Richards notes, attend closely to “the amount of moisture in the soil and its influence on such factors as crop yields, forest growth, and soil strength.” In the management, control, or regulation of a watershed, then, as in agriculture, forestry, or certain engineering projects, the equations whose outputs yield quantitative productivity criteria as wells as define normal and abnormal unproductive deterioration and death of crops, forests, or soil strength, are fundamental to achieving, in effect, success. Determining and calibrating soil moisture of the watershed is thereby justified by common sense calculation we all recognize as common sense. As with Humboldt’s scientific natural history, with the determined-in-advanced understanding of nature such that the nature of nature is mathematical and thereby eminently susceptible to measurement, the nuclear method’s advanced technicality entails and projects an enveloping scientific explanation. For example, he says that a great deal of research has been done to analyze the suitability of the nuclear method in field work. He does not mention the science necessary for the determination of the nuclear method itself, but instead offers an explanatory summary of “the theory of operation of the nuclear method,” quoting Carlton et al. (1953):

“The measurement of soil moisture is based on the physical laws governing the scattering of neutrons in the soil...the emitted neutrons collide with the atoms comprising the soil...in each collision the neutron loses part of its kinetic energy...the average energy loss is much greater in neutron collisions with atoms of low atomic weight than in collisions involving heavier atoms...the number of slow neutrons found near the source is a function

of the number of atoms of low atomic weight present in the soil...hydrogen is the only element of low atomic weight found in ordinary soils in appreciable amounts...if a device for detecting slow neutrons is placed in the soil...the number of slow neutrons counted per unit time is a measure of the concentration of hydrogen atoms in the soil...hydrogen is largely contained in molecules of free water...the slow neutron count is a direct measure of the moisture content of the soil.”

Richards adopts as a tool, or as means to an end-goal, the multiple embedded scientific-epistemological understandings-in-advance and subsequent explanations evident in this passage, including what neutrons are, what atoms are, what kinetic and potential energy are, what collision and other activity and interactivity is, and so on—not merely explanations of *how* any or all of these function and *why* one or another acts or operates as it does. Embedded in his method, this scientific explanation not only explains how and why the nuclear method works, but also explains why the method he chooses for accomplishing his ends is validly judged to be *justified*. While not the first quantitative evaluation of the NCCRP (recall the Angelo’s property taxes as well as Heath Angelo’s climate records), Richards’ calibration of the Elder Creek watershed certainly is the first investigation recognizable academically or scientifically as deliberate research. It is so, primarily, because Richards’ proceeds in pursuit of scientific knowledge according to validly validated rule-bound protocols of one or another scientific-epistemological methodology. Like the USACE, the Bureau, the CDWR, and the CDFG, for example, Richards’ undertakes a rigorously scientific natural historical survey. Even so, Richards does not scientifically-epistemologically explain his findings in order to confirm, qualify, or perhaps falsify a hypothesis that he posited, tested—validly scientifically methodologically, whether experimentally or otherwise—and evidenced by the data he produced.

Darwin Richards’ research was the first scientific natural history research undertaken at the NCCRP. Richards’ research also exemplified the orientation and character of the majority of research performed at the preserve from 1967 through the late 1980s. Richards’ calibration of the Elder Creek watershed was a quantitative inventorying of the water as resource. From 1967 to the mid-1980s, researchers who traveled to the NCCRP undertook primarily taxonomic inventories of biological species. Most of the researchers during these years came from various campuses of the California State University system. The publications resultant from these research inventories largely took the form of technical reports, though several matured into master’s theses. The titles themselves indicate the natural historical genre: “Preliminary List of,” “List,” “Inventory,” “Check List,” “Survey,” “Census Plot,” and “Field Guide.” What is inventoried? Categories include vascular plants (1968), birds (1974), freshwater algae, fungi, mosses, and lichens (1975); bryophytes and flora (1976); common fishes, vegetation, mammals, and breeding birds (1977); shrubs and trees (1978); mammals (1980); river otters, amphibians, and reptiles (1981); owls (1985); and amphibians (1986).³⁷⁰ A survey of breeding bird populations in Douglas fir and hardwood forests is the last such inventory, dating from 1987.

Until the mid-1980s, formal scientific ecological research, including necessarily such research’s necessarily preparatory scientific natural historical investigations, appears only intermittently among the aforementioned scientific natural historical studies. In 1976 Allan Grover and Caryla Larsen published a technical report which included both a mammal inventory of the NCCRP and “Feral Hog Ecology at...NCCRP.”³⁷¹ Cameron Barrows and Katherine Balderston published a paper in 1978 treating roost characteristics and behavioral thermoregulation of spotted owls.³⁷² The authors examine the hypothesis that heat intolerance is

a factor in spotted owl habitat selection. Their research conclusions explain heat transfer to or from owls by convection, radiation, dissipation, etc., as correlated with these owl's behaviors. Barrows developed his research into a master's thesis at CSU Long Beach, "Roost Selection by Spotted Owls: An Adaptation to Heat Stress," published in 1980. In 1983, Grover published the development of his work as a master's thesis at CSU Sacramento, entitled "The Home Range, Habitat Utilization, Group Behavior, and Food Habits of the Feral Hog (*Sus scrofa*) in Northern California." From 1983 through 1986, University of California, Berkeley doctoral student William Trush surveyed six tributaries, including Elder Creek, and sections of the South Fork Eel River, measured their channel morphologies, censused spawning steelhead trout and their redds, and recorded streamflow data so as to "formulate and test interrelationships between stream channel dynamics and steelhead trout spawning habitat."³⁷³ Trush's doctoral research both spanned and, in a sense, indicated a transitional period at the NCCRP, denoted by a waning preponderance of natural history research and growing preponderance of environmental science, including prominently ecology, as well as hydrology and geology.

1985 seems to mark, approximately, a shift away the preponderance of quantitative, scientific natural history inventories, surveys, and lists towards formally scientific research at the NCCRP, including ecological experimental research. This year Barrows published "Cool Owls of the Old Forest" in *Pacific Discovery*, a literature organ of the California Academy of Science, discussing thermoregulation, habitat selection, and behavior.³⁷⁴ He published again in 1986, but this subsequent work is decidedly natural history, reporting data from a year-long census of wrens in various habitat types.³⁷⁵ What begins to appear in 1985, which had not been present before, are publications in well-recognized national and international academic science journals resulting from research at the NCCRP. This is a notable shift away from the few master's theses and abundant unpublished technical reports authored by CSU students, demonstrative as these are of the character of research at the preserve beginning in late 1960s.

In 1985, scientists affiliated with the University of California, Davis's Department of Land, Air, and Water Resources published "Stream microhabitat selectivity, resource partitioning, and niche shifts in grazing caddisfly larvae" in *Hydrobiologia*.³⁷⁶ The authors explain the application of their research to instream flow (ISF) requirements. The management of regulated streams requires microhabitat data for stream organisms. Because of the economic value of iconic macrofauna, most ISF research had been done on fish, as demonstrated time and again in the various reports by the members of the State-Federal Interagency Group and by the CDFG in their decades-long reconnaissance of the Eel River. Many fish, as the article's authors point out, depend on invertebrates as food. Generally invertebrates are not as mobile as fish and, consequently, have narrower tolerances to changes that are not satisfied by ISF criteria modeled on fish. For improved management of regulated streams, the authors believe that species-specific ISF criteria could prove useful for selecting those species with the narrowest ISF tolerances as indicator species. Their study does not determine ISF requirements for the five species of grazing caddisfly larvae they examine, but they hope that their microhabitat data can be utilized for this purpose.³⁷⁷ Microhabitat studies examine the importance of physical parameters on species' micro-distributions. Experimental manipulation in the lab or the field is the most common technique to determine the importance of a parameter, they recognize, but such manipulations may produce "completely unnatural conditions."³⁷⁸ The authors opt, instead, for a "technique that avoids this problem" by "test[ing] for selectivity by comparing microhabitat availability to utilization."³⁷⁹ By measuring underwater microhabitat availability and utilization along numerous transects sited on three NCCRP streams, the scientists quantified microhabitat

selectivity, resource partitioning, and niche shifts among the five caddisfly species of focus. Microhabitat, for the authors, comprises a series of quantified parameters: water depth, water velocity, substrate size, substrate roughness, and substrate slope (e.g. the slope of the rock face occupied by an individual invertebrate sample. “Species” as referred to by the scientists are populations. These physical habitat parameters entail a prior understanding of the not only the *hows* and *whys* of epistemological metaphysical physics, but also of the *whats*, such as what potential and kinetic energy are and, thus, what scientific-epistemological energy is. The researchers three objectives for the study were (1) to describe the stream microhabitats of the five species of grazing caddisfly larvae, (2) to test for microhabitat selectivity, (3) to test for resource partitioning, and (4) to test for niche shifts.³⁸⁰ The authors understand habitat to be a resource which the five invertebrate species—remarkably similar to these same ecologists utilizing the river and its biological organisms—utilize as means to achieve their ends-goals (whether of need or desire) and to overcome physical conditions and adverse biological interactions as solution to evolutionary problems which, in turn, are means to solve further problems effective for survival and, thus, existence. The authors’ three study sites at the NCCRP included Elder Creek, Fox Creek, and the South Fork Eel River.

In 1987, Barrows published a short article concerning diet shifts in breeding and non-breeding spotted owls in *Journal of Raptor Research*.³⁸¹ He reports quantitative census and specimen collection data analyzed by means of statistical calculi, but ultimately demurs from offering causal explanations beyond evidentially inferred but, as he acknowledges, untested hypotheses. His report is exemplary of rigorously quantitative and calculations-based scientific natural history. This same year, two researchers at the University of California, Davis’s Department of Land, Air, and Water Resources published “Experimental analysis of the grazing interaction between a mayfly and stream algae” in *Ecology*.³⁸² They conducted their experiment in Barnwell Creek, a permanent second-order tributary to the South Fork Eel River located approximately 1.6 kilometers downstream of Elder Creek. The end goal of their experiment was in initial mechanistic explanation of “the interaction between a grazing mayfly, *Ameletus validus*, and periphyton [...]”³⁸³ The hypothesized that “natural densities of the mayfly influenced both standing crop and community structure of the periphyton,” and, as secondary hypothesis, “that the growth of *A. validus* was food-limited.”³⁸⁴ To test these hypotheses by *in situ* manipulation of *A. validus*, they established a gradient of *A. validus* population density across four blocks of four joined, parallel flow-through plexiglass channels each, with each block placed in an upstream-downstream series on the stream bed over a 20-meter stretch. They then assessed the effect of grazer density of periphyton productivity and grazer growth. Understanding that “the ecological relevance of a manipulative field experiment depends to a great extent on how well natural conditions are maintained within the experiment,” they “preserved” “natural conditions as much as possible while simultaneously restricting mayfly movement.”³⁸⁵ When transferring cobbles from the streambed into their experimental channels, for example, the scientists strove “to minimize the time these cobbles were exposed to the air in order to disturb the established periphyton as little as possible” (emphasis added).³⁸⁶

1987 was a momentous year for the NCCRP. In the fall of 1987, freshwater community ecologist Mary E. Power began an assistant professorship in the Department of Zoology at the University of California, Berkeley (the department was later reorganized into the Department of Integrative Biology).³⁸⁷ Power came to UC Berkeley from the University of Oklahoma Biological Station.³⁸⁸ The research she had performed in Oklahoma, as well as her doctoral research at the University of Washington, sustained her publication output during the first two

academic years of her assistant professorship.³⁸⁹ By her second academic year, however, Power had found her way to the Eel River, and specifically to the NCCRP on the South Fork Eel. In 1988, she became the faculty manager of UC Berkeley's research relations with The Nature Conservancy with regard to the NCCRP, and after the university signed a management and use agreement with the conservancy in 1989, faculty manager of the NCCRP.³⁹⁰

Power published a co-authored paper in December 1989 from research undertaken in part on the Rice Fork, a tributary of Lake Pillsbury and, thus, the Eel River.³⁹¹ The researchers' primary objective was to examine grazing invertebrates' impact on periphyton biomass in twenty-one pools across three northern California streams. Secondly, the scientists sought to examine the influence of riparian canopy – as an interactive factor regulating incident light reaching streambeds – on periphyton accrual, grazer abundance, and grazer impact on periphyton. To accomplish these, the authors conducted a field experiment in which nine pools in each stream were chosen to contain experimental plots. Within each pool, they established four plots, each plot consisting of two sets of commensurable, artificial substrate tiles on which levels of periphyton and invertebrates had been shown to accumulate at rates and amounts similar to comparably dimensioned stream rocks. The scientists elevated one of the two sets of tiles in each plot 5-15 cm off the streambed to reduce access by invertebrate grazers, while the other set, the control, was placed directly on the stream bed. For each plot, they measured grazer density, periphyton standing crop, stream depth, and current velocity every 10–12 days over a 62-day period. Grazer abundance, for instance, was measured both as numbers and as biomass per unit area, while periphyton's biomass per unit area was measured as Ash Free Dry Weight, and chlorophyll *a* used to estimate algal biomass per unit area. To measure and subsequently categorize percent of stream under cover at each experimental plot, the authors used a spherical densiometer. This experimental design and its constituent measurements and manipulations both entailed layered causal explanations and generated analyzable test outcomes the authors subsequently sought to explain. In explanations of experimental outcomes, Power and her co-authors bring population, energy, and matter together in very specific, inductively arrived at, mechanistic causal ecological explanations.

Power and her collaborators conducted their experimental field work for the *Feminella et al.* paper in 1986.³⁹² This suggests that by 1987, when she began her assistant professorship at UC Berkeley, Power very shortly thereafter, if not before, began to explore the research feasibility of sites along the Eel River. These sites included, one can infer, the NCCRP. Certainly her 1988 appointment as faculty manager of the NCCRP—an appointment she has held through to the present—indicates that by this time she had indeed undertaken exploration not only of the Eel River broadly but of the South Fork Eel at the NCCRP in particular.

With the ecology of the Eel River and its basin awaiting, either as the world or the scientific study of the world, or perhaps both; with the river and its basin's awing beauty; and with the state and (as of January 19, 1981) federally enacted designation and protection as a Wild and Scenic River, one can understand why Power would seek an experimental station along the Eel at which to build and maintain an ecological research program. She found such a station at the NCCRP.³⁹³ Here, nature had been purposefully preserved, more or less, with comparably little anthropogenic disturbance since the 1930s.³⁹⁴ In this condition, ecologists and other natural scientists could produce data by which statistical baselines and their correlated states could be calculated. From these, ecologists and other natural scientists could effectively monitor and evaluate ecological change and variation, stable or alternative states, and normal or pathological deviations (i.e. disturbances) therefrom of the activity of river and its tributaries, the activity of

these waterways aquatic biological organisms, and the activity and interactivity of the river's terrestrial surrounds.³⁹⁵ According to the founders of the University of California's Natural Reserve System (NRS), the NRS was set up for *ecological* research by ecologists into the state's ecology as a foremost consideration:

In the last analysis the science of ecology, whose truths spring from the study of nature, holds the key to the survival of the human race in the face of its growing dilemmas of population increase, environmental alteration, and energy balance. The same laws and relationships that govern populations of cockroaches, bats, or butterflies governs us. Much of the intricacy of these natural controls is just emerging from ecology, and hence to reserve and protect samples of the basic resource of this science is a vitally important concern to every far-sighted person, scientist and layman alike.³⁹⁶

Power stepped fortuitously into this ecology-deferent milieu.³⁹⁷ By the summer of 1989, if not earlier, she had launched her ecology research program at UC Berkeley, begun to settle in for the long-term at the NCCRP, and taken firm steps along a path to scientific preeminence. By 1990, the following year, based on research done exclusively on the South Fork Eel River at the NCCRP, Power published a paper in the journal *Science* that would become, and remains today, a canonical touchstone of the science of ecology, as it undoubtedly does for the subdisciplines of community and freshwater ecology, as well.³⁹⁸ In subsequent years, Power, her graduate students, and her undergraduate ecology students (e.g. Eyes on the Eel) would take their research not only to the NCCRP along the South Fork Eel, but from Lake Pillsbury in the southern reaches to the Eel River estuary at the river's northern most extreme.³⁹⁹

2.7 Beginning again

Are the ecological food webs of the Eel River what I understood them to be at the outset of this chapter? Did I figure out what the ecological food webs were doing during the twentieth century?

Is the ecology of the Eel River what I understood them to be at the outset of this chapter? Did I figure out what the ecology of the Eel River was doing during the twentieth century, how it was functioning in order to achieve what it was doing, who was utilizing it, and for what end-goals? Could I discern—beyond academic training or evidence of its credentialing, and by what they understood, by what they explained, by what they achieved, what they did, and by how they did it—*who* were the ecologists of the Eel River and who were the engineers, economists, biologists, demographers, surveyors, resource managers, regulators, and technicians of the Eel River?

Is ecology what I understood it to be at the outset of this chapter? Did I figure out what ecology was doing on, to, at, in, and around the Eel River during the twentieth century? Could I discern—beyond academic training or evidence of its credentialing, and by what they understood, by what they explained, by what they achieved, what they did, and by how they did it—*who* were the ecologists of the Eel River and who were the engineers, economists, biologists, demographers, surveyors, resource managers, regulators, and technicians of the Eel River?

I could not answer any of these questions without feeling I was, in a very essential way, putting the cart before the horse in order to achieve the research objectives I willfully set before myself in the manner I was learning to do so. This did not feel good, or truthful, or genuine. I

had to respond to the question anew with openness and my full attention, intention, and careful thinking along the ways the question opened: *What are the ecological food webs of the Eel River? What is the ecology of the Eel River? And what is ecology?* To begin to do so, I decided it was best to try to understand *what* ecologists scientifically-epistemologically researched and *what* they scientifically-epistemologically explained.

In chapter 3, I turn to the research of Mary Power and begin trying to understand what she researches and what she explains. If she researches and explains the ecological food webs of the Eel River and its basin, and if she researches and explains the ecology of the Eel River and its basin, then very well: *What are these*, as she understands them? Likewise, is *what* she understands and is *what* she explains of what she understands consistent and coherent? To begin to respond to this, I can begin by attempting to discern if it is epistemologically-metaphysically and, thereof, scientifically-epistemologically consistent and coherent and, thereby, scientifically-epistemologically explanatory. In other words, I can try to discern whether what Power understands and explains is consistent and coherent by the rules, validities, methodologies, and other techniques epistemological metaphysics and, thereof, science-epistemology wills to make, to ground, to activate, to govern, to control, to utilize at will, to tweak and change at will, and to abide by in order to—with validly methodologically validated scientific-epistemological validity—demonstrate their scientific-epistemological validity and, thus, correctness as true?

Chapter 3 Professor Mary E. Power and the ecological food web of the Eel River

3.1 Understanding the ecological food webs of the Eel River

What is the Eel River ecological food web? To understand what the Eel River ecological food web is, I attend closely the peer-reviewed published work of community ecologist Mary E. Power. Power's explanations of the Eel River food web are ecological explanations of the trophic dynamics of actors and reactors, their actions and reactions, and the dynamic patterns (or structures) that emerge from these interactions. In other words, Power ecologically explains how actors and reactors of the Eel River function trophically such that their activities enact, activate, and actualize the ecologically dynamic structural phenomena one can observe. In Power's ecological explanations, I find several scientific-epistemological ambiguities and problems, including scientific-epistemological contradictions. In beginning to sense these scientific-epistemological problems, I may, perhaps, begin to sense with awareness the understandings which Power has of the ecology of the Eel River. In doing so, I also begin to sense and understand with awareness the limits, contradictions, and hypocrisies of my own.

3.2 What is the Eel River ecological food web?

What is the ecological food web of the Eel River? In this chapter I attend at length to the different variations of Power's Eel River ecological food web diagrams as she has developed them over her career, from circa 1990 through the present. I notice that Power's ecological food web diagrams of the Eel River are different from descriptions of whom eats who, what eats what, when, and where.

Power's ecological food web diagrams are scientific-epistemological explanations of how the Eel River ecological food web functions and why it functions as it does. In order to explain *why* the Eel River ecological food web functions as it does, Power explains *how* it functions. In other words, Power's ecological food web diagrams scientifically-epistemologically, and thereof, ecologically, explain. Her diagrams explain ecological causes and effects, which is to write, ecological causation. Through sustained attention to these diagrams, I come to sense the intricacies of Power's explanations of ecological food web interactors and interactions. Upon so doing, I may come to sense ecological understandings of: what *to interact*, *to relate*, *to process*, *to structure* (or *to pattern*), *to factor*, *to control*, *to regulate*, *to release*, *etc.*, are; what *to act*, *to react*, and *to interact* oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably are; as well as to what a host of other descriptors of ecological activities-reactivities, and the actions-reactions that comprise these activities-reactivities, are understood to be.⁴⁰⁰ Power's ecological food web diagrams of the Eel are scientific-epistemological explanations of how interactors and interactions function such that scientifically-epistemologically observable, phenomenal patterns dynamically emerge into existing, existingly endure in some spatiotemporality, and existentially pass away.

As Power proceeds through the decades of ecological research and ecological explaining, she develops and adjusts her ecological explanations as she continues her research. In Power's Eel River ecological food web diagrams—which is to write, in her ecological explanations—scientific-epistemological problems of *How?* and, in a qualified sense, problems of *Why?* hold sway, prevailingly and exclusively.

I close this chapter by turning to further questions that come before me if I am to attempt to respond to the opening question: *What is the Eel River ecological food web?* To begin, I come before such questions as: What is an ecological food web? What is *ecological* of an ecological food web? What is *ecological* of Power's ecological food web diagrams of the river? Whence comes what is ecological of Power's Eel River ecological food web diagrams? What is scientific-epistemological, and thereof, ecological explanation?

3.3 Power's diagrams of the Eel River ecological food web

In 2018, an attention-catching article appeared in *Nature Ecology and Evolution*: "100 articles every ecologist should read."⁴⁰¹ A paper published on November 9, 1990 in *Science* by Power, "Effects of Fish in River Food Webs," ranked in one hundredth place. This was neither a minor accomplishment nor a pedestrian recognition.⁴⁰² As the *New York Times* reported following this *Science* article's publication, ecologists widely considered Power's experiments and the results she obtained to be one of the clearest tests to date of food chain dynamics theory.⁴⁰³ On the first page of her article, in the upper right-hand corner, the reader finds Figure 2.⁴⁰⁴ Figure 2 is a diagram of the trophic relations of dominant biota associated with algal turfs on the South Fork Eel River during the summer low-flow period. These trophic relations span four trophic levels. The arrows of the diagram point upwards, from prey below to their successive consumers above. Figure 2 is the first published diagrammatic iteration of what Power would subsequently elaborate into a now well-known diagram of the Eel River ecological food web. Over the last three decades, the diagram has come to be warmly recognized among many biologists and ecologists whose research has brought them to Eel River, as well as among Power's many undergraduate and graduate students.⁴⁰⁵

In its first published iteration, Power's ecological food web diagram represents four trophic levels: photosynthesizing producers, invertebrate herbivores, invertebrate and vertebrate predators, and vertebrate predators. At the base of the ecological food web are epiphytic diatoms (primarily *Epithemia*), the green algae these grow on (principally *Cladophora glomerata*), and the cyanobacterium *Nostoc*. Chironomid midges, especially their *Cladophora* dwelling, tuft-weaving larvae, are the herbivorous consumers of the second level. The third trophic level is a guild comprised of predatory insects, such as lepidopteran damselfly nymphs, and the fry of two fish species, California roach and the three-spined stickleback. The fourth trophic level is comprised of adult California roach and juvenile steelhead trout.⁴⁰⁶ Power is, of course, aware of the empirical difficulties of trophic level categorizations, as she acknowledges.⁴⁰⁷ Hence, one arrow points upwards from producers—*Cladophora* and its epiphytic diatoms, specifically—directly to omnivorous adult California roach of the fourth level.

Without first reading the *Science* article, Power's ecological food web diagram appears unremarkable. It is a graphical representation that, ostensibly, a keen Eel River fly fisherman or avid naturalist could describe or depict with commensurate accuracy and observational minutiae. Yet there is a rub. The same fly fisherman or naturalist would likely be quick to point out that Power's ecological food web is, at best, incomplete, even in its immediate trophic detail and without appreciably shifting temporal or spatial scales. As will become clear, Power knew very well the fly fisherman and naturalist would be perfectly correct. She would tell them she had purposely circumscribed the ecological food web diagram of Figure 2. Of course, she would say—as she in fact writes later in the article—steelhead and California roach just as commonly eat sialids, coenagrionids, and naucoriids, and heptageniid, baetid, and siphonurid mayfly

nymphs, and elmid beetle larvae, as they eat lestid damselfly nymphs. It is likely that aeshnid nymphs regularly secure places in steelhead and large roach stomachs, too. Various species of cased-caddisfly larvae (*Dicosmoecus gilvipes*, *Neophylax* sp., *Glossosoma* sp., and *Gumaga* sp.) and aquatic moth larvae (*Petrophilia* spp.) are surely present among the rocky substrate. And all of these herbivorous invertebrates, in turn, graze the *Cladophora* and its epiphytic diatoms (e.g. *Melosira* and *Cymbella*), epilithic diatoms, or detritus on the river bed. She could continue on, naming other freshwater macrofauna, autochthonous or introduced, such as greenhead sturgeon (now very rare), Chinook and Coho salmon, Pacific lamprey, Western pond turtles, aquatic garter snakes, numerous other fish species, aquatic amphibians, freshwater gastropods, freshwater crustaceans, and at least two species of freshwater bivalve mollusks (unionids). There are other algae, too, as well as aquatic fungi and bacteria, of course. Upon hearing Power acknowledge the profusion of the Eel River's species, foods, and feeders, the fly fisherman and the naturalist would relax any suspicion, reassured of Power's credibility as a fellow Eel River expert. Yet a question might stubbornly linger in their minds: Why would an Eel River expert publish a graphical representation of a food web of the river so conspicuously incomplete?

There is a reason—all the more peculiar for its utter banality—that Power's *Science* food web diagram would initially impress the fly fisherman and the naturalist of the Eel River as woefully incomplete. Her food web is an *ecological* food web diagram. *Ecological* tells me that it is *of ecology*. Ecology is a science-epistemology. (Science-epistemology is neither exhaustively nor exclusively ecology, however.) The onus of the present chapter is to orient my attention so that I may begin to discern, distinguish, and understand with increasing awareness what the Eel River ecological food web is and why it should be qualified as *ecological*. Likewise, I will begin to understand with greater acuity what Power's diagrammatic representations of the Eel River ecological food web are and why they, too, are qualified as *ecological*.

My effort and attention in this chapter, as in chapter 4, will be with Power and specific antecedent ecologists – which is to write, with the scientists-epistemologists of ecology. I am not primarily interested in *how* my colleagues know, or *how* my colleagues understand, or even *how* they undertake their research. I shall attempt to learn, solely and simply, *what* they understand. I may come to understand much more about their problems of *How?* and, perhaps, *Why?* as I do so. I attend to what I can confidently assume to be scientifically-epistemologically peer-reviewed and peer-accepted (regardless of whether or not peers scientifically-epistemologically agree or are persuaded); most revised; most polished; most clearly and unambiguously articulated; most well-reasoned; most thoroughly and meticulously considered, thought, written, illustrated; and most persuasively argued, evidenced, and presented. I attend, in other words, to the ecologists' scholarly publications. I begin by turning to what is likely among the most accessible and, perhaps, most emblematic of the decades of Power's research, teaching, and explanations of the Eel River ecological food web: her ecological food web diagrams.

3.4 The first published iteration of Power's Eel River ecological food web diagram, or Figure 2

I have written that Power's *Science* food web diagram would impress the hypothetical fly fisherman and the hypothetical naturalist of the Eel River as woefully incomplete. The reason for this is that Power's food web diagram is an *ecological* food web diagram. As such, it must

be qualified as *ecological*. What is the ecological food web of the Eel River that Power represents diagrammatically?

The caption for Figure 2 of “Effects of Fish in River Food Webs” reads as follows: “Trophic relations of dominant biota in and around algal turfs during the summer low-flow period. Arrows point from prey to their consumers.”⁴⁰⁸ What does Power understand a trophic *relation* to be? She tells the reader in the first two sentences of the body of the article, which read: “The role of fish in river food webs has been hotly debated. The earlier notion that physical factors play stronger roles than trophic interactions in structuring ecological communities in flowing waters (1) is being challenged by the view that both matter (2, 3).”⁴⁰⁹ From these two sentences I learn Power understands trophic *relations* to be trophic *interactions*. A relation between the biological organisms of the Eel River ecological food web is an interaction. To relate ecologically, then, is to interact.⁴¹⁰ I can infer generally that *to interact* is *to act* and *to react*, or what is the same, in a system of two or more existing-existences (e.g. existing bodies, entities, relations, events, occasions, properties, categories, concepts, theories, notions, frames, perspectives, ideas, positions, actors, reactors, interactors, agents, actions, reactions, interactions, etc.), for each existing-existence to act upon the other oppositely, existentially simultaneously, equally, and, thus, scientifically-epistemologically causally indistinguishably. This is the epistemological metaphysical and, thereof, scientific-epistemological third law of motion.⁴¹¹ I return to this below. Lastly, I learn from the above excerpt that trophic *interactions* play *roles* in Eel River ecological food webs and, thus, the ecological community of the Eel River, if such a food web and a community are scientifically-epistemologically distinguishable. Likewise, fish of the Eel River play roles in Eel River ecological food web and community, as do physical *factors*. What does Power understand a trophic interaction to be?

In the second and third sentences of the article’s abstract, Power writes:

California roach and juvenile steelhead consume predatory insects and fish fry, which feed on algivorous chironomid larvae. In the presence of fish, filamentous green algae [*Cladophora*] are reduced to low, prostrate webs, infested with chironomids.⁴¹²

These chironomids are mainly the herbivorous larvae of *Pseudochironomus richardsoni*. Herein I learn that Power understands *to consume* to be a *trophic relation* (which is, recall, a trophic interaction). Consumption is an interaction. *To consume* is *to interact*. A consumer is an actor-reactor and, thus, an interactor. She understands *to consume*, in turn, to be the same as *to feed upon*. I may assume that Power understands *to feed upon* to be the same as *to eat* and *to be nourished by*, or *to nurture*—hence the Greek *trophic* of *trophic interaction*, from *trophikós* (τροφικός) of *trophé* (τροφή).⁴¹³ Power understands, then, *to eat* and *to be nourished by* to be *to interact*. I can also infer that an activity of production is an interactivity—for example, an activity-reactivity on and to consumption. *To produce*, then, is *to interact*. A producer is an actor-reactor and, thus, and interactor. What, then, does Power understand an interaction to be?

Once again, she readily tells the reader. In the first sentence of the abstract Power writes: “Experimental manipulations of fish in a Northern California river during summer base flow reveal that they have large effects on predators, herbivores, and plants in river food webs.”⁴¹⁴ Fish have large effects on predators, herbivores, and plants in river food webs. In the Eel River, California roach and juvenile steelhead have large effects on predators (Roach fry, stickleback fry, predatory insects), herbivores (Tuft-weaving, algivorous chironomids), and plants

(*Cladophora*, epiphytic diatoms, *Nostoc*). *To have a large effect on* is to *act on* and scientifically-epistemologically necessarily, to oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably *react to*. Insofar as there exists activity there exists reactivity, and insofar as there exists this interactivity, there exists the effectivity—however great or small, strong or weak, absolute or relative—of the actions and reactions that comprise these activities-reactivities. California roach and juvenile steelhead (secondary predators) act on primary predators, herbivores, and plants. California roach and juvenile steelhead are *actors* and epistemologically metaphysically necessarily, therefore, oppositely, existentially simultaneously, equally, and thus scientifically-epistemologically causally indistinguishably *reactors*. The effects of California roach and juvenile steelhead are *on* primary predators, herbivories, and plants. I have previously learned Power understands *consumption* to be a modality of activity-reactivity, or interactivity, and therefrom, I have inferred that Power understands *production* to be a modality, likewise, of activity-reactivity, or interactivity. A consumer and a producer are, therefore, understood to be actors-reactors. Ecologically (i.e. scientifically-epistemologically), to interact entails at least two prior entities or relations act and react in interaction. Ecologically, or scientifically-epistemologically, to interact is to act oppositely, existentially simultaneously, equally, and, thus, scientifically-epistemologically causally indistinguishably; in other words, to interact is the action of, minimally, a first on a second, and the reaction of a second on the first. These opposite, existentially simultaneous, and equal actions-reactions are the interaction. Thus, to interact requires, minimally, two actors, or as is commonly said, an actor and a reactor. To interact entails that one or more actors act, and that the one or more distinct actors acted upon (commonsensically but misleadingly called a *reactor*) act oppositely, simultaneously, equally, and thus scientifically-epistemologically causally indistinguishably upon the actor that acts on it.

An ecological interaction, as scientific-epistemological interaction, is no different. An ecological interaction is possible only if one ecological actor *acts* on at least a second and if this second ecological actors acts oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably on the actor that acts on it (again, commonsensically *to react*). Two or more interactors are, I may write, actor and reactor, or opposite, existentially simultaneous, equal, and, thus, scientifically-epistemologically causally indistinguishable actors. An interactor is an actor-reactor, and vice versa. An actor is scientifically-epistemologically necessarily a reactor, and vice versa. I have learned, then, that Power understands *relations* to be *interactions*, and *to relate* to be *to interact*. She likewise understands interaction to be opposite, existentially simultaneous, and equal actions, or action and reaction, and to interact to be for two to act oppositely, existentially simultaneously, and equally on each other, which is to write, to act and react. Again, *re-* of *react* can be scientifically-epistemologically misleading as to the spatiotemporal directionality of the action-reaction and its scientifically-epistemologically judged causal influence or determinacy. The reaction by the reactor—which is *the effect*, or result, of the action by the actor—scientifically-epistemologically does not, and scientifically-epistemologically cannot, be either existentially prior or subsequent to or of greater or lesser effectivity than the act. The action (*A*) is an opposite, existentially simultaneous, equal, and thus scientifically-epistemologically causally indistinguishable reaction, or effect, of the opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable reaction (*B*), or effect, of the action (*A*), and vice versa. Scientifically-epistemologically, actor (*A*) and reactor (*B*) and action (*A*) and reaction (*B*) are and must be spatiotemporally opposite, existentially simultaneous, and equal.

This existentiality remains regardless of whether or not one or another reference frame of the actor and reactor, if distinct, is inertial or non-inertial. I will return to this in a later chapter.

Power concludes the first paragraph of her 1990 *Science* article with the following three sentences. These three sentences offer the reader further insight into her ecological (i.e. scientific-epistemological) understandings and those, consequently, of her diagram of the Eel River ecological food web, or Figure 2. She writes:

Although some field studies have shown that herbivorous fish can directly control algal standing crops in rivers (3, 4), and by implication must influence other parts of algal-based food webs, no studies in rivers have demonstrated that effects of predatory fish can cascade through food webs to alter primary producers, as has been shown in lakes (5, 6). In this report, I present experimental evidence of strong fish effects on both predatory and herbivorous insects, and on macro- and epiphytic algae in a river. These effects are direct and indirect, and propagate through four trophic levels in the river food web.⁴¹⁵

I learn that when Power writes “to have large effects on,” she understands this to be the same as and interchangeable with “[to have] strong [fish] effects on.” A *large* effect is a *strong* effect. California roach and juvenile steelhead have strong effects on primary predators, herbivores, and plants in the Eel River. These two species-populations of fish—California roach and juvenile steelhead of the Eel River—have strong effects on primary predators, herbivores, and plants in the Eel River. As California roach and juvenile steelhead each have strong effects on primary predators, herbivores, and plants, I may write—indeed, ecologically (i.e. scientifically-epistemologically) I *must* write—that, in the Eel River ecological food web that Power illustrates graphically, California roach and juvenile steelhead are strong actors-reactors. If California roach and juvenile steelhead are strong actors-reactors, they are strong interactors.

I have come upon a scientific-epistemological, and thereof, an ecological problem. This scientific-epistemological problem is, in general of no small import. That I may begin to notice the contours and character of this ecological problem, and subsequently to understand it, I must take a step back to assess briefly what Power tells the reader in the first full paragraph of her article.⁴¹⁶ Power opens her article by writing of “the role of fish in river food webs.” Following immediately, she writes “[the notion that] physical factors play stronger roles than trophic interactions in flowing waters.” Power understands, with other ecologists, that in flowing waters such as rivers both physical factors play a role and trophic interactions play a role, regardless of the relative strength of these roles. *To play a role* in a river food web, for example, is *to have a role* in a river food web, but not necessarily *to be a role* in a river food web. The role of fish in the river food webs in focus is a *trophic* role: fish *consume* other biological organisms; fish *eat* other biological organisms. I learned that Power understands *to eat* to be *to consume food*. Likewise, she understands *to consume* to be *to interact*, and *to interact* to be *to act* and *to react*, or *to act* mutually, i.e. to act oppositely, existentially simultaneously, and equally, and thus scientifically-epistemologically causally indistinguishably. I may plausibly infer, then, that Power understands “[a] role of fish in river food webs” to be the same as “trophic consumption by fish in river food webs” and, thus, “[a] trophic interaction of fish with other biological organisms in river food webs.” *To play a role*, Power understands, is a modality of interactivity. Thus, the role of fish is the interactions, trophic or otherwise, of fish with other fish, with other biological organisms, and with abiotic activity-reactivity. As I will learn below, Power understands *to play a role* to be the same as *to function in* or, what is the same, *to be a function*

in or to be a function of. The functions in, of, and that *are* an ecological food web and an ecological community can be strong or weak—or, as I will see, what Power speaks of as the same: functionally significant (strong) or functionally insignificant (weak).

What or who plays a trophic role in river food webs? Who or what acts and reacts? Who or what interacts? California roach and juvenile steelhead interact directly with their prey (primary predators) as well as indirectly with herbivores and primary producers. California roach and juvenile steelhead are actors-reactors of strong effects. Yet *to play a role* or *to have a role*, without qualification, in a river food web is not necessarily *to be a role* in a river food web, again without qualification. I come to understand, then, that Power understands that to play an *ecological role* or to have an *ecological role* is *to ecologically* (i.e. *scientifically-epistemologically*) *be an ecological role* in an ecological river food web and, thus, ecological community. Insofar as California roach and juvenile steelhead act and, thus, interact, they are oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably acted upon.

I am coming to understand the title of Power's article, "The Effects of Fish in River Food Webs" and, therein, Figure 2. I am coming to understand, likewise, that Power understands river food webs—all river food webs, as river food webs—to be *ecological* (i.e. *scientific-epistemological*). If, where, and when a river food web is, this river food web is ecological. Power understands food webs to structure, at least in significant part, ecological communities. If Power understands food web as food web to be ecological (i.e. scientific-epistemological), and thus all food webs, as food webs, to be ecological, then community, as community, is—as she tells the reader—ecological (i.e. scientific-epistemological).⁴¹⁷ If community as community is ecological, one or another particular community, as a community, is ecological. The Eel River (ecological) food web structures in some part the Eel River (ecological) community. Here, along with ecological food web and ecological community, I begin to sense that I must carefully and discerningly attend what structuring or patterning are and, thus, of and from what these speak.

I now turn back to Power's first paragraph while keeping in mind, as I have, Figure 2. What I have learned above of Power's understandings allows me to come to increasingly sense these understanding's contours and character. Thus, for example, she writes that "the earlier notion that physical factors play stronger roles than trophic interactions in structuring ecological communities in flowing waters (*I*) is being challenged by the view that both matter (2, 3)." Insofar as factors play roles, factors are causes.⁴¹⁸ Regardless of their strength, Power understands (with other ecologists) that a factor is an actor-reactor. Likewise, then, to factor is to act-react.

Power writes "[a]lthough some field studies have shown that herbivorous fish can directly control algal standing crops in rivers (3, 4), and by implication must influence other parts of algal-based food webs, no studies in rivers have demonstrated that effects of predatory fish can cascade through food webs to alter primary producers, as has been shown in lakes (5, 6)." I notice that there is a subtle yet fundamental confluence, as there was with factors, of *to control*, *to release*, *to influence*, *to cascade through*, and *to alter* with *to act* and *to react*. The field studies she cites are her own (references 3 and 4), belonging to both her doctoral work (1984) and her postdoctoral work with colleagues while at the University of Oklahoma in the 1980s (1985, 1988).⁴¹⁹ In the Panamanian stream Rio Frijoles, armoured catfish of the family *Loricariidae* consume periphyton. As Power writes in 1990, these loricariids are some of the herbivorous fish that can directly control algal standing crops in rivers. Likewise, in Brier Creek of south-central Oklahoma, the algae-grazing minnow *Campostoma anomalum* is one of the

herbivorous fish that “can directly control algal standing crops in rivers.” These catfish and minnows eat algae. Power understands *to eat* to be *to consume food* or *nutrients*. These fish consume algae. Their consumption of algae “can directly control algal standing crops.” I have learned that Power understands *to consume* to be a modality of *to act* and *react*. *To consume* is, to some stronger or weaker degree, a modality of *to control*, and *to control*, consequently, is likewise a modality of action and reaction, i.e. of *to act* and *react*.

For now it suffices to note that Power understands *to control* to be a modality of *to act* and *react*. Likewise, she understands *to influence* to be a modality of *to act* and *react*. She seems to understand *to alter* similarly. *To cascade* is also a modality of activity-reactivity and the actors-reactors and actions-reactions that comprise it. As I come to understand Power’s understandings, then, I recognize that these are subtly nuanced, just as *to control*, *to factor*, *to alter*, and *to influence* are derivations, or variations, or degrees of action and reaction in one or another spatiotemporally situated ecological case.

There is another aspect of what Power writes in her first paragraph I should, in passing, note for the purpose of understanding Figure 2. In “Effects of Fish in River Food Webs,” Power tells the reader that she presents “experimental evidence of strong fish effects on both predatory and herbivorous insects, and on macro- and epiphytic algae in a river.” Likewise, in her abstract she writes that her “[e]xperimental manipulations of fish in a Northern California river...reveal that they have large effects on predators, herbivores, and plants in river food webs.” *The effect on x* is not the same as either *the effect is x* or *x is the effect*. I have already learned that Power understands relations and interactions to be subsequent to that which relates or interacts. The relation or the interaction is not those individuals or species-populations between which the relation or interaction is actualized. The relation or interaction between two is *not* the one or other existing-existence which relates or interacts, even if these two or more existing-existences are, for example, other relations, actors, occasions, events, entities, frames, etc. Power understands *to relate* and *to interact* to be *inter-*. Hence she writes of, for example, trophic relations *of* dominant biota, rather than trophic relations *as* dominant biota. Power understands pattern, or structure, to interactively supervene upon processes. Ecological-biological patterns are scientifically-epistemologically phenomenal effects, or reactions, or what is the same again, complexly supervening structures that emerge existingly of, from, and by active-reactive processes. Ecological-biological patterns are—oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably *of*, *from*, and *by* existing-existences acting, reacting, and, thus, interacting. Processes are relations, and vice versa, and relations and processes are actions-reactions—that is, they are interactions. There are scientific-epistemological ambiguities here that are scientifically-epistemologically problematic for scientific-epistemological, and thereof, ecological evaluation, examination, and explanation.

For now, I consider another example. Ecologists, including Power, understand and subsequently write of plants (including aquatic plants such as the algae *Cladophora*, epiphytic diatoms, and *Nostoc*) to be producers: “to alter primary producers.” To be a plant is to be a (primary) producer. A plant is a (primary) producer. Yet a plant is a *primary* producer. Why primary? Because an herbivore, a primary predator, and a secondary predator are *also* producers. Likewise, just as herbivore and predator are consumers, the plant is a consumer. All biological organisms are *both* producers and consumers in some degree (primary, secondary, tertiary, etc.). Which spatiotemporal direction does ecological action-reaction move? What or which is action and what or which is reaction or, what is scientifically-epistemologically the same, effect or result? What or which is process and what or which is pattern? What or which is

epistemologically-metaphysically and, thereof, scientifically-epistemologically phenomenal and what or which is epistemologically-metaphysically noumenal? What or which is enacting, activating, and actualizing and what or which is—from, of, and by such activity-reactivity—existingly emerging (or supervening), existingly enduring (emergently or superveniently), and existentially passing away? These questions present scientific-epistemological difficulties—if not impasses and contradictions—to scientific-epistemological explanations. These scientific-epistemological problems cannot remain unsolved, much less unaddressed, if scientific-epistemological explanations are to proceed with scientific-epistemological validity and, thereof and thereby, scientifically-epistemologically validated correctness.

I have begun to notice that Power understands *interaction* to be “[to] have...effects on.” Inferring from what I have read thus far, Power also understands *to factor* to be *to act-react*. A factor is an action-reaction. I also learn that Power understands experimental manipulations to *reveal* something or someone (“experimental manipulations of fish in a Northern California river...reveal that they have large effects on...”). In the case of Power (1990), these experimental manipulations reveal that certain size and age classes of particular fish species in the Eel River—adult California roach and juvenile steelhead, both secondary predators—have large direct effects on primary predators and large indirect effects on herbivores and algae of the river’s ecological food webs. Experimental manipulations, that is, reveal scientific-epistemological effects and, thereby, scientific-epistemological actions-reactions—that is, the actions-reactions of which, from which, and by which ecological (including abiotic and biotic) patterns (or structures) emerge into existing, existingly endure, and existentially cease. Until her ecological study, “no studies in rivers [had] demonstrated that effects of predatory fish can cascade through food webs to alter primary producers.” By means of scientific-epistemological evaluation, experimentation, and examination, Power evidences what is understood to be a scientific-epistemological *discovery*. The momentousness of Power’s scientific-epistemological discovery is attested to by her corresponding publication in the preeminent journal *Science*. I learn that scientific-epistemological discovery is scientific-epistemological *revelation*, and vice versa.

Who discovers is who reveals, and vice versa. The scientist-epistemologist discovers, and is, thereby, the discoverer. The scientist-epistemologist reveals and is, thereby, the revealer. In this case, Power is the discoverer, and thus the revealer. The discovery, or revelation, is *itself* the effect of—or, what is scientifically-epistemologically the same, the reaction to—the scientist-epistemologist’s actions and the activity these comprise. All the actors, reactors, and, thus, the interactors and their interactions that are experimentally involved (sunlight, water, air, fish, invertebrates, algae, *et al.*) are effectively made to participate actively-reactively by means of the scientist-epistemologist’s activity—that is, by means of the scientist-epistemologist as, *herself*, actor and, thus, as means to actualizing scientific-epistemological experimental results (or reactions) and, later, scientific-epistemological explanations. I learn, then, that ecology—if not science-epistemology generally—is a means to activate and, thereby, actualize, or make, revelations. I learn that sunlight, water, air, animals, plants, *et al.*, are means to activate and, thereby, to actualize, or make, revelations. I learn that the scientist-epistemologist’s activity and all the actions-reactions that comprise this activity, as well as all that is necessary in order to be scientifically-epistemologically active-reactive, is a means to activate and, thereby, to actualize, or make, revelations. Perhaps, then, the scientist-epistemologist is *herself* an active means to activate and, thereby, to actualize, or make, scientific-epistemological revelations.⁴²⁰ In any case: *Revelations of what or who?* Ecology and ecologists—and science-epistemology and scientists-epistemologists, generally—make revelations of actors and reactors and their actions

and reactions (or effects). That is, science-epistemology and scientists-epistemologists—including scientific-epistemological ecologists—activate and, thereby, actualize revelations of interactions and, thus, interactors.

Why is any of this important? This is important, at the least, because Power's 1990 *Science* ecological food web diagram would be dismally incomplete were it solely a descriptive depiction of an Eel River food web. She could only have been entirely aware of this at the time of publication. Her ecological food web diagram is *purposefully* incomplete. Likewise, the peer reviewers of Power's article all knew and understood this, too, possibly in advance of reading the body of the article for the first time. (Had they not so understood, Power tells the reader as much on the second page.) In fact, the calculated incompleteness of Power's *Science* ecological food web diagram is probably indicative of one of *the* reasons why Power's article was not only published in one of the two most prestigious peer-reviewed journals of the natural science world (the other being *Nature*), but also why ecologists today continue to consider it a seminal paper in ecology as a whole—indeed, perhaps one of the 100 most seminal papers in the history of scientific-epistemological ecology.

Power's food web diagram of the Eel River is incomplete because it represents an *ecological* food web. This food web is a particular type and must be qualified as *ecological* or, encompassing the latter, *scientific-epistemological*. Power's ecological food web diagram represents an ecological food web. In this ecological food web, for example, to have a *large* effect is to have a *strong* effect. To have a strong effect is to be a strong actor; that is, to have an effect is the same as to act on-react to. To act is to be an actor-reactor, regardless of whether an actor is strong in one context and weak in another. To say, then, that steelhead and large roach of the Eel River have a large effect is to say that their relations to the organisms depicted in the ecological food web diagram are not only interactions, but *strong* interactions. To have a *large* effect is to *strongly* interact. If these strong interactions are strong *interactions*, it follows that California roach and steelhead are strong *interactors*.⁴²¹ The biological organisms *not* depicted in Power's diagram are weak actors-reactors.⁴²² To be a biological organism is, at least, a scientific-epistemological modality of oppositely, existentially simultaneously, equally, and, thus, scientifically-epistemologically causally indistinguishably acting on and to another actor and, thus, is a modality of interacting.

Power understands that a trophic interaction is strong or weak. A trophic interaction is the effect—or what is scientifically-epistemologically the same, the reaction, or result—of two or more existing actors-reactors acting oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on and to one another. A biological organism is an actor-reactor, strong or weak. If the interactions of large roach, juvenile steelhead, and the other depicted biological organisms are strong interactions, then those Power does not represent in the diagram are, in comparison, weak interactions. Importantly, these weak interactions are, nonetheless, *interactions*. Likewise, if California roach, juvenile steelhead, and the other biological organisms of the Eel River that Power represents *are* strong interactors, then *all* biological organisms in any trophic relation (i.e. interaction) of the Eel River or its surrounding environment—direct or indirect, strong or weak—*are* interactors, too. They are, as I have said, both actors and oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably effects, or reactors.

Power's understanding that scientific-epistemological actors-reactors and, thus, interactors, and that actions-reactions and, thus, interactions have strength is not new. Power follows R. H. MacArthur, R. M. May, and R. T. Paine with no discernable difference or

alteration of understanding or language of strong and weak interactors. This remains the case until the near present.⁴²³ As did each of these three eminent ecological predecessors, Power recognizes a gradient between strongest and weakest. Even so, interactors are either strong or weak and interactions are either strong or weak. In the history of scientific-epistemological ecology, Power's doctoral advisor, Robert T. Paine, is famous—among other now-canonical contributions—for raising interaction strength to prominence as an indispensably important metric for discerning, identifying, evaluating, testing, examining, and explaining ecological food web dynamics and their corresponding structures. In the two famous papers in which Paine introduces and discusses the metric of interaction strength—“Food Webs: Linkage, Interaction Strength and Community Infrastructure” of 1980 and “Food Webs: Road Maps of Interactions or Grist for Theoretical Development?” of 1988—he references both Robert M. May and Robert H. MacArthur and, respectively, R. M. May.⁴²⁴ Of note, Paine wrote of trophic cascades for the first time in this 1980 paper. A trophic cascade is, precisely, the cascading downward activity-reactivity, or interactivity—or what is identical, the cascading downward forces—of a *strong* interactor species and its actor-units (or first actors) enacting, activating, and actualizing chains of strong interactions. The *first* strong trophic action-reaction is the *actus primus* of the entire trophic cascade. This *actus primus*, however, as its necessary first enactor, is also oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably enacting, activating, and actualizing itself by means of feedback density-dependent interactivity. This poses notable scientific-epistemological difficulties—unacknowledged by Paine or, later, Power—of the spatiotemporal directionality of the activities-reactivities of the spatiotemporally *circular*, not spiral, interactivity chain. The downward cascades of strong trophic interactions are a modality of density-dependent feedback control and regulation of interactivity constantly activating and actualizing the abundance and distribution of species-populations in a defined ecological system. Again, the spatiotemporal directionality of trophic cascades is not only ecologically fundamental to ecological trophic dynamics in ecological systems, but *essential* and, in its essentiality, essentially scientifically-epistemologically and, thereof, ecologically problematic—as I discuss elsewhere. In these papers, Paine follows May's and MacArthur's distinction: interactors are either strong or weak. However, as did May and MacArthur, Paine also recognizes contextually dependent degrees of actional-reactional, i.e. interactional strength or weakness.

In “Food Webs” (1980), Paine also cites an important but nearly forgotten paper of 1972 by his doctoral advisor, Frederick E. Smith.⁴²⁵ It is of note that Smith's doctoral advisor at Yale University, in turn, was G. E. Hutchison, as was R. H. MacArthur's. For his near contemporary anonymity, Smith's influence scientific-epistemological ecology was enormous. Smith was one of the three co-authors of arguably one of the most important papers in the history scientific-epistemological ecology, “Community Structure, Population Control, and Competition,” in which density-dependent feedback control of trophic interactivity is fundamental to the green-world hypothesis. R. T. Paine's immensely famous papers of 1966 and 1969 emerged directly out of the work of Hairston, Smith, and Slobodkin (on note, Paine wrote for the first time of keystone species in the latter paper).⁴²⁶ Golley has described Smith as “director of the U.S. IBP [the United States International Biological Program] biome program.”⁴²⁷ Along with the work of R. H. MacArthur and R. M. May of the same year (see below), Smith's 1972 paper was one of the primary catalysts of change in understandings and attitudes among ecologists diversity and stability in ecological systems. Smith, like May, demonstrated that destabilization of an ecological system “accompanies increases in the number and connectance of system elements,”

i.e. with increasing in species diversity.⁴²⁸ Smith presaged R. M. May's work, in fact, demonstrating in 1969, after shifting his studies "from the real world to the world of the computer" and "having spent the last year doing field research with an IBM 7090," that "the concept that food-web stability is derived from diversity cannot be supported in models."⁴²⁹ As did her doctoral advisor, R. T. Paine, Power also draws on Smith's 1969 and 1972 papers in at least two of her most well-known and influential publications, both of 1992: "Top-Down and Bottom-Up Forces in Food Webs: Do Plants Have Primacy?" and "Habitat Heterogeneity and the Functional Significance of Fish in River Food Webs."⁴³⁰ In both of these papers, as in her 1990 *Science* paper, the interaction strength of feedback controlled, density-dependent regulation of trophic activity-reactivity is both central and fundamental. In these two papers, Power begins to write of interaction strength as, identically, dynamic significance and functional significance.

In 1972, MacArthur emphasized that, while the existence of competition and predation had never been questioned, ecologists needed to assess the strength of these modalities of interactions. He suggested that a competitor or predator is strong, or important, if removing it produces a dramatic effect, or reaction. Alternatively, if the course of the evolution of a community would have been markedly different in the absence of a given competitor or predator, the competitor or predator is strong, or important. However, MacArthur writes, "interactions should be—and are—on the borderline between strong and weak."⁴³¹ Otherwise, he continues,

if species interact weakly, their communities are vulnerable to invasion by additional species thereby increasing the interaction; if they interact strongly, they are vulnerable to almost all the hazards of existence and some will go extinct, thereby reducing the interaction. The in-between degree of interaction is surprisingly robust and is reflected in the uniform character displacement ratios to which Hutchinson (1959) drew our attention.⁴³²

In other words, the strength or weakness of a species' interactions and, thus, interactors (actors-reactors) is determinative of its success or failure in the scientific-epistemological evolutionary struggle for existence. During the 1960s, Robert H. MacArthur collaborated closely with his older brother, John W. MacArthur, Jr., who has been described as a "dominant influence" on his younger brother throughout the latter's life.⁴³³ Earlier in their respective careers, the two brothers reconvened to co-author at least two peer-reviewed papers in preeminent ecology journals.⁴³⁴ J. W. MacArthur, Jr., was a physicist. He received a Master's Degree in physics from the University of Chicago and his Ph.D. in particle physics from Rensselaer Polytechnic Institute in 1953 with a dissertation titled "Alpha-particle induced pulses in cadmium-sulfide."⁴³⁵ J. W. MacArthur continued his academic career as a professor at Marlboro College in Vermont, where he taught physics, astronomy, and advanced mathematics.⁴³⁶

To be sure, R. H. MacArthur, too, was familiar with physics and information theory and, to say the least, extraordinarily comfortable with these field's mathematics.⁴³⁷ Later in 1972, after R. H. MacArthur published "Strong, or Weak, Interactions?," he co-authored "Niche overlap as a function of environmental variability" with other preeminent ecologist, Robert M. May.⁴³⁸ During this same year, May published a highly influential article in *Nature*, "Will a Large Complex System Be Stable?," in which he galvanized the entire field of scientific-epistemological ecology by using the classical, deterministic Lotka-Volterra one-predator-one-prey differential equations—with adaptations, additions, and derivations—to thoroughly unsettle the long-entrenched ecological theory that greater species diversity in a defined ecological

community (correlatively) activates and actualizes, within this community, greater stability of (i) the number of species, (ii) greater stability of the number of each of these species' member-units, and (iii) greater stability of the quality and quantity of interspecific ecological interactions (namely, predation and competition). As May would emphasize in his book of the following year (see below), "whether or not the Lotka-Volterra equations are applicable to real-world situations is beside the point."⁴³⁹ The point that May makes, with scientifically-epistemologically ground-shaking repercussions, is "that simple mathematical models with many species are in general less stable than the corresponding simple mathematical models with few species."⁴⁴⁰ In the 1972 article, for example, May writes that " α may be thought of as expressing the average interaction 'strength', which average is for simplicity common to all interactions."⁴⁴¹ Subsequently, he explains that

[t]he central feature of the above results for large systems is the very sharp transition from stable to unstable behaviour as the complexity (as measured by the connectance and the average interaction strength) exceeds a critical value...Applied in an ecological context, this ensemble of very general mathematical models of multi-species communities, in which the population of each species would by itself be stable, displays the property that too rich a web connectance (too large a C) or too large an average interaction strength (too large an α) leads to instability. The larger the number of species, the more pronounced the effect...two different systems of this kind, with average interaction strengths and connectances α_1, C_1 and α_2, C_2 respectively, have similar stability character if [see equation in article]...Roughly speaking, this suggests that within a web species that interact with many others (large C) should do so weakly (small α), and conversely those which interact strongly should do so with but a few species.⁴⁴²

If one reads between the lines, one notes that the density-dependent, feedback regulated or feedback controlled interactivity of species within a defined ecology system continually activates and actualizes the stability or instability of the system. Cybernetic feedback control of activity-reactivity and the problem of density-dependence versus density independence of the control of, regulation of, and, thus, the stability or instability of an ecological system of species-populations' abundances and distributions is utterly central to May's mathematical models and his results. As C. S. Holling would explain the following year in another now-classic paper in the science-epistemology of ecology, on reviewing "the large class of coupled differential equations expression the rate of change of two populations as continuous functions of both," these models' behavior results from

the interplay [i.e. interaction] between (a) stabilizing negative feedback on density-dependent responses [i.e. reactions] to resources and predation, and (b) the destabilizing effects produced by the way individual predators attack and predator numbers respond to prey density...⁴⁴³

While the Lotka-Volterra equations are "the simplest and least realistic of these" models, they still entail the interactive feedback regulatory control of the activities-reactivities of the predator unit and the prey unit and, thus, of the stability or instability of the mathematically modeled ecological system.⁴⁴⁴ Introducing and combing the complementary mathematical modeling of interaction strength with those of connectance, May picks up where Gardner and Ashby had left

off in their 1970 *Nature* article “Connectance of Large Dynamic (Cybernetic) Systems: Critical Values for Stability.” Looking only at connectance, Gardner and Ashby had found that

[w]hen $n = 4$ [n : number of units in system], the probability that the system would be stable depended on C [C : connectance of units in the system] in a somewhat complex curve (which could perhaps be predicted exactly). But as n increases, the curve changes shape rapidly towards a step-function, so that even when n is only 10, the shape might be so regarded, at least for some practical purposes. Thus, even at $n = 10$, questions of stability can be answered simply by asking whether the connectance is above or below 13 per cent: 2 per cent deviation either way being sufficient to convert the answer from "almost certainly stable" to "almost certainly unstable".⁴⁴⁵

To arrive at the innovation of mathematically combining the calculations of the units of a complex system's connectance and average interaction strength, May also drew upon Ramón Margalef's 1968 book, *Perspectives in Ecology Theory*.⁴⁴⁶ In the first chapter of this book, “The Ecosystem as a Cybernetic System,” Margalef considers that

[a] simple example of an elementary cybernetic mechanism, in the form of a negative feedback loop, is the classical one of a predator and its prey...since [organisms] can be destroyed but cannot be produced from nothing, any regulatory mechanism implies an initial overshoot. An excessive number of offspring is produced by the prey. This number is reduced to a lower level through destruction by the predator. Such destruction is density-dependent, because the numbers of the predators themselves are dependent on the numbers of the prey at a previous time. The interactions between species can be considered cybernetic mechanisms.⁴⁴⁷

Margalef then presents a set of differential equations derived from the Lotka-Volterra predator-prey models. When the matrix of the coefficients of the products of the numbers, or intensities [i.e. strengths], of interacting elements are associated in a matrix of possible cross products of the differential equations, Margalef finds that, according to the values of the coefficients, “interactions [between predator species and prey species members] may be more or less strong.”⁴⁴⁸ Empirical evidence seemingly supportive of the model, he notes, indicates that “species that interact feebly with other do so with a great number of other species” and “[c]onversely, species with strong interactions are often part of a system with a small number of species having strong fluctuations.” One could continue to trace the sources Margalef draws upon in *Perspectives in Ecological Theory* to solve problems of the feedback control and regulation of interactivity in ecological systems into the fields of cybernetics, information theory, and classical and quantum physics.

May, like J. W. MacArthur, Jr., was trained as a physicist. He received his doctorate from the University of Sydney in 1959 with a dissertation entitled “Investigations towards an understanding of superconductivity.”⁴⁴⁹ Indeed, May wrote one of his earliest ecology papers on trophic interactional web complexity and the resulting (i.e. reacting) ecological community stability or instability, “Stability in Multispecies Community Models” of 1971, while still in residence as a professor in the School of Physics at the University of Sydney.⁴⁵⁰ Before moving to Princeton University in 1973, where he would become R. H. MacArthur's successor as the Class of 1877 Professor of Zoology, May published a seminal work in the history of scientific-

epistemological ecology, *Stability and Complexity in Model Ecosystems*. This is a work both Paine and Power both cite with explicit reference to interaction strength. In the book, May asks, for example, “what is the probability $P(m, C, s)$ that a particular matrix drawn from the ensemble will correspond to a stable community” if “a system with a specified number of species, m , connectance, C , and average interaction strength, s ” is considered.⁴⁵¹ As in 1972, May emphasizes that “[t]he central feature of these results for large systems [of competition dynamics or predator-prey dynamics] is the sharp transition from stable to unstable behavior as either the number of species m , or the connectance C , or the average interaction strength s , exceeds a critical value.”⁴⁵²

It is hardly a supposition to infer that—if he was he not already familiar with them—J. W. MacArthur, Jr. and May introduced R. H. MacArthur to the theoretical fundamentals of contemporary standard model particle physics concerning the fundamental forces, or interactions. These fundamental forces, or interactions, *are* the scientific-epistemological universe *absolutely* and—oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably—are *of* and *in* the scientific-epistemological universe *absolutely* (absolute: throughout all space and all time or, relativistically, are and are of absolute spacetime consisting of all possible particular, discrete spatiotemporal localities and the worldlines of their interactivities). There are currently four fundamental interactions, or fundamental forces, scientifically-epistemologically known to exist. They are the electromagnetic interaction (or force), the gravitation interaction (or, despite physicists contemporary common sense, is still force), the *weak nuclear interaction* (or the *weak nuclear force*), and the *strong nuclear interaction* (or the *strong nuclear force*). The latter two are most commonly referred to as the *strong interaction* and the *weak interaction* (or, respectively, the *strong force* and the *weak force*). When measured, the position and momentum of particles are subject to quantum uncertainties and the force or forces acting on them is not well-defined. For this reason, contemporary physicists, astronomers, and cosmologists prefer to speak of four fundamental interactions rather than four fundamental forces.⁴⁵³ The four fundamental interactions are identical to the four fundamental forces, and vice versa. All of the four forces, as well as the interactions they effect (or, identically, all of the interactions and the forces they enact, activate, and actualize) obey the conservation laws for energy, momentum, angular momentum, and electric charge.⁴⁵⁴ “At the level of the ultimate constituents of matter,” i.e. at the fundamental physical level, the strong (nuclear) force, or the strong (nuclear) interaction, is *between* quarks and gluons—in other words, the strong force, or the strong interaction, is the force that holds all nuclei together *as* nuclei.⁴⁵⁵ The collisions between two quarks, the interaction between three quarks to make a baryon (neutrons and protons are types of baryons), or between a quark and an antiquark to make a meson are each controlled by the strong force.⁴⁵⁶ The strong force, or the strong interaction, enacts, activates, and actualizes the great *stability* of all atomic nuclei.⁴⁵⁷ The strong force does not make, act on, or act between leptons. Also “[a]t the level of the ultimate constituents of matter, i.e. at the fundamental physical level, is the weak (nuclear) force, or identically, the weak (nuclear) interaction. The weak force “is deeply involved in many reactions that bring about the decay of *unstable* particles” [emphasis added].⁴⁵⁸ It was revealed (i.e. discovered) during investigations of the radioactive decays of atomic nuclei—that is, the β [beta] decay of a nucleus and, thus, of a neutron. The weak force is responsible for other types of decay, as well. The weak force acts between (or, identically, the weak interaction is between) two quarks, two leptons and between a lepton and a quark.⁴⁵⁹ Unlike the strong force and leptons, the weak force also acts on baryons and mesons, though its

effects (i.e. the reactions, that is, the opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable actions) on these hadrons is often concealed behind that the much larger effects of the strong force (strong interaction) or the electromagnetic force (electromagnetic interaction).⁴⁶⁰

R. H. MacArthur's; J. W. MacArthur, Jr.'s; and R. M. May's scientific-epistemological reasoning that ecological systems are pushed and pulled (i.e. forced, or identically: consistently interactively enacted, activated and reactivated, and actualized and re-actualized) towards either *stability* or *instability* of the numbers of the system's species-population actor-units and these populations' individual actor-unit members by the *strong* and *weak forces* of or, identically, by means of the activity-reactivity of *strong* and *weak interactions* of, density-dependent feedback activity-reactivity and density-independent disturbing activity-reactivity (the latter enacting, activating, and actualizing irregular, uncontrolled and even chaotic oscillations or fluctuations in the system) is epistemologically-metaphysically existentially and, thereof, scientifically-epistemologically physically impeccable. The epistemological-metaphysical and, thereof, scientific-epistemological fundamentality *and* essentiality of the MacArthur brothers' and May's understanding with regard to scientific-epistemological physical systems and, complexly emerging therefrom, thereof, and thereby, scientific-epistemological patterns and structures *such as* ecological systems (e.g. ecological food webs, communities, etc.) is indicated by Frank Wilczek. Wilczek writes,

Fields are necessary to achieve locality, and quantum fields produce particles. Following this logic, we obtain a deeper understanding of why particles exist, and of their amazing interchangeability. There is no need to introduce two different sorts of fundamental ingredients, fields and particles, after all. Fields rule. Quantum fields, that is.⁴⁶¹

When Wilczek writes of fields, he writes of fields of quantum interactivity. Thus, when Wilczek writes of fields, one can substitute the emergently supervening fields of strong and weak interactions of an ecological system absolutely. When Wilczek writes of particles, he writes of the fundamental particles of the standard model of particle physics and, thus, the particles that are excitations (i.e. interacting interactions) of a quantum field (as explained by one or another quantum field theory). Thus, when Wilczek writes of particles, one can substitute the emergently supervening unit-actors-reactors of ecological interaction fields that are, for example, species-populations and these populations' individual actor-reactor units. The biological species population *Homo sapiens* and its individual actor-reactor (or agential) units are—epistemologically-metaphysically and, thereof, scientifically-epistemologically necessarily and without epistemological-metaphysical and, thereof, scientific-epistemological exception absolutely—included. Human-beings scientifically-epistemologically existing in the world are—primordially, fundamentally, essentially absolutely—effects of fundamental forces acting, reacting, and interacting and human beings scientifically-epistemologically existing in the world are oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally *of, from, and by* these fundamental forces, i.e. these fundamental interactions. Wilczek continues, summing up:

From [fundamental] forces we are led to fields, and from (quantum) fields we are led to particles. From particles we are led to (quantum) fields, and from fields, we are led to

forces. Thus, we come to understand that substance and force are two aspects of a common underlying reality.⁴⁶²

One must understand, then, that epistemologically-metaphysically and, thereof, scientifically-epistemologically originally, primordially, fundamentally, essentially, ultimately, and absolutely, particles are complexly emerging *effects*, or reactions-actions of force (singular, including the four fundamental *forces*) forcing and being forced in its four fundamental modalities, or what is identical, interactivity (singular, including the four fundamental interactions) interacting and self-interacting quantumly in this interactivity's four modalities of interacting. In other words, in the succinct and incisive words of Paul Davies: “[p]articles do not [fundamentally or essentially] [e]xist.”⁴⁶³

Yet the epistemological-metaphysical and, thereof, scientific-epistemological senses of and understanding of interaction strength is not the discovery, revelation, idea, concept, frame, notion, innovation, heuristic, *et al.*, of the MacArthur brothers, May, Margalef, or any of the abovementioned others. Interaction strength is implicit and inextricable from the Lotka-Volterra equations (and, therefore, in all of the subsequent mathematical modeling and field studies based on or interrogating and testing these equations).⁴⁶⁴ In *The Struggle for Existence*, G. F. Gause, for example, writes

The part which the quantitative relations between species at the beginning of their struggle [for existence] play in the outcome of competition presents an interesting problem...Even when the species that has first established itself is somewhat weaker than another species in the same habitat, it can for a comparatively long time resist its stronger competitor simply because it was the first to occupy this place. Only in the case of a considerable weakness of the first comer will its domination be merely a temporary one, and the effect of the first accidental appearance will be rapidly eliminated...⁴⁶⁵

Gause's book is a classic in scientific-epistemological ecology for, among other things, his experimental prowess and his formulation and experimental demonstration of the competitive exclusion principle.⁴⁶⁶ Among the many, many ecologists who have cited Gause over the decades are included such luminaries as G. E. Hutchinson, L. Cole, L. C. Birch, F. E. Smith, T. Park, R. T. Paine, and Oksanen, *et al.*⁴⁶⁷ Beyond his competition and predator-prey models, Alfred J. Lotka writes of interaction strength, for example, in a section of *Elements of Physical Biology* entitled “Chess as a Conventional Model of the Battlefield of Life.”⁴⁶⁸ Stephen A. Forbes understood interaction strength to be most fundamental too *all* life and its shifting orders, writing

In this lake, where competitions are fierce and continuous beyond any parallel in the worlds periods of human history; where they take hold, not on good of life merely, but always upon life itself; where mercy and charity and sympathy and magnanimity and all the virtues are utterly unknown; where robbery and murder and the deadly tyranny of strength over weakness are the unvarying rule; where what we call wrong-doing is always triumphant, and what we call goodness would be immediately fatal to its possessor,—even here, out of these hard conditions, an order has been evolved which is the best conceivable without a total change in the conditions themselves; an equilibrium has been reached and is steadily maintained that actually accomplishes for all the parties

involved the greatest good which the circumstances will at all permit. In a system where life is the universal good, but the destruction of life the will-nigh universal occupation, an order has spontaneously arisen which constantly tends to maintain life at the highest limit—a limit far higher, in fact, with respect to both quality and quantity, than would be possible in the absence of this destructive effect.⁴⁶⁹

Here the reader hears the resonant voice of, for example, Adam Smith and the stability and instability conferred by the machinic, mechanistically interactive feedback self-regulating engineering device, or economy, of classical political economics.⁴⁷⁰ Alfred R. Wallace wrote of the strength of the feedback self-regulating interactivity of evolution by natural selection, which is akin, he noted, to the centrifugal governor of a steam engine.⁴⁷¹ And, as many consider him, the father of ecology, too, wrote of interaction strength:

Natural selection will produce nothing in one species for the exclusive good or injury of another; though it may well produce parts, organs, and excretions highly useful or even indispensable, or highly injurious to another species, but in all cases at the same time useful to the owner. Natural selection in each well-stocked country, must act chiefly through the competition of the inhabitants one with another, and consequently will produce perfection, or strength in the battle for life, only according to the standard of that country. Hence the inhabitants of one country, generally the smaller one, will often yield, as we see they do yield, to the inhabitants of another and generally larger country. For in the larger country there will have existed more individuals, and more diversified forms, and the competition will have been severer, and thus the standard of perfection will have been rendered higher.⁴⁷²

Darwin, it could be said, began the scientific-epistemological debates over the problems of the activity-reactivity of density-dependence versus density-independence and stability versus instability—debates that continue unabated over problems unsolved in the science-epistemology of ecology through the present day. He wrote

The dissimilarity of the inhabitants of different regions may be attributed to modification through natural selection, and in a quite subordinate degree to the direct influence of different physical conditions. The degree of dissimilarity will depend on the migration of the more dominant forms of life from one region into another having been effected with more or less ease, at periods more or less remote;—on the nature and number of the former immigrants;—and on their action and reaction, in their mutual struggles for life;—the relation of organism to organism being, as I have already often remarked, the most important of all relations.⁴⁷³

Finally, in one of the most memorable passages of one of the most important chapters of *On the Origin of Species*, entitled “The Struggle for Existence,” governing the innumerable evolutionary wars of the struggle for existence, the machinic, interactive feedback self-regulating and self-controlling engineering apparatus—that is, evolution by natural selection—checks and balances “the action and reaction of the innumerable plants and animals which have determined, in the course of centuries, the proportional numbers and kinds of trees now growing on the old Indian ruins!”⁴⁷⁴ Natural selection “is a power incessantly ready for action, and is as immeasurably

superior to man's feeble efforts, as the works of Nature are to those of Art."⁴⁷⁵ If, there, we are to begin to scientifically-epistemologically discover, i.e. reveal these complexities of biological organismic activity-reactivity, or interactivity,

[a]ll that we can do, is to keep steadily in mind that each organic being is striving to increase at a geometrical ratio; that each at some period of its life, during some season of the year, during each generation or at intervals, has to struggle for life, and to suffer great destruction. When we reflect on this struggle, we may console ourselves with the full belief, that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply.⁴⁷⁶

Increasingly, however, “we [scientific-epistemological biologists, including ecologists] have overemphasized competition over the last 5- to 60 years—which nevertheless is “a fundamental aspect of ecology” as “the driver of adaptation.”⁴⁷⁷ Yet, even if evolution by natural selection overemphasizes competition because “evolutionary theory was developed by hyper-competitive white dudes,” *all* scientific-epistemological activities-reactivities and, thus interactivities that *are* ecological systems and that are oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably *of, from, and by* ecological systems—including, for example, mutualism, commensalism, and facilitation—are originally, primordially, fundamentally, ultimately, and absolutely interactivities and the interactions that comprise them, or what is identical, force forcing and being forced in its four fundamental modalities of forcing and these modalities' innumerably existingly emergent, existingly enduring, and existentially ceasing forms.⁴⁷⁸ And absolutely each and every epistemological-metaphysical and, thereof, scientific-epistemological action *A* is oppositely, existentially simultaneously, equally, and, thus, scientifically-epistemologically causally indistinguishably a reaction *A* to the actor *B* that oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably acts on actor-reactor *A*. This is interaction between actor-reactor *A* and actor-reactor *B*.

In the ecological food web of the Eel River, large roach and steelhead are keystone species. Not all strong interactors at the top of functionally significant trophic interactor-interaction chains are keystone species. Nevertheless, the conspicuous incompleteness of Power's 1990 diagram of strong interactions does hint for the ecologically trained eye that this could be the case. In other words, the scientific-epistemological explanation of keystone species is subtly suggested, but not explicit. To be a biological organism of a keystone species is to be not only a strong interactor and primary consumer (whether herbivore or predator, depending on the length of the chain), but to *initiate* one or more chains of strong interactions that cascade through an ecological community's food web *and* to have a disproportionately large (or strong) effect relative to the species' abundance. The keystone's disproportionately strong effects benefit one species of consumer that would otherwise compete at disadvantage with one or more other competitively dominant consumers.⁴⁷⁹ This sets a keystone apart from both strong interactors and dominant species in an ecological food web. In other words, to be a biological organism of a keystone species is to be the *strongest* interactor of the ecological food chains comprising the particular ecological food web spoken of, written about, or diagrammatically illustrated while having a relatively small abundance compared to other strong and dominant species in the web. Power's diagram subtly suggests that California roach and steelhead trout may be keystone interactors (as, in fact, they turn out to be).⁴⁸⁰

The arrows, then, of the 1990 *Science* ecological food web diagram represent interactions. Each arrow represents an interaction. The interaction must be *between* at least two actors-reactors. The interactions, that is, must be between, minimally, two actors-reactors, or actor and opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable reactor. Each actor-reactor must be prior to the interaction. Collectively, the arrows represent *only* the *strong* interactions of the river's ecological food web. Each arrow in the diagram represents one strong interaction.

The words in the diagram name biological organisms that are, in this ecological food web, strong interactors. Scientifically-epistemologically, each actor must exist prior to and distinct from an interaction *between* two or more actors. As I have learned, a relation is an interaction. The strong actors-reactors and the strong interactions of the Eel River's ecological food web are strong interactors and strong interactions, respectively, as explained by R. H. MacArthur and R. M. May.⁴⁸¹ R. T. Paine further scientifically-epistemologically elaborated, explained, and evidenced MacArthur's and May's explanation.⁴⁸² In Power's diagram, both the arrows and the biological organisms' names represent strong actions-reactions and actors-reactors, respectively, as distinguished from weak, or as I may write, proximate actions-reactions and actors-reactors. I have come upon at least two scientific-epistemological difficulties: Which or what is the actor and which the reactor? Which actor originates *this* action-reaction and, thus, *this* interaction? Is *this* action-reaction and actor-reactor pair scientifically-epistemologically discernible from *that* action-reaction and actor-reactor pair? In what spatiotemporal direction do the actor-reactor and reactor-actor move and in what spatiotemporal direction do their opposite, existentially simultaneous, and equal actions-reactions move? Who or what is the effect of the action, and how are the actors and reactors, actions and reactions (i.e. effects) scientifically-epistemologically discerned, distinguished, and identified, much less each independently scientifically-epistemologically examined, evaluated, tested, and explained?

For now, it is sufficient to recognize and understand that in her *Science* ecological food web diagram—fashioned after she had completed her experiments and analyzed her data—Power excised from the outset all known trophic interactions measured or otherwise evaluated to be less than strong interactions. Likewise, she excised all trophic interactors measured or otherwise evaluated to be less than strong interactors. She did not and would not have done so, I must assume, out lack of concern for those biological organisms and interactions she struck out. Nor did she do so, I must also assume, without understanding that future scientific experimental manipulations could reveal errors or oversights in her diagram and the experiments, data, and interpretations of the data she reports in *Science*. Power's ecological food web diagram is incomplete because it must ecologically explain. In ecologically explaining, it is scientific-epistemological. The ecological food web of the Eel River that Power represents in her diagrams is a scientific-epistemological food web scientifically-epistemologically explained by an ecologist. Ecology is epistemologically-metaphysically a science-epistemology. An ecologist is epistemologically-metaphysically a scientist-epistemologist. An ecological food web diagram is a scientific-epistemological explanation. Such a diagram scientifically-epistemologically explains an ecological food web. An ecological food web is an ecologically defined system of ecological actors acting oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on and to each other or, what is the same, ecological interactors interacting.

Power's Eel River ecological food web diagram, then, presents a complex of scientific-epistemological explanations. Taken as a whole, it is an aggregate scientific-epistemological

explanation. First, of course, is the ecological explanation of a four-level ecological food web of the ecological Eel River. This explanation has previous explanations embedded within it. For example, in order to explain the Eel River's ecological food web, Power diagrammatically positions each biological species-population on a trophic level. In Figure 2 of her 1990 *Science* article, there are four trophic levels. A community ecological trophic level is an ecological category denoting the ecological trophic function of each biological species-population of an ecological system (e.g. an ecological community). An ecologist defines an ecological system by means of validly methodologically validated parameters.⁴⁸³ Functional bio-ecological trophic categories commonly include, for example, primary producers, herbivore consumers, detritivore consumers, primary predator consumers, secondary predator consumers, tertiary predator consumers, etc. Omnivory, phenology, and biological organisms' life-cycle stages present challenges to such ecological categorization but can, nonetheless, be diagrammatically represented with adequately defined parameters. Ecologists adopted *producer* and *consumer* from the science-epistemology of economics.⁴⁸⁴ Unlike either ecosystem ecological pyramids of ecosystem ecological trophic levels (e.g. Odum 1959), and unlike Eltonian pyramids of numbers (e.g. Elton 1927), contemporary community ecological trophic chains and their levels conserve the individuality of each biological species-population.⁴⁸⁵ The total calorie content of a biological species-population, the total biomass of a biological species-population, and the quantity of any particular species-population's organismal actor-units in a defined area at a defined time of the ecology of the Eel River do not determine into which community ecological trophic level Power positions any given biological species-population. Contemporary community ecological trophic levels are explanatory functions of, in turn, the trophic functionalities of the biological species-populations of an ecological system such as, for example, an ecological community.

Power's ecological community food web diagrams go a scientifically-epistemologically explanatory step further, however. The active, effective strength of the dynamics of, or—what is identical—the active, effective strength of the functionality of each evaluated, individual biological species-population in an ecological community can determine whether Power includes the species-population in the diagram at all. For example, in Figure 2 Power includes only “trophic relations of dominant biota in and around algal tufts during the summer low-flow period.”⁴⁸⁶ In this case, *dominant* speaks of both the quantity of individual actor-units of the biological species-populations diagrammed *and* of the strength of the dynamics (or the strength of the functionality) of their trophic interactions. However, unlike in ecosystem trophic levels or Eltonian pyramids of numbers, in Power's community ecological food web diagrams *dominant* does not necessarily speak of greater calorie content or greater numbers of organismal unit-actors in an evaluated species-population, as Paine has explained.⁴⁸⁷ In Power's diagrams, *dominant* does speak necessarily of organisms acting in and reacting to *strong* interactions; *dominant* does speak necessarily, then, of *strong* interactors, even if any one of these actors is also ecologically evaluated to be a *weak* actor entrained in a strong interaction chain. This is scientific-epistemological contradiction, as I note below. Alternatively—as I shall see in later iterations of Power's diagrams—the active, effective strength of the dynamics of, or—what is identical—the active, effective strength of the functionality of each evaluated, individual biological species-population in an ecological community determines not the inclusion, but rather the category of the interaction *arrows* or *lines* between those species-populations Power has evaluated and included in the diagram.

The inclusion in a diagram of the name of a biological species-population or the trophic interaction indicators (e.g. arrows, lines) of the Eel River ecological food web are functions of the strength of the dynamics (or functionality) of the trophic interactions of these biological species-populations. Each biological species-population—and, thus, each average individual organismal unit of each biological species-population—is a trophic actor acting on and oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably reacting to trophic interactions with the other individual biological species-populations of the river (and, thus, with other average individual organismal actor-units of each of these species-populations). Only by first scientifically-epistemologically evaluating and ordering the strength of each interactor’s effective trophic dynamics or, what is identical, the strength of each interactor’s effective trophic functionality, does Power delineate and systematize interactions between actors in different trophic levels. She scientifically-epistemologically categorizes and orders in this manner in order to explain trophic actors, their interactions, and the effective strengths of their dynamics or, identically, their functions. Community ecological trophic interaction chains and their representation in diagrammatic webs with trophic level categories are functions of, in order of priority: (i) trophic dynamic or function (producer, consumer); (ii) the scientifically-epistemologically evaluated effectivity and efficiency (or strength) of the trophic interactions (i.e. the trophic dynamics, the trophic functionality) of the biological species-populations included and, thus, each of these species-populations’ individual organismal actor-units and the effective strength of each of their own averaged individual trophic activity; and (iii) the ecological diagram’s effectivity as a means to scientifically-epistemologically order, categorize, and explain the functions and strengths of ecological interactors and their trophic interactions within a given ecological system (e.g. an ecological community).

In the Figure 2 diagram, Power represents each trophic interactor level by horizontally and vertically arranging the written-form names of the organisms of the respective biological species-populations. Each horizontal line of names graphically represents one trophic level. The four horizontal lines of names are then ordered vertically by function, with primary producers on the bottom and the highest degree of predatory consumer on the top. The interposition of the arrows between interactors marks the trophic relations between the strongly interacting species-populations. In other words, these are scientific-epistemological relations (i.e. interactions) between scientific-epistemological organisms evaluated as species-populations. To act and, thus, to interact is to act oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably to the actor that likewise acts on one. Thus, each biological organism whose name Power writes is an ecological actor and opposite, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishable reactor to the actor acting upon it. To reiterate: In Figure 2 diagram, Power depicts neither all of the known ecological trophic interactions nor all of the known ecological trophic interactors of the Eel River’s ecological food web. She includes the strong trophic actors and their strong trophic interactions only. The diagram scientifically-epistemologically explains that this ecological food web is comprised of five ecological food chains jointly spanning four levels of “dynamically significant interactions.”⁴⁸⁸ A dynamically significant interaction is a strong interaction. A dynamically significant interactor, then, is a strong interactor.

Following below are the five strong, i.e. the five dynamically significant chains of ecological trophic interactions and ecological trophic interactors represented in Power’s 1990

Figure 2 diagram. Each except the fifth proceeds from the first trophic level or base of producers upwards to herbivores and primary and secondary predators:

- (1) *Cladophora*/diatom epiphytes/*Nostoc* → tuft-weaving chironomids → predatory insects (lestids) → large roach.
- (2) *Cladophora*/diatom epiphytes/*Nostoc* → tuft-weaving chironomids → predatory insects (lestids) → steelhead.
- (3) *Cladophora*/diatom epiphytes/*Nostoc* → tuft-weaving chironomids → roach fry → steelhead.
- (4) *Cladophora*/diatom epiphytes/*Nostoc* → tuft-weaving chironomids → stickleback fry → steelhead.
- (5) *Cladophora*/diatom epiphytes/*Nostoc* → large roach.

The only two-level dynamically significant interaction chain is the fifth. It represents the omnivory of large or adult roach and, thus, one of the perennial challenges of ecological trophic level organization.

In the diagram, Power interposes arrows between prey and consumer. All depicted interactors except the photosynthetic producers and secondary predators on the first and fourth levels, respectively, are both prey and consumer, at least as explained by the diagram. The fact that Power understands them to be, and consequently names the biological organisms she depicts “prey” and “consumer” is scientifically-epistemologically explanatory of spatial and temporal *directionality* of opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable actions of and by the interactors. Remember, to eat is to consume and to consume is to act-react, or interact. While not exhaustive of possible scientific-epistemological interaction chains, within an ecological food web diagram, naming interactors *prey* and *consumer* scientifically-epistemologically identifies and explains a chain of actions-reactions that spatiotemporally moves from consumer to prey. The consumer eats the prey. A consumer individual causes the biological death, for example, of a prey individual. A consumer population, for example, regulates or controls—which is to say, proximately or ultimately activates and, thereby, actualizes—the number of members in or biomass of a prey population. Power scientifically-epistemologically explains, then, by means of labelling interactors “consumers” and “prey,” that the actions-reactions move in the *opposite* spatiotemporal direction than the upward orientation of the arrows. That is, the actions-reactions spatiotemporally move secondary predator, to primary predator, to herbivore, to producer. Recall, however, that Power understands both *to eat food* and *to be food* each to be modalities of activity each comprised of their respective actions-reactions. The arrows’ upward orientations, therefore, must also scientifically-epistemologically explain another spatiotemporal directionality of activity-reactivity. In this case, the spatiotemporal directionality of the actions-reactions is opposite that explained by the names “consumer” and “prey,” spatiotemporally moving instead, as indicated by the arrows, from producer to herbivore to primary predator to secondary predator. Most ecologists, including Power, understand the arrows’ upward orientations to scientifically-epistemologically explain the spatiotemporal directionality of the flow of energy and matter—from one individual biological organism to another individual biological organism and from one species population to another species population of which these respective individual biological organisms are part.⁴⁸⁹ This flow of energy and matter scientifically-epistemologically necessarily entails actions-reactions and, thus, interactions. I find, then, that in her diagram,

Power scientifically-epistemologically explains that in the Eel River food web, trophic actions-reactions move, simultaneously and equally, in opposite spatiotemporal directions. This presents a scientific-epistemological conundrum Power does not acknowledge or address in the article.

I have just discerned two opposing scientific-epistemological explanations of the spatiotemporal directionality of actions-reactions and actors-reactors in Power's diagram. I recall once again that, in her diagram, Power has delineated solely the strong interactors and the strong interactions of the Eel River ecological food web. In so doing, she gives a scientific-epistemological explanation of trophic activities-reactivities and the actions-reactions that comprise them. She explains, in other words, the spatiotemporal directionality of the actions-reactions and actors-reactors of each corresponding interactor-interaction chain. There is still one interaction chain yet to be mentioned. Power scientifically-epistemologically explains not only actions-reactions, but the spatiotemporal direction of the *strong* actions-reactions by and of *strong* actor-reactors, i.e. by and of strong interactors. This is *in addition to* her explanations of (i) the spatiotemporal directionality of consumption and production and, thus, of the motion of producers and consumers as well as (ii) the interactivity of the flow of energy and matter. This third explanation is not necessarily scientifically-epistemologically congruent, much less scientifically-epistemologically compatible, with either of the other two sets of scientific-epistemological explanations of actional-reactional spatiotemporal directionality without scientific-epistemological contradiction.

What makes an actor a *strong* actor? What makes an actor a *strong* interactor? What are the proximate actions-reactions and what is the ultimate action-reaction pair such that these are evaluable as strong actions-reaction of and by strong actors-reactors? In other words, what or who makes an actor or a reactor a *strong interactor*? To be a strong interactor is to be a strong actor and oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably a strong reactor activating and actualizing strong effects as evaluated against other comparable actors and reactors, actions and effects. I can write the same differently: To be a strong interactor is oppositely, simultaneously, equally, and thus causally indistinguishably to be strongly acted on and, thus, to be a strong effect or, what is the same, a strong reactor as evaluated over against other comparable actors and reactors, actions and effects. Each and every strong interactor is—scientifically-epistemologically necessarily and throughout time and space (i.e. absolutely)—oppositely, simultaneously, equally, and, thus, scientifically-epistemologically causally indistinguishably *both* a strong actor *and* a strong reactor acting strongly, oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on the strong actor acting on it. Scientifically-epistemologically, each and every strong interactor and strong interaction is and can only be strong as scientifically-epistemologically evaluated and judged in interaction with *weaker* interactors. Such an evaluation and subsequent judgement, however, as well as the scientific-epistemological results of (i.e. reactions to) tests or comparisons demonstrating strong and weak actions-reactions and actors-reactors is scientifically-epistemologically contradictory. Actor and reactor strength, and thus interactor strength, as well as action and reaction strength, and thus interaction strength, each scientifically-epistemologically explains the spatiotemporal directionality of the actions and reactions evaluated, and thus of these actors' and reactors' motions. Yet these actions-reactions are, and these actors-reactors are, scientifically-epistemologically necessarily opposite, existentially simultaneous, equal, and, thus, scientifically-epistemologically causally indistinguishable. Again, this is the third law of motion, as Newton gave his voice to it in

thinking and writing: “To every action there is always opposed an equal reaction: or the mutual actions of two bodies upon each other are always equal, and directed to contrary parts.”⁴⁹⁰

Unlike the first and second epistemological-metaphysical and, thereof, scientific-epistemological laws of motion, I sense that the essence of third law continues to give and to govern general relativity and quantum mechanics. For relativity, perhaps one may sense the oppositionality, existential simultaneity, and equality of actions-reactions, for example, in the words of John Archibald Wheeler:

How is this abstract world of curved spacetime geometry wired up to the everyday world of tennis balls and falling weights, of spaceships and planets, of stars and galaxies? The answer is simple yet wonderful: spacetime geometry is wired up to the everyday world by a geometric principle of fantastic innocence and power, a principle that says that “the boundary of a boundary is zero.” This boundary principle reaches out guiding hands from every region to the surroundings of that region. In this way *spacetime grips mass, telling it how to move*. In this way *mass grips spacetime, telling it how to curve*. With those two statements in hand, we hold before us in a nutshell all of Einstein’s great geometric theory of gravity.⁴⁹¹

More technically, perhaps, one may sense the opposition, existential simultaneity, and equality of action-reaction and, therefore, of actors-reactors, for example, in the words of Sean Carroll:

Having paid our mathematical dues, we are now prepared to examine the physics of gravitation as described by general relativity. This subject falls naturally into two pieces: how the gravitational field influences the behavior of matter, and how matter determines the gravitational field. [...] Just as Maxwell’s equations govern how the electric and magnetic fields respond [i.e. react] to charges and currents, Einstein’s field equation governs how the metric responds [reacts] to energy and momentum. [...] With the normalization chosen so as to correctly recover the Newtonian limit, we can present Einstein’s equation for general relativity:

$$R_{\mu\nu} = 8\pi G (T_{\mu\nu} - \frac{1}{2} T g_{\mu\nu}) .$$

This tells us how the curvature of spacetime reacts to the presence of energy-momentum.⁴⁹²

Similarly, we may action-reaction opposition, existential simultaneity, and equality in gravitational field self-coupling, i.e. acting upon itself oppositely, existentially simultaneously, and equally to its action upon itself:

In Newtonian gravity the potential due to two point masses is simply the sum of the potentials for each mass, but clearly this does not carry over to general relativity outside the weak-field limit. There is a physical reason for this, name that in GR the gravitational field couples to itself. This can be thought of as a consequence of the equivalence principle—if gravitation did not couple to itself, a gravitational atom (two particles bound by their mutual gravitational attraction) would have a different inertial mass that

gravitational mass (due to the negative binding energy). The nonlinearity of Einstein's equation is a reflection of the back-reaction of gravity on itself.⁴⁹³

In quantum mechanics, the oppositionality, existential simultaneity, and equality of actions-reactions may be, perhaps, sensed, for example, in CPT conservation, quantum field self-interaction at zero-point energy, particle coupling and momentum coupling, and as illustrated lucidly in Feynman diagrams.⁴⁹⁴

What do I learn? Each and every scientific-epistemological and, thereof, ecological actor and reactor, each and every interactor, each and every action and reaction, and each and every interaction represented in Power's *Science* Eel River ecological food web diagram is, scientifically-epistemologically necessarily and absolutely, *both* strong and oppositely, existentially simultaneously, equally, and *identically* weak. Each and every scientific-epistemological actor and reactor, each and every interactor, each and every action and reaction, and each and every interaction is oppositely, existentially simultaneously, equally, and *identically* both strong and weak. Such scientific-epistemological contradictions are *essential* epistemological metaphysical and, thereof, scientific-epistemological problems not yet scientifically-epistemologically solved or otherwise fixed.

Strict ecological empiricists notwithstanding, these scientific-epistemological contradictions were not noticed by Power, the peer reviewers of her 1990 *Science* article, the editors of her 1990 *Science* article, and—so far as I have been able to discern from searching the ecological literature—the readers of her article, including ecologists and, I presume, other types of scientists-epistemologists.⁴⁹⁵ This scientific-epistemological contradiction remains unaddressed and—again, if I give each one of the parties above the benefit of the doubt—not understood with any awareness by Power or any other of the aforementioned parties, from the time of Eel River food web diagram's publication in 1990 through the present.

The ecologists and other scientists-epistemologists that have read her article have, as far as I can discern from the literature, progressed forth with their scientific-epistemological activities and active productions of knowledge—which is to write, active production of, or making, of scientific-epistemological explanations—never- and nonetheless.

3.5 Power's 1996 Eel River ecological food web modules, or Figure 27.1

I have begun to sense what is epistemologically metaphysically and, thereof, scientifically-epistemologically ecological of Power's ecological food web diagrams of the Eel River. Over the years after her first diagrammatic iteration of the ecological food web of the Eel, Power continued to develop her diagrams in step with further theoretical (i.e. mathematically modelled) and experimental findings. One or another of these diagrams have appeared periodically in her academic publications as well as appearing consistently in her seminar presentations and UC Berkeley course lectures. As with the initial ecological food web diagram of 1990, each of her subsequent diagrams is an aggregate ecological explanation of—and not a descriptive illustration of—the Eel River's ecological food web.

In 1996, Power *et al.* published three diagrammatically represented ecological food web modules—as the authors called them, following R. T. Paine—of the Eel River.⁴⁹⁶ In Figure 27.1 I find module *a*, *b*, and *c*.⁴⁹⁷ By 1996, Power had effected experimental manipulations on the South Fork of the Eel during two climatic regimes, or alternative states, historically recurring in the Mediterranean climate of northwestern California.⁴⁹⁸ In the first state—one Power calls a

typical year—a rainy winter is followed by a dry summer with slowly decreasing river and tributary base flows that provide enough water to support algae, invertebrates, and fish in webs of four-level trophic interactor-interaction chains. Such are the chains Power explained in 1990.⁴⁹⁹ During winter of these years, the channels of the river are scoured by floods. The second state occurs when there is a drier winter with no scouring floods. During the dry summer months a two-level trophic interactor-interaction chain develops. In Figure 27.1, module *a* depicts the ecological food web during the summer water drawdown after scouring winter floods. Module *b* illustrates the same food web during summer low flows following a winter without scouring floods. Module *c* presents the ecological food web after typical scouring winter floods and an anomalous June spate that exported prior algal growth and its residents (e.g. tuft midges).

A cursory glance at the three modules of Figure 27.1 shows that the diagrams consist of embedded scientific-epistemological explanations. A reader can discern by the distinction between black and white arrows whose different arrangements somehow correspond to each of the three overarching climatic state qualifiers. In the figure's caption, confirming one's discernment, Power tells the reader that these food web modules represent functionally significant food chains. As I have noted, Power understands *functionally significant* to be identical to *strongly interacting*.⁵⁰⁰ As I learned from "Effects of Fish in River Food Webs," *strongly interacting* is identical to *dynamically significant*.⁵⁰¹ *Functional significance* is identical, therefore, to *dynamical significance*. A functionally significant interactor, then, is a strong interactor, and vice versa. In other words, Power tells the reader that these modules delineate strong interactions and strong interactors. In her caption, Power tells the reader straight away that these are scientific-epistemological explanations of the ecological trophic interaction-interactor chains of the Eel River food web. As before, arrows point upwards from prey to consumer, representing interactions between interactors. Yet the diagrammatic scientific-epistemological explanations she gives here differ subtly but importantly from those of the 1990 *Science* diagram. "Small predators" subsumes "Predatory insects (lestids)," "Roach fry," and "Stickleback fry" of the third trophic interactor level of the 1990 diagram. Grouping all primary predators into a single representative guild simplifies the diagram for explanatory clarity. Additionally, two new groups of trophic interactors now appear in the grazer guild—"mayflies" and "armored or sessile grazers"—which include three categories of trophic interactors: mayflies, armored grazers, and sessile grazers. Related to the addition of these two grazer groups, Power now represents strong interactions with black arrows to distinguish them from weak interactions, or white arrows. Likewise, strong interactors are thus differentiated from weak interactors.

In module *a*, while mayflies, armored grazers, and sessile grazers are included as interactors, they are functionally insignificant. They are weak interactors. Module *a*, therefore, is quite similar to Power's 1990 diagram. The differences are important, though. First, Power no longer considers the two-level trophic interactor-interaction chain between producers and large roach—a secondary predator—functionally significant. Instead, she now interposes a white arrow between these interactors, indicating a weak trophic interactor-interaction chain. Three additional categories of biological organisms and their corresponding populations are represented in the grazer guild that Power left out of the 1990 diagram. In 1990, she depicted *only* functionally significant interactions and interactors. Doing so, I again infer, was strategic so as to increase the clarity of her scientific-epistemological explanations. Weak interactions and weak interactors and their diagrammatic depictions were insignificant to Power's scientific-epistemological explanations of the dynamics of the Eel's ecological food web. At the time,

these biological organisms were, nevertheless, undoubtedly present in the river and its tributaries and, thus, in the river's food web. For reasons I will shortly understand, Power now includes *six* weak ecological trophic interactor-interaction chains in *a*, as follows:

- (1) algae → large roach
- (2) algae → mayflies → small predators [predatory insects (lestids)] → steelhead
- (3) algae → mayflies → small predators [predatory insects (lestids)] → large roach
- (4) algae → mayflies → steelhead
- (5) algae → mayflies → large roach
- (6) algae → armored grazers

I note that three additional ecological trophic chains can be easily distinguished, for a total of nine weak ecological trophic interactor-interaction chains:⁵⁰²

- (7) algae → mayflies → small predators [roach fry] → steelhead
- (8) algae → mayflies → small predators [stickleback fry] → steelhead
- (9) algae → sessile grazers

Power excluded all but one of these in her 1990 diagram as either of merely ordinary ecological functionality or of insignificant ecological functionality—that is, of merely ordinary strength of the interaction dynamics (or what is identical, of the interaction's functionality) or of weakness. Finally, unlike the 1990 diagram, module *a* is qualified by an overarching “Scouring Winter Floods.” This qualification is, perhaps, the most ecologically consequential addition to the diagram from that of 1990. I will return to it below.

Module *b* differs from *a* in two ways. First, the only functionally significant ecological trophic interactor-interaction chain formally depicted is a *two-level* chain: algae → armored or sessile grazers. (Power's depiction entails two functionally significant trophic chains, one ending with armored and the other with sessile grazers.) Second, *b* is comprehensively qualified by “Drought or Artificial Regulation,” just as *a* was by “Scouring Winter Floods.”⁵⁰³ Module *c* differs from *a* and *b*. Tuft midges no longer figure as interactors, weak or strong, in any chain and have been removed from the diagram. There are now two functionally significant trophic interactor-interaction chains: (1) algae → mayflies → steelhead and (2) algae → large roach. The first is a three-level chain and the second a two-level chain. Tuft midges, small predators, and armored and sessile grazers—all of which were strong interactors in either *a* or *b*—are now all weak interactors. Finally, module *c* is comprehensively qualified by “Scouring Winter Food, Late Spring Flood.”

I can now gather a first general observation from modules *a*, *b*, and *c*. When I review all three diagrams, the only interactors Power represents in Figure 27.1 are those that are functionally significant trophic interactors under at least one of the two climate regimes (*a* or *b*) or the late spring flood anomaly (*c*). She excises diagrammatic representation of any ecological trophic interactor or interaction of the Eel River that is not functionally significant under *a*, *b*, or *c*. In this sense, *a*, *b*, and *c* are exactly like Power's 1990 diagram. This alone tells the reader, once again, that these diagrams are *ecological* explanations, i.e. aggregate scientific-epistemological explanations. They are not food web diagrams, unqualified. They are not descriptions. They are *ecological* food web representations and, therein, *scientific-*

epistemological food web representations. This said, *at least* the same three scientifically-epistemologically problematic explanations of the spatiotemporal directionality of actions-reactions and actors-reactors in the 1990 diagram are again present in the diagrams of Figure 27.1. I can now consider each of the three comprehensive qualifications of *a*, *b*, and *c*—“Scouring Winter Floods,” “Drought or Artificial Regulation,” and “Scouring Winter Flood, Late Spring Flood,” respectively—and their functionally significant, that is, their strongly interactional importance to Power’s ecological explanations.

To understand the import of these three overarching qualifications in Figure 27.1 I must first return to Figure 2 of Power’s 1990 *Science* article. Figure 2—as do the modules of Figure 27.1—has another dimension of ecological, which is to say, scientific-epistemological explanation to which I have yet to turn. This dimension of scientific-epistemological explanation brings me well within the spheres of a formative and utterly central set of problems, debates, and areas of research of ecology since at least the late 1920s: *How are (i), (ii), and (iii) controlled, regulated, limited, checked, or otherwise actively-reactively determined?*

- (i) the spatiotemporal distribution and abundance of the populations of species that, within specified temporal and spatial parameters, biotically comprise an ecosystem or ecological community (i.e. an ecological system)
- (ii) the number of the member actor-units of each species-population in an ecological system and these numbers’ spatiotemporal variations
- (iii) the ecological system’s resultant pattern of apparent stability or instability through space and time

Many of ecology’s core subspecialties (such as ecosystem, population, and community ecology) were indelibly and deeply marked, if not forged and developed, in the fires—blazing or smoldering at any given date—sustained by problems (i), (ii), and (iii) and their corresponding debates. Whether or not physical (abiotic) or biological (biotic) factors or, corresponding respectively, whether or not density-independent or density-dependent factors determined (i), (ii), and (iii) in *rivers* and other flowing waters were in 1990 (as they continue today) a habitat-specific branch of the scientific-epistemological theories, labors, and often contentious debates that have surrounded (i), (ii), and (iii)’s fundamental place in ecology and its development since the late 1920s.

I recall that in Figure 2 Power depicts strictly those ecological trophic interactors and interactions that she experimentally determined to be strong. She deliberately excludes all weak ecological trophic interactors and interactions (again, as determinable by her study’s survey and experimental data). The experimental manipulations Power reported in the *Science* article, as she writes, revealed that large California roach and juvenile steelhead have large effects on primary predators, herbivores, and plants in river ecological food webs. The large effects of these predatory fish actively-reactively cascade through the ecological trophic interactor-interaction chains of the Eel River’s ecological food webs to alter not only the abundance and distribution of primary producers (*Cladophora*, epiphytic diatoms, *Nostoc*), but that of primary predators (lestids, roach fry, steelhead fry) and of algivores (tuft-weaving chironomids).⁵⁰⁴ Therefore, with figure 2, Power scientifically-epistemologically explains that, in the Eel River, large roach and juvenile steelhead, as secondary predators, are the first actors and, thus, that the trophic consumption by both is each an *actus primus* of a trophic cascade in which strong interactors alternately control or release the interactor biological organisms comprising the

populations of primary predators, herbivores, and producers spatiotemporally further along these interactor-interaction chains.⁵⁰⁵ These large effects, as she writes, are direct and indirect. The secondary predators directly control the primary predators by predation of the latter. Secondary predators' predation of primary predators reduces primary predators' populations. The reduced numbers of the primary predator population activates and, thereby, actualizes the release of the tuft-weaving algivores, whose populations, in turn, increase. This increase of the quantity of actor-units of these chironomids' (i.e. tuft-weaving algivores) populations, in turn, controls the primary producer, or algae, holding its populational biomass (or standing crop) in check by the act of trophic consumption, i.e. ecological eating.⁵⁰⁶ When Power excluded large roach and steelhead from experimental enclosures, three-level trophic interactor-interaction chains developed instead of four-level. In these three-level chains, the primary predators suppressed the algivorous, tuft-weaving chironomids, thereby releasing *Cladophora*, its diatom epiphytes, and the associated cyanobacterium *Nostoc*.⁵⁰⁷ *Nostoc* is a nitrogen fixer, and *Cladophora*'s predominant epiphyte, *Epithemia*, contains a nitrogen-fixing cyanobacterial endosymbiont. Thus, Power explains, algae in the three-level ecological trophic interactor-interaction chains of this ecological food web become nutrient (nitrogen, in this case) limited, which is to say, resource limited. This, in turn, gives these nitrogen fixers "a competitive advantage over other algae."⁵⁰⁸

Both Figure 2 and figure 27.1 scientifically-epistemologically explain all of this to the ecologically trained reader. The scientific-epistemological explanations I have discerned thus far, however, are not yet exhaustive of these figures' ecological explanatory content. There is more Power scientifically-epistemologically explains in each.

Figure 2 of 1990 is *not* comprehensively qualified by any climatic state (also known as a climate regime) or anomalous abiotic occurrence, as are *a*, *b*, and *c* in Figure 27.1 of 1996. Figure 2, therefore, scientifically-epistemologically explains that the ecological food webs of the Eel River are density dependent. In other words, the distribution and abundance of the species-populations enacting, activating, and, thereby, actualizing and, thus, structuring the ecological community of the Eel River (problem [i] above) and the quantity of the member units of each of these populations (problem [ii] above) are controlled by direct or indirect density-dependent actions and reactions and, therefore, actors and reactors—including the distribution and abundance of one or more of the populations at issue and the quantity of their member units. Thus, with Figure 2, Power scientifically-epistemologically explains that the ecological interactors, ecological interactions, and the ecological food web of the Eel River's ecological community (if these are scientifically-epistemologically distinguishable) activate, actualize, and react to (i.e. are activated and, thereby, actualized by) density-dependent interactivity.

Density-dependent interaction is a modality of feedback regulatory control, in which *to regulate* and *to control* are, thus, types of actions-reactions of feedback interactivity. Density-dependent interaction is a feedback loop. The interactors of density-dependently looping interaction chains enact, activate, and actualize the distributions and abundances of populations of species-interactors interacting and, thereby, making and structuring their respective ecological community as well as the quantities of each of these populations' member actor-units. The actions-reactions of a density-dependent feedback loop, as with the ecological trophic interactor-interaction chains of the ecological food web, scientifically-epistemologically necessarily proceeds in one spatiotemporal direction or sequential order. In other words, the feedback-looping interactivity of a closed density-dependent system moves either clockwise or counterclockwise along its interactive pathway, or circuit, and enacts, activates, and actualizes

either positive or negative opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable effects or results, i.e. reactions. Generally but often over-simplistically, positivity associated with destabilizing activity and reactivity (such as a devastating plague or epidemic) while negativity is associated with stabilizing activity and reactivity with some equilibria (such as biological organismic homeostasis or a building's thermostatic heating and cooling system).⁵⁰⁹ That the closed feedback regulatory system's actors-reactors move and, thus, actions-reactions proceed along a pathway or circuit in either clockwise or counterclockwise spatiotemporal direction that activates and actualizes either positive and destabilizing or negative and stabilizing reactions (or effects), however, is scientifically-epistemologically problematic, if not scientifically-epistemologically impossible. Why? An action (A) that acts on (B) has an opposite, existentially simultaneous, equal, and, thus, scientifically-epistemologically causally indistinguishable action (B) that acts on it (A). An actor (A) that acts on (B) has an opposite, existentially simultaneous, equal, and, thus, scientifically-epistemologically causally indistinguishable actor (B) that acts on it (A). A feedback circle of interactivity commonsensically only circulates in one or the other spatiotemporal direction (or sequential spatiotemporal order) of its closed, circular loop or circuit. Depending on the spatiotemporal direction of the feedback interactivity and interactors, the results, or reactions, are positive or negative and, thus, destabilizing or stabilizing, respectively. However, scientifically-epistemologically necessarily, the actions-reactions and actors-reactors of a feedback loop *must* move oppositely, existentially simultaneously, equally, and thus scientifically-epistemologically causally indistinguishably in *both* spatiotemporal directions. In other words, which spatiotemporal direction the actions-reactions and actors-reactors of a closed feedback loop move, and whether the effects-actions are positive or negative is scientifically-epistemologically impossible to discern, identify, and explain with scientific-epistemological consistency and coherency. There are only side-stepping technical fixes such as, for example, tinkering in one's explanation with the types of evaluations that are spatial or temporal scales.

In Figure 27.1, which is to say, in *a*, *b*, and *c* individually or jointly, Power's scientific-epistemological explanation has changed. What now interactively determines this ecological web's feedback loop and any sub-loops, as well as their component ecological trophic interactor-interaction chains, is a singular abiotic action or the abiotic activity a set of abiotic action, which is to say, density-independent action or actions. For *a*, this is "Scouring Winter Floods;" for *b*, "Drought or Artificial Regulation;" for *c*, "Scouring Winter Flood, Late Spring Flood."⁵¹⁰ This abiotic action or set of actions is *not*, as far as Figure 27.1 explains, a feedback loop. According to the figure, it is spatiotemporally linear and does not respond to the density-dependence of the Eel River's ecological food webs. Rather, the abiotic action or set of actions actively determines the quality and quantity of density-dependently looping action-reaction and actor-reactor circuits, or circular interaction chains. The abiotic action or set of actions determines, which is to say, ultimately activates and actualizes density-dependent feedback interactivity loops' possibility, their emergence into existing, their existingly enduring, their form and spatiotemporal extent, their content, and their existential cessation. Again, at least accordingly to Figure 27.1, each such density-dependent feedback loop actively-reactively emerges superveniently as one or more efficient effects of a spatiotemporally linear abiotic activity-reactivity sequence, or chain. Hence, in opening their article's section, "Effects of Hydrologic Disturbance on River Food Chains: Experiments and Surveys in Northern California Rivers, 1989-1993," Power, *et al.* write:

Large reaches of rivers can be reset by a single major disturbance, such as a flood that mobilizes and scours the river bed...Year-to-year variation in the severity and timing of floods permits comparisons of trophic structures that develop under different disturbance regimes.⁵¹¹

Power understands “to develop under” to be “to be enacted, activated, and, thereby, actualized by.”⁵¹² The Eel River’s density-dependent circular-interactivity trophic structure, therefore, or ecological food web, is *an effect of*, or what is the same, reaction to abiotic actional-reactional determination – in the present case, by abiotic climatological, meteorological, and the resultant hydrological conditions. This, however, is a scientific-epistemological contradiction. Insofar as the Eel River’s density-dependent circular-interactivity trophic structure, or food web, is an effect, or reaction to such abiotic activities-reactivities, then either the Eel River food web as a net action-reaction and net actor-reactor *or* all of each of its actors-reactors individually *also* act oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on the abiotic actions and actors that act on them. This would no longer be, however, a *density-dependently* circulating loop of interactivity, and one would have all the more scientific-epistemological trouble discerning, examining, experimenting on, and explaining the spatiotemporal directionality of the feedback loop’s activity-reactivity and, thus, whether or not its effects, or reactions, were positive or negative. This scientific-epistemological problem inheres in each of Figure 27.1 food web modules, though without notice, at least, by Power.

Since the period between 1990 and 1994, Power has given consistent scientific-epistemological explanatory priority to abiotic, or density independent, factors as dominant for, and ultimately determinant of, the Eel River’s ecological food webs, these webs’ constituent ecological trophic interactor-interaction chains, as well as those ecological webs and chains of rivers in general. After all, the authors’ title is “Disturbance and Food Chain Length *in Rivers*.” In so doing, however, she nonetheless recurs to density-dependent, which is to say, feedback interactivity loops in order to scientifically-epistemologically explain her empirical observations and experimental data. Power’s understanding that abiotic activities-reactivities are ultimately determinative places her on one side of one of ecology’s perennial and formative debates: abiotic versus biotic activities-reactivities, or density independent verses density dependent activities-reactivities, as ultimately determinative of three of ecology’s formative problems, i.e. (i), (ii), and (iii). While it is correct that “[t]he earlier notion that physical factors play stronger roles than trophic interactions in structuring ecological communities in flowing waters (*I*) is being challenged by the view that both matter (2,3),” ecologists have never debated or disputed *this*.⁵¹³ Yes, of course, both matter; that is, yes, both are ecologically important and indispensable for ecological scientific-epistemological explanation. The perennial scientific-epistemological problem of abiotic and biotic, or density independent and dependent activities-reactivities is *which* is scientifically-epistemologically *ultimately* determinative. It has not been, and is not, whether one or the other matters, or is important. Scientifically-epistemologically, both—abiotic and biotic, density independent and density dependent activities-reactivities—cannot *both* be ultimate. Power opens her 1990 *Science* article, consequently, with two statements that are conciliatory but scientifically-epistemologically uninformative.

Power’s scientific-epistemological explanatory recurrence to density-dependent feedback controlled interactions is in scientific-epistemological tension with what she understands to be the ultimate ecologically determinative activities-reactivities—for example, abiotic climatological, meteorological, and hydrological factors. Over the years, she has revealed and

identified operative scientific-epistemological biotic and abiotic activities-reactivities and, therefrom, scientific-epistemological explanations from increasingly extensive spatiotemporal scales.⁵¹⁴ Spatiotemporal scale—as an scientifically-epistemologically evaluative, quantitative measurement of space and time set up and validly methodologically arbitrated by the ecologist as means towards some goal, typically a scientific-epistemological explanatory goal—is often cited by ecologists in order to, knowingly or unknowingly, side-step scientific-epistemological explanatory ambiguities, incongruities, or even contradictions. This may be the case in some of Power’s published research.⁵¹⁵ Hence, when Power and Dietrich write that, “in studies of spatial food webs, as of any complex system, trade-offs exist between realism and mechanistic understanding on the one hand, and scope and generality on the other,” the reader learns that their goal is to bridge the two—mechanistic understanding and spatiotemporal scope—by means of mechanistic understanding.⁵¹⁶ Unfortunately, their goal of increased spatiotemporal scope of scientific-epistemological explanation does not and cannot solve the scientific-epistemological incongruities, or scientific-epistemological problems, of observing, evaluating, examining, testing, and explaining the spatiotemporal directionality of activities-reactivities and actors-reactors of the Eel River food web. These scientific-epistemological problems can be sensed, for example, in Power’s invocations and explanations of processes versus patterns (or structures); ultimate versus proximate activity-reactivity; abiotic versus biotic activity-reactivity; density independent versus density dependent control and regulation (as modalities of activity-reactivity); and interaction and interactor strength.

3.6 Power’s best known Eel River ecological food web diagram, in three arrangements

Power’s best-known ecological food web diagram of the Eel River has appeared in many of her undergraduate courses over the years at the University of California, Berkeley, as well as in her academic and public seminars.⁵¹⁷ Often Power presents the diagram in one of three ways, which I shall refer to as arrangement one, arrangement two, and arrangement three. In the first arrangement, all arrows between interactors are grey, uniform, inconspicuous, and with an upwards orientation pointing from prey to consumer.⁵¹⁸ The interactors have been arranged into three aggregate trophic levels: producers, herbivores, and predators. Producers are typically backgrounded with a green rectangular box, herbivores with a yellow, and all predators—regardless of whether they are primary, secondary, or tertiary—with a red box. Power includes one example of an omnivore to remind the reader of the difficulties omnivory poses to such gross categorization—a crayfish that straddles the line between the yellow and red boxes. Arranged in this manner, Power emphasizes the trophic categorization of the interactors and the corresponding gross energy and material flows between trophic levels, from plants and algae that fix carbon into edible forms using the sun’s energy, to herbivores, to predators.⁵¹⁹ This is a Lindeman-type arrangement with the gross trophic-level categorization encompassing the individual interactor species, which are thereby deemphasized. This is, in part, an ecosystem ecological (or energy flow) food web diagram which scientifically-epistemologically explains the ecological food web’s structure as the complexly supervening effect of rates of primary productivity, the efficiency and rates of energy transfers, and the predominant energy and material (nutrient) pathways between interactors. Only interactors of ecologically predominant and hence ecologically significant energy pathways are included. This ecosystem ecological web, however, also includes at least one example of an ecological community interaction web in

which all interactions are excised unless strong. This ecological community interaction chain is not demarcated in any manner and is, therefore, undistinguishable in this arrangement.

In arrangement two of the diagram, interactors are not aligned to fit into background boxes representing Lindeman-type trophic level categorizations.⁵²⁰ None of the interactors included in the diagram have changed from the first arrangement, nor has Power altered the arrows' orientations or positions between the interactors. However, the arrows themselves are now differentiated by color and boldened for emphasis while the green, yellow, and red gross trophic level boxes have been removed. With the arrows boldened and color-coded, Power emphasizes the trophic *interactions* of one interactor species with another. The interactor species represented now stand by themselves without any trophic-level categorization. Each interactor species-population's individuality is thereby prioritized (following Robert T. Paine, who, according to Power, despised Lindeman-type functional groups: "Thou shalt honor the individuality of species").⁵²¹ The arrows are color-coded green, blue, red, and yellow. Green arrows represent an interaction from primary producer to herbivore, blue from herbivore to primary predator, red from primary predator to secondary predator, and yellow from secondary predator to tertiary predator. Rather than three gross trophic levels, there are now *five* possible trophic interactor levels and chains of up to *four* trophic interactions. Ecological trophic food chain *lengths* are accentuated. Power speaks of this as "functional food chain length."⁵²² In addition to ecological food chain lengths, interactor species, and interactions, this second diagram also foregrounds its scientific-epistemological explanation of energy and material transfers from one interactor species-population to another. Thus, this is a community ecological food web diagram with attention to (i) energy flow and storage through *specific* interactor-interactor energy and material transfers rather than across gross trophic levels and (ii) pathways of bottom-up control of interactor species populations by their trophic resources.

In arrangement three of the diagram, Power differentiates between functional and functionally significant ecological food chains in the Eel River.⁵²³ While arrangement two depicted functional ecological food chains without emphasizing any particular chain as functionally significant, the third arrangement emphasizes an exemplar functionally significant ecological trophic interaction chain. In arrangement three, arrangement one is overlain by large red arrows pointing *downwards*. These arrows represent a series of strong interactions. *Only* ecologically strong interactions, which is to say, functionally significant interactions, are demarcated and emphasized. Likewise, only strong interactors and those associated weak interactors (i.e. those paired in strong interactions with strong interactors) are highlighted and emphasized as the waypoints between the red arrows. All other interactors of arrangement two shift to the background, though still visible. In version one of arrangement three, the red arrows initiate with a great blue heron and proceed to a steelhead juvenile, a water scavenger beetle larva, a tuft-weaving midge, and the epiphytic diatoms that grow on *Cladophora*. This is a five-level ecological, or functionally significant, trophic interaction-interactor web comprised of one strong interaction chain. Alternatively, in the second version of arrangement three, the red arrows proceed from the great blue heron to steelhead and roach, to a mayfly nymph, to the epiphytic diatoms. This version is a four-level functionally significant trophic interaction-interactor web. Arrangement three's scientific-epistemological explanation is similar to that of both Power's 1990 *Science* Figure 2 diagram and her 1996 Figure 27.1 diagrams of modules *a* and *c*.

In arrangement three, unlike Figure 2 of 1990 or Figure 27.1 of 1996, as discussed above, Power adds the great blue heron as either a fifth level interactor tertiary predator (in arrangement

three, version one) or a fourth level interactor secondary predator (in arrangement three, version two). The heron is the only interactor of the chain that does not reside in the river's water during any of its life stages. Furthermore, there is a certain ambiguity as to which are the strong interactors and which the weak interactors paired to strong interactors in strong interactions. The great blue heron, for instance, could be interpreted as a strong interactor. Yet in a 1998 publication with a different (though closely related) ecological food web diagram, Power indicates that the heron is *not* a strong interactor in either flood or drought years.⁵²⁴ If I ignore the heron, the strong interactors in arrangement three version one are steelhead juveniles, adult roach, and tuft-weaving midges. Their strong interactions entail weak interactors, namely small primary predators (such as damselfly nymphs and water scavenger beetle larvae) and *Cladophora* and its associated epiphytic diatoms.⁵²⁵ With herons absent, this ecological food web diagram is the *same* scientific-epistemological explanation as the 1990 *Science* web of Figure 2 and 1996 Figure 27.1's module *a*. If I ignore the heron in arrangement three version two, the strong interactors are, at the top, the primary predators steelhead and roach and, at the bottom, the primary producers *Cladophora* and its associated diatoms. Mayfly nymphs are the entrained weak interactors whose populational abundance is suppressed by steelhead and roach, thereby releasing *Cladophora* and its diatoms. With herons absent, version two is nearly the same scientific-epistemological explanation as the 1996 Figure 27.1's module *c*. In module *c*, however, the interaction between mayflies and large roach is not strong, while the interaction between large roach and algae is strong.

In arrangement three versions one and two, *Cladophora* and its diatoms are also entangled in scientific-epistemological ambiguity and possible scientific-epistemological contradiction. In one instance in 1992, Power understands these producers to be not merely strong interactors, but *the* strongest interactors in her functionally significant trophic interaction webs, exerting an ultimate (“primacy”) density-dependent, i.e. biotic bottom-up control without which this functionally significant interaction chain would collapse.⁵²⁶ Of course, this primacy is, in turn, ultimately-ultimately controlled by the activities-reactivities of abiotic, i.e. density-independent hydrology, which in turn is ultimately-ultimately-ultimately controlled by the activities-reactivities of abiotic, density-independent climatology, meteorology, and geology—and so on. Sixteen years later, in 2008, she writes that, during the years of her experimental studies, *Cladophora* and its diatoms were *never* strong interactors, regardless of the occurrence or absence of seasonal hydrologic disturbance.⁵²⁷ Then, in 2017, Power and co-authors do not address whether or not *Cladophora* and its associated diatoms are strong interactors. Instead, they suggest that “over 83 years, controls of summer algal production were mediated more by hydrologic impacts on grazers than by their influence on growth conditions for algae.” Or, in other words, “positive effects of floods on annual algal production were primarily mediated by ‘top-down’ (consumer release) rather than ‘bottom-up’ (growth promoting) control.”⁵²⁸ Power *et al.* now accord primacy for producer abundance not to the producers (as in 1992) but to the hydrologic regimes of the Eel River Basin, a density-independent, or abiotic, activity-reactivity. This primary activity-reactivity is, again, the effect of primary-primary activities-reactivities and actors-reactors, such as climate, weather, and geology. Power *et al.* accord secondary proximate explanatory priority to density-dependent, or biotic, top-down control (suppression by armored caddisfly larvae and *Petrophila* larvae after an *absence* of flood scour; suppression by tuft-weaving midges after flood scour) of algal production and biomass. But could this density-dependent control be, rather, a tertiary proximate activity-reactivity, the effect of a secondary proximate cause, fluvial hydraulics, which are, in turn, the effect of some prior and, thus, more

primary density-independent (abiotic) activities-reactivities, such as the basin's hydrology or geomorphology? Yes, it could. Power, as I have already had occasion to write, has consistently and enthusiastically affirmed as much over the years. This said, the fact that there *is* a trophic cascade scientifically-epistemologically entails, necessarily, that there *must be* an ecological trophic interaction-interactor chain (or chains) comprised of strong interactors with weak interactors suppressed and thereby entrained in strong interactions.⁵²⁹ So, insofar as these three articles are any indication, scientific-epistemological problems of (i), (ii), and (iii) still scientifically-epistemologically loom after at least 25 years (1992-2017) of scientific-epistemological (ecological) research and scientific-epistemological (ecological) explaining: "Top-Down and Bottom-Up Forces in Food Webs: Do Plants [*Cladophora*, epiphytic diatoms] Have Primacy?"

These scientific-epistemological discrepancies are important. Both versions of arrangement three are functionally significant trophic interaction-interactor webs, which is to say, ecological explanations. Ecological explanations are scientific-epistemological explanations. In arrangement three, Power emphasizes the individual species-populations activating and, thereby, actualizing and oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably being enacted, activated, and, thereby, actualized by strong or—what is ecologically identical—functionally significant interaction chains and their interactors. Both versions of arrangement three illustrate a trophic cascade. A trophic cascade is a scientific-epistemological explanation of the actional-reactional mechanisms of the alternating control (or regulation)-by-suppression and control (or regulation)-by-release of species-populations' abundances down the specified functionally significant interaction-interactor chain, from predators to producers. Strong interactors are understood to be primary actors whose first trophic action-reaction, whatever this may be, is—in the case of each strong actor—a first action (*actus primus*) originating and activating the activity-reactivity chains of the corresponding trophic cascade. In other words, they control, or regulate, by suppressing the populational abundances of the weak interactor species. Without the cascading interspecific trophic interactions, even if the two actor species were present in the river, the *interaction's* effect—trophic interactivity-actualized population control, as suppression or release—would not occur.⁵³⁰

3.7 Subsequent iterations of Power's Eel River ecological food web diagrams, 1996-present

Since 1996, in addition to the three arrangements I have just discussed, Power and her co-authors have illustrated a small handful of other ecological food web diagrams about the Eel River. From among these, two figures are outstanding examples, one from 1998 and the other 2008.⁵³¹ I have already referenced both in my preceding discussion. All the ecological food web diagrams (1998: 2 diagrams; 2008: 4 diagrams) comprising each of these two figures are scientific-epistemological explanations. They represent *ecological* food webs. From my discussions of the web diagrams of 1990, 1996, and arrangement one, two, and three I have begun to learn of the interaction-interactor specific trophic dynamics of the Eel River ecological food web. These species-specific trophic interaction dynamics are reiterated in the ecological web diagrams of the figures of 1998 and 2008. Figure 6-2 of 1998 consists in two ecological food web representations, each a redesigned variation of the second and third arrangements above, though with fewer overall species-populations depicted. Each diagram of Figure 6-2 represents the same species-populations in the same spatial disposition on the page. The arrows

in both diagrams mirror one another. All arrows point upwards, connecting species. Each diagram depicts a functional interaction-interactor trophic web with functionally significant interaction chains accentuated with boldened black arrows. The arrows, then, illustrate ecological trophic interactions and, therein, each species population's function in the ecological Eel River community. With their upwards orientation, the arrows explain the spatiotemporal directionality of energy and material transfers through species-specific producers, to herbivores, and to first, second, and even third order predators. In other words, they explain bottom-up interactions, or dynamics. Bottom-up dynamics are scientifically-epistemologically necessarily bottom-up control of species-specific populational abundances, regardless of whether this control increases or decreases populational abundances or chain lengths. Scientifically-epistemologically, without directionally specific energy and material transfers, i.e. interactions, there cannot be an ecologically functional trophic interaction-interactor chain, an ecological trophic web, or an ecological community.

As an ecological trophic interaction web, figure 6-2's interaction-interactor chains also explain population control by top-down trophic suppression or release by consumers of the consumed. The diagram on the left corresponds to a "flood year" and that on the right to a "drought year." On the left, in the flood year diagram, the functionally significant interaction-interactor chain is very similar to that of Figure 2 of 1990, module *a* of 1996's figure 27.1, and arrangement three versions one and two. There are two notable differences. The first difference is that now kingfishers, river otters, and herons are all depicted as equally weak interactors. They each are the ecological community function, or role, of tertiary predator consuming large roach and juvenile steelhead (both of which, recall, are strong interactors). The second important difference is that mayfly nymphs are represented in a three-level trophic interaction-interactor chain with the producers and the large roach and steelhead. This is a functionally weak trophic chain. Mayfly nymphs comprise >50% and >60% of the insect dry biomass in average large roach and average juvenile steelhead guts, respectively. This is greater in each fish population than the total percent of dry biomass of other invertebrate primary predators (odonates, naucorids, stoneflies; 21% in roach, 30% in steelhead) and other invertebrate grazers (caddisflies, chironomids; 11.6% in roach, 3.3% in steelhead) combined.⁵³² Nevertheless, mayfly nymphs are not strong interactors; they are weak interactors, which is to say, weak functions of the ecological community's trophic dynamics and populational control. Nor are mayflies in a functionally significant trophic interaction-interactor chain. In the drought year diagram on the right, the functionally significant interaction-interactor chain is the same as that of module *b* of Figure 27.1. Again, the sole functionally significant, i.e. strong trophic interaction-interactor chain in this diagram is that between algae (*Cladophora* and epiphytic diatoms) and armored and sessile grazers (cased caddisfly larvae and *Petrophila* larvae). These larvae control by suppression the populational abundance of the algae (measured as biomass). In the drought year ecological web all other species populations are weak interactors and, while functional, functionally insignificant in the control of algae production and abundance.

The second outstanding example of Power's remaining ecological food web illustrations is that of 2008. Figure 14 consists of four distinct ecological food web diagrams. Each of the four diagrams represents a different hydrologic regime during the rainy season immediately prior to each of the corresponding dry season (summer) experimental studies. As Power writes in detail in the caption, she represents three flood years (1989, 1993, 1997) and two drought years (1990, 1991). Each of the three flood years corresponds to one of three web diagrams. The two drought years are represented by the fourth web diagram. There are notable similarities to

previous ecological food web diagrams. The “1989” diagram represents the same trophic dynamics as those of 1990 Figure 2, 1996 Figure 27.1 module *a*, and 1998 Figure 6-2 “Flood Year.” Likewise, it portrays similar strong trophic dynamics to arrangement three version one, with one primary predator species (water scavenger beetle larvae) replaced with odonates, stickleback, and roach fry in the strong interaction chain. The “1990, 1991” diagram delineates similar trophic dynamics as 1996 Figure 27.1 module *b* and 1998 Figure 6-2 “Drought Year.” Yet here, with “1990, 1991,” I meet a scientific-epistemological causal discrepancy. In Figure 27.1 module *b*, steelhead are neither strong interactors nor entrained in a strong interaction. The same can be said for steelhead in Figure 6-2 “Drought Year.” In neither of these two figures does Power write that she only represents strong interactions that control primary producer productivity and abundance. Rather, for both module *b* and “Drought Year,” functionally significant interaction-interactor chains are differentiated from weakly functional interaction-interactor chains. In “1990, 1991,” however, steelhead *are* strong interactors first enacting, activating, and actualizing strong interactions in a two level trophic chain. These strong interactions entrain the primary predator guild consisting of odonates, stickleback, and roach fry. Steelhead suppress these primary predators’ population abundances without having any strong effect on the abundance of *Cladophora* and its epiphytic diatoms. These primary producers, as in module *b* and “Drought Year,” *are* entrained in a strong interaction activated and actualized, in turn, by the strong interactors, armored or sessile grazers (*Dicosmoecus gilvipes* or *Petrophila* larvae).

In “1993” I find a similar scientific-epistemological explanatory discrepancy. Figure 14’s “1993” ecological web diagram corresponds to 1996 Figure 27.1 module *c* and arrangement three version two. In the winter of 1992/93, the regional drought of 1989/90-1991/92 was broken with the first scouring winter floods in three years. Then, the initial *Cladophora* bloom was exported by augmented flow from an unseasonably late spate in June 1993.⁵³³ In module *c*, Power delineates two strong trophic interaction-interactor chains, as follows: (1) algae → mayflies → steelhead and (2) algae → large roach. As Power explains, by “algae” in module *c* she referred to epiphytic diatom blooms. During her 1993 summer experiments, cloud-like epiphytic diatom blooms suffused through much of the water column. Positive strong effects of steelhead, releasing diatoms, could have affected *Cladophora* unfavorably, as epiphytic diatoms shade, compete for nutrients, and possibly directly injure their host.⁵³⁴ Yet, in diagram “1993,” mayflies are no longer included in chain (1), while chain (2) remains unaltered (keeping in mind that “algae” in module *c* refers to diatoms). In chain (1), roach fry have replaced mayflies. Thus, in “1993,” the two strong (or functionally significant) trophic interaction-interactor chains are (A) diatoms → roach fry → steelhead and (B) diatoms → large roach. (A) corresponds to (1), and (B) to (2). Roach fry are omnivorous and do graze epiphytic diatoms. Mayfly larvae are algivores and could have strongly suppressed *Cladophora*. It occurs to one that, perhaps, *both* roach fry and mayfly larvae should have been represented in tier two of chain (1) and (A) and Power simply, purposely or not, left one or the other out in her diagrams. This is unlikely, however, since Power does include “small predators” in module *c*, and as I have learned, “small predators” includes odonates, stickleback, *and* roach fry. In module *c*, “small predators” is connected to “mayflies” below and “steelhead” and “large roach” above. “Small predators” is not connected to “algae,” as it would be if roach fry were included in the category. Roach and their fry are omnivores and graze algae. Furthermore, when discussing module *c*, Power writes mayflies were the dominant functionally significant herbivore.⁵³⁵ Perhaps what I have written above has an air of inferential speculation. Yet, when discussing diagram “1993,” she writes that

“[t]he major invertebrate algivores in the 1993 summer food web were mayflies and free-living chironomids. Roach and steelhead had positive effects on mayflies (Fig. 6), despite feeding on them (Power et al. 1992). Positive effects of fish on mayflies may have been the indirect consequence of fish suppression of invertebrate predators...”⁵³⁶

“Major” is not the same as “functionally significant” or “strong.”⁵³⁷ Any aura of speculation vanishes. This is the *opposite* scientific-epistemological explanation from that Power gives with module *c*. In module *c*, steelhead suppress—which is to say, negatively effect—mayfly larvae population abundance. This negative effect, in turn, positively affects “algae,” which is to say, activates and actualizes the release of “algae,” i.e. epiphytic diatoms, which bloom abundantly. In light of Power’s explanation, as quoted above, the scientific-epistemological explanations of chain (1) of module *c* and chain (A) of “1993” are scientifically-epistemologically contradictory.

There is another noteworthy difference between the four ecological food web diagrams of Figure 14 and all of the other web diagrams I have discussed. In the diagrams of Figure 14, Power distinguishes between strong and weak interactors. Strong interactors suppress resource populational abundance via trophic consumption in strong trophic interaction-interactor chains. Weak interactors are those resource populations whose abundances are suppressed, whether in strong trophic interaction-interactor chains or by other weak interactors in weak trophic chains. As Power writes in the caption, strong interactor populations are written in black type while suppressed (weak) interactor populations are written in gray type. While this differentiation is ecologically entailed in all strong trophic interaction-interactor chains, in Power’s work and beyond, the diagrams of Figure 14 make this scientific-epistemological differentiation explicit. This is a differentiation between distinct ecological actors-reactors and is, in so being, a scientific-epistemological explanation of the spatiotemporal directionality of both actions-reactions and the motion of actors-reactors. Such explanation is not only fundamental to Power’s work, but to all ecological explanation of strong and weak trophic interactor-interaction chains and strong and weak trophic interactors.

Strong and weak interactions and strong and weak interactors are fundamental to all of the ecological food web diagrams I have studied thus far. Strong and weak interactions and strong and weak interactors, however, lead one deep into scientific-epistemological problems. I will find, too, essential scientific-epistemological contradictions. An *essential* scientific-epistemological contradiction is essential to what science-epistemology *is*. It cannot be scientifically-epistemologically solved or resolved. I have already alluded to this in passing and will explore this at length in subsequent work. Strong and weak interactions and strong and weak interactors entail that the scientist-epistemologist reveals, discerns, and identifies actions and their opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable effects, or reactions, or what is the same again, actions on the actor that acts on the one effected (or reactor); that she discerns actional-reactional progression in space and time; that she discerns and identifies the directionality of chains of interaction and their effects, whether considered linear or circular; that she discovers and discerns between and, then, identifies first actions from subsequent actions and reactions, or ultimate from proximate actions and reactions; and that she discerns between and identifies interactors from interactions, relators from relations, actors from actions, controllers from controls, regulators from regulations, and so on. Lastly, I will come to the question of whether or not any of this is more than or different than faith, religious or otherwise—if I can so much as call it faith. One is

faithful, after all, insofar as one is attentively aware of, intentionally considerate of, and openingly responsive to and responsible for their understandings—which, then, are no longer understandings in advance—of *what* is, of *why* what is is what is or what it is, and of *why* what is is how it is. And I will come to understand—if nothing else—that this is *the furthest thing* from a naïve or arrogant question.

3.8 The ecological food web: Actors and actions, reactors and reactions, interactors and interactions

Power scientifically-epistemologically researches the Eel River ecological food web in order to ecologically explain the trophic actors and reactors of this food web and their trophic actions and reactions. Actors and reactors are interactors. Actions and reactions are interactions. The Eel River ecological food web is enacted, activated, and, thereby, actualized by Eel River trophic actors-reactors, their trophic interactions, and these interactions' direct and indirect, ultimate and proximate, antecedent and consequent, abiotic and biotic, density independent and density dependent, etc., actions and reactions (i.e. effects, or results), and, thus, interactions. Power reveals and ecologically explains dynamically significant actors, reactors, and their dynamically significant interactions. A dynamically significant interaction is a strong interaction, and vice versa. A dynamically significant interactor is a strong interactor, and vice versa. Dynamically significant interactors and their interactions are identical to functionally significant interactors and their interactions. An actor and a reactor—i.e. interactors—are scientifically-epistemologically necessarily opposite, existentially simultaneous, equal, and, thus, scientifically-epistemologically causally indistinguishable. Power's scientific-epistemological and, thereof, ecological explanations are scientifically-epistemologically grounded on fundamental scientific-epistemological problems that—as far as I can discern from her published work with which I am familiar—she does not acknowledge. Nonetheless, she has pursued her scientific-epistemological activities with extraordinary success, renown ecological insight, and exemplary scientific-epistemological explanatory productivity. Is any of the above an anomaly of Power's own contextually peculiar understandings, particular ecological research, or case-specific ecological explanations? No, it is not. Nor are Power's ecological explanations ecologically erroneous (which does not entail that they are ecologically conclusive), and Power is the furthest thing from scientifically-epistemologically ignorant, naïve, or negligent. In chapter 4, I read Allee et al.'s *Principles of Animal Ecology*. This book is both genealogically antecedent to Power's riverine community ecological research and an enormously influential work in the history of ecology. What do Allee et al. understand a food web to be?

Chapter 4

Epistemologically-metaphysically: A food web is an ecological food web

4.1 An ecological food web, an ecological space-time community lattice

Epistemologically metaphysically given, a food web is, exhaustively and exclusively, a scientific-epistemological food web. Like Power, Allee *et al.* understand a food web to be and to be of an ecological community's trophic actors and reactors, their actions and reactions, these interactions, and these interactions' direct and indirect, proximate and ultimate, antecedent and subsequent, abiotic and biotic actions, reactions, and, thus, interactions. Food either is or contains scientific-epistemological energy. Likewise, food is a survival value. Biological organisms necessarily strive to access, attain, secure, utilize, and consume food, i.e. survival value. Except those that are photosynthetic and chemosynthetic, all biological organisms both utilize and feed upon other biological organisms and are, likewise, utilized and trophically consumed by other biological organisms. To be a biological organism—including photosynthetic and chemosynthetic—is to be a survival value disposed for utilization and to utilize such values. A biological organism is survival value. But what is an ecological community? An ecological community is a space-time community lattice, and vice versa. An ecological community is and oppositely, simultaneously, and equally is by its respective biological organisms and these biological organisms' respective species populations. The biological organisms of an ecological community and their respective species populations are both the *actus primus* and oppositely, existentially simultaneously, equally, and *identically*, the *actus sui* of the community; i.e. of *their* space-time community lattice. In closing I read Louis-Félix Bersier's chronicle of the history of the study of ecological communities and ecological food webs, from Charles Darwin to the present. I find again that a food web epistemologically-metaphysically given to sense and understanding is an ecological food web. An ecological food web is the total dynamic activity of trophically interacting interactors.

4.2 Allee *et al.*, *Principles of Animal Ecology*

In 1949, Allee *et al.* published a monumental volume of undisputedly excellent scholarship in ecology.⁵³⁸ Now considered a classic, the book was widely read for years after publication. It had an enduring influence in ecology as a whole, though the authors conceived their work primarily as a textbook for the young science of animal ecology. It was undoubtedly much more. *Principles of Animal Ecology* is astonishing in its breadth and depth. The authors open their book with an unusual chapter. It is a carefully considered, chapter-length discussion of philosophical questions and responses—thoroughly epistemological—that they understand to be both proper and prerequisite for all that follows in their textbook. It is here that Allee *et al.* note within the science of ecology a general proclivity towards scientific ahistoricism:

There is an understandable tendency in any synthesizing discussion to review chiefly the progress made in recent years or decades. This is sound practice in many ways, but one result is that work, often excellent work, of previous decades or even centuries may be neglected. A false idea of rapidity of progress is thereby encouraged, and the concept of the relatively complete modernity of subject matter tends to be built up in the thinking of

younger readers, although the minds of authors and editors may have been entirely free from such a misconception.⁵³⁹

Accordingly, so as to “supply historical perspective and regard the history of ecology and [...] its antecedent sciences as an integral and significant part of [their] treatment,” the authors dedicate Section I (of five sections comprising the book) to, in their words, “The History of Ecology.”⁵⁴⁰ Section I consists, in turn, of chapters 2 and 3, “Ecological Background and Growth Before 1900” and “First Four Decades of the Twentieth Century,” respectively. Few subsequent textbooks of ecology have followed Allee *et al.*’s example.⁵⁴¹ Nevertheless, among the relatively few existent historiographies of ecology, most authors of note turn to Allee *et al.*’s work, whether for historical data or sources from Allee *et al.*’s own historiography or insight into ecology’s development from their remarkable milestone.⁵⁴²

4.3 Allee *et al.*: To eat, to consume, to utilize, and to biologically exist

Chapter 27 of *Principles of Animal Ecology* is entitled “Community Organization: Metabolism.” It is here that the authors turn their attention expressly to food webs and the food chains that comprise them. “One of the fundamental causes,” they begin, “of the adaptive utilization of the space-time community lattice is the drive for nourishment. An organism must eat to live, and the food it consumes maintains the balance between physiological input and output of energy.”⁵⁴³ With the very first phrase of chapter 27, I am *immediately* within the realm of scientific-epistemological and, thereof, ecological understanding in advance. Written differently, I immediately meet understandings in whose sway the authors are sensibly carried into and through the world and the world’s sensibility.

As the authors write, the space-time community lattice is *utilized* by biological organisms.⁵⁴⁴ Or, written actively, biological organisms utilize the space-time community lattice. The biological organisms’ utilization of the space-time community lattice is caused by each individual biological organism’s drive for nourishment. The authors understand nourishment either to come from or to be food. I notice in passing that whether nourishment *is* food (or vice versa) or *comes from* food is unclear and has unacknowledged scientific-epistemological implications for the author’s scientific-epistemological explanations. I continue: A biological organism’s drive for nourishment, therefore, is a cause. Allee *et al.* understand a biological organism’s drive for nourishment, in turn, to be its *reaction*, first and foremost, to one of its three fundamental biological-ecological needs.⁵⁴⁵ This need is, namely, the need for food or nourishment. This *drive* is a reaction to this *need*. If the drive is a *reaction* to the need, then the need itself is an *action*. An action of whom or what the authors do not tell the reader: *who* or *what* acts? I note, likewise, that a biological organism’s drive for nourishment or food is both an action and a reaction, and therefore a cause and an effect, respectively.

“An organism,” the authors have written, “must eat to live, and the food it consumes maintains the balance between physiological input and output of energy.” The drive for food or nourishment is a reaction to the need for food or nourishment. This drive, however, scientifically-epistemologically actualized and, thereby, realized. The biological organism scientifically-epistemologically must act. If the biological organism does not act, it does not exist. If it biologically does not exist, it is not a biological organism. If a biological organism does not exist, it does not biologically live. If a biological organism does not exist, it cannot have a drive, it cannot be a drive, it cannot be driven, and it cannot drive itself (for nourishment,

for example). I notice here that I am before a scientific-epistemological problem: If a biological organism must act to exist, and thereby to biologically live, how does it come to biologically exist at all? A biological organism scientifically-epistemologically necessarily must first exist if it is to act. Otherwise, there is scientifically-epistemologically nothing that can biologically act. Biologically, to exist livingly is to biologically be alive, or to biologically live. Yet a biological organism cannot live if it does not eat. Scientifically-epistemologically, to eat is an action.

I set this scientific-epistemological problem aside momentarily, however, and continue: The biological organism must *eat* to live. Like Power, Allee *et al.* understand in advance *to consume* to be the same as *to eat*, and vice versa.⁵⁴⁶ *To consume*, understood to be the same as *to eat*, is an action. But Allee *et al.* are uneasy about their understanding of drive, writing that it may be “partially mystical.”⁵⁴⁷ (This uneasiness seems to be rather superficial, if not entirely rhetorical, for the authors write perfectly easily of biological drive and drives throughout the remainder of the book.⁵⁴⁸) Thus, instead of writing that the biological organism’s need for nourishment or food causes its drive for nourishment or food, I write that the biological organism’s *need* for nourishment or food *causes* the *action* of consumption or eating. In other words, this need causes the biological organism *to consume* (which is understood to be the same as *to eat*). Again, “[a]n organism must eat to live.” A biological organism scientifically-epistemologically must necessarily *act* to live.

Respecting and thus following Allee *et al.*’s initial scientific-epistemological hesitancy around *drive*, I decided above that instead of writing that the biological organism’s need for nourishment or food causes its *drive* for nourishment or food, I would write that the biological organism’s need for nourishment or food causes it to consume (or eat). I do not write of drive. In other words, I write that the biological organism’s need for nourishment or food causes the biological organism’s *action* of consuming or, what is the ecologically the same, eating. This action (to consume), then, is the effect of the cause, the biological organism’s need for food or nourishment. I learn here that the authors understand *an action* to be *an effect*. *To act* is an effect. *To act* is *to be caused by*. The need *causes* the biological organism *to consume* (effect of the cause). To consume (or to eat) is an action. The biological organism acts, and this act is to consume (or to eat), consumption. Recall, however, that *drive* was a *reaction*. Drive was a *reaction* to the cause, the need for nourishment or food. I have set drive aside. Yet Allee *et al.* are *not* hesitant that drive—insofar as drive scientifically-epistemologically is at all—was a reaction.⁵⁴⁹ If drive is, then it is a reaction. If drive is a *reaction* to a cause—the need for nourishment or food—then regardless of what Allee *et al.* come to understand of drive, I learn that they understand a cause to cause a reaction. If a cause causes a reaction, then *to act* is *to cause*. To act causes a reaction. And if to act is to cause, then to react is the *effect of this cause*. I learn, therein, that Allee *et al.* understand *to consume* (which is the same as *to eat*) to be (i) effect, (ii) reaction, and (iii) action, where (ii) is understood to be (i). I have written that *to consume* (as is *to eat*) is an action, or (iii). I have learned that Allee *et al.* understand *to act* to be *to cause*. Thus, to consume (or to eat) is to cause. Allee *et al.* understand *to act* to be *to cause* and *to react* to be *to be caused by*, or to be an effect. I learn additionally that (i) a cause is an effect of a prior cause; (ii) that an action is the reaction to a prior action; (iii) that a reaction is the effect of a prior cause; and (iv) that a cause is the reaction to a prior action. All of this is of scientifically-epistemologically *fundamental* importance, for there are fundamental scientific-epistemological problems and, most likely, scientific-epistemological contradictions herein.⁵⁵⁰

The reaction, then, to the need for (i.e. to the cause that is the need for) nourishment or food is the biological organism’s action of consumption of nourishment (or food). Yet on what

does this action scientifically-epistemologically depend for its possibility? To consume nourishment or food scientifically-epistemologically is, and can only be, subsequent to and consequent upon the following actions: accessing, attaining, and securing nourishment or food. If the biological organism does not or cannot access, attain, and secure nourishment or food, it cannot consume nourishment or food. To access, to attain, and to secure are *also* effects of the cause, the need for nourishment or food. To access, to attain, and to secure are the reactions to the action of the need for nourishment or food. Scientifically-epistemologically: To act is to cause, and vice versa identically. Yet to consume nourishment or food is not scientifically-epistemologically possible if the biological organism does not first access, attain, and secure nourishment or food. Is to consume nourishment or food also, therefore, the reaction to, and thus the effect of, accessing, attaining, and securing food? Allee *et al.* write only of *to consume* food and do not specify access, attainment, and securing of food. Yet I have—as they must have—recognized that consuming food is only possible for a biological organism if it first accesses food, then attains and secures the food accessed.

There is a scientific-epistemological flip side of *to consume* (and *to eat*), as well. If *to consume* (or *to eat*) is an action, and therefore a cause, then *to be consumed* (or *to be eaten*) is the *effect* of being consumed, of the biological organism's act of consumption. It is, therefore, also the necessary effect of the biological organism's actions of accessing, attaining, and securing the nourishment or food. Scientifically-epistemologically, an effect is a reaction, and vice versa. Being consumed is a reaction to a biological organism's act of consumption. This reaction—the effect of the action, i.e. of being consumed—does not scientifically-epistemologically necessarily entail consideration of biological dying and death, however (though this this consideration *is* required, too). Recall parasites, for example, consuming their host or mosquito bites.

Allee *et al.* understand the two other fundamental needs to be protection (or shelter) and reproduction (i.e. to reproduce). Of these three needs, however, the authors understand nourishment or food to be the primordial, primary, and foremost biological need, where this need is either an action (of whom or what the reader is not told) or the need *itself* acts. Again, the authors understand *to act* to be *to cause*, and *an action* to be *a cause*, and vice versa identically both cases. This is to write that, of these three *causes*, the authors understand the need for nourishment or food to be the primordial, primary, and foremost biological cause: “An organism must eat to live.” The other two biological needs, and the biological reactions to (i.e. the effects of) these needs, follow and are only biologically possible insofar as the biological organism first consumes or has consumed sufficient nourishment or food to—at the absolute minimum—balance its total energy output and loss.

Here I come into the presence of an important understanding. The authors understand to biologically live to be a reaction to the biological organism's act, the consumption of food or nourishment such that its total energy output and loss is, minimally, balanced. To act is to cause; to react is to be an effect of a cause. To biologically live—to be a biological organism at all—is an effect of the biological organism's cause, the consumption of food. The biological organism's act (and thus, cause)—to consume food—is a reaction to, and therefore an effect of, the primary biological need for nourishment or food. This need, then, cannot be the biological organism's, for the biological organism is a reaction to the action of this need, and therefore an effect of this cause, the need. The biological organism scientifically-epistemologically does not, and cannot, biologically exist prior to this need. Likewise, the biological organism does not, and cannot, biologically exist prior to its own act, to consume nourishment or food. A biological organism

scientifically-epistemologically *is* only insofar as it scientifically epistemologically and, thereof, biologically exists. A biological organism scientifically-epistemologically exists only insofar as it is biologically alive, or biologically living. To be a biological organism is, scientifically-epistemologically, to be a reaction and, thus, scientifically-epistemologically, to be an effect or aggregate of effects. To be a biological organism is to be an effect or aggregate of effects of a prior cause or causes. This is what Allee *et al.* understand in advance.

There are tenacious scientific-epistemological contradictions and scientific-epistemological impossibilities in this understanding. There are, yes, unsolved scientific-epistemological problems here. The authors give no indication that they are aware of this, or the understandings of which I write. These may be understandings in advance.

4.4 Scientific-epistemological and, thereof, biological drive

I return and focus once more. Unfortunately for the authors' scientific-epistemological explanation, and subsequently for me as I try to understand the authors' own understandings so as to, in turn, understand their scientific-epistemological explanations, the authors rely upon *drive* immediately after expressing their scientific-epistemologically hesitancy towards it. Allee *et al.* understand the drive for nourishment to be a drive towards a favorable ecological position.⁵⁵¹ The degree of the organism's success in the achievement of satisfaction of the need presently and the security of satisfying the need in the future indicates the degree to which the biological organism attains (rather than *obtains*)⁵⁵² and secures a favorable ecological position.⁵⁵³ Thus, while I temporarily set aside drive above out of respect for the authors' apparent scientific-epistemological tentativeness, I must return to its consideration.

Recall that Allee *et al.* understand each of the fundamental three needs to be *actions* (of or by whom or what, they say not). Likewise, the authors understand that an action is a cause, and vice versa identically. Each of the three needs is a *cause*. But not only a cause. Each of these three causes is a scientifically-epistemologically fundamental biological cause. The biological organism's primordial, primary, and foremost reaction (setting drive aside, as I have) is its self-activation, coordination, direction, and actualization of its fundamental activity of accessing, attaining, securing, and consuming food, or nourishment.⁵⁵⁴ Thus the biological organism's actions in response to the need for nourishment—self-activating, coordinating, directing, actualizing; accessing, attaining, securing, consuming—are *reactions* to, and therefore *effects of*, the need for nourishment. Allee *et al.* scientifically-epistemologically understand nourishment to be the primordial, primary, and foremost cause of a biological organism itself and the possibility of biological organismal existence. I have learned that the authors understand nourishment to either be or to be contained in food. I have learned that the food a biological organism consumes “maintains the balance between physiological input and output [and loss] of energy.” Allee *et al.* understand food to be or to contain energy. (Whether food *is* energy or *contains* energy has scientific-epistemological ramifications and entailments for scientific-epistemological explanation of which the authors give no indication of awareness.) To be nourished, therefore, is minimally to attain sufficient energy (in or as food) input to balance energy output (or utilization) and loss. The authors understand *to consume food* to be the same as, ultimately, *to consume energy*. The former is, ultimately, the latter.⁵⁵⁵ And, once more, the *to consume energy* is a reaction, and thus an effect of the action, and thus of the cause, i.e., the fundamental need for nourishment. From the beginning, Allee *et al.* convey expressly an understanding of the scientific-epistemological primacy and primordial causality of biological

organism's utilization, or consumption, of energy: "[t]he interaction of the environment and the organism is obvious in almost every field of biology...energy for life is derived from the environment."⁵⁵⁶ This understanding, however, and the scientific-epistemological explanations of this understanding, are, as I am learning, far from *scientifically-epistemologically* unequivocal.

But what about drive? As I observed above, Allee *et al.* understand the drive for nourishment to be a drive towards a favorable ecological position, and the degree of the organism's success in the achievement of satisfaction of the need presently and the security of satisfying the need in the future indicates the degree to which the biological organism attains and secures a favorable ecological position.⁵⁵⁷ Yes, *and* "one of the fundamental causes of the adaptive utilization of the space-time community lattice is the drive for nourishment. An organism must eat to live..." Drive is not only a reaction, and thus an effect, of a prior cause (the need for nourishment or food), but is, in turn, the cause of the biological organism's utilization of the space-time community lattice.

The biological organism, I infer, adaptively utilizes the space-time community lattice in order to achieve the goal of satisfying its primordial, primary, and foremost biological need: to consume food, or nourishment, and therein to secure a sufficiently favorable ecological position. The achievement of this goal, in turn, secures the achievement of a further goal: the biological organism's coming alive, or biological coming to biologically exist, and its continued biological existence until its biological death. Scientific-epistemological problems of biological organismal genesis immediately leap to the foreground. A biological organism must eat to biologically exist and, thereby, to biologically live. Scientifically-epistemologically to eat or to consume food, is, and can only be, an act *of* the individual biological organism that eats sufficiently to balance, minimally, energy input with energy output and loss. Is, for example, the individual biological organism's mother in or of the space-time community lattice? What about the one or two progenitor cells, i.e. the one or two progenitor biological organisms that biologically produce (where to produce is an act, or cause) the individual biological organism at issue here?

In any case, the space-time community lattice is, then, a means the individual biological organism utilizes adaptively to access, attain, secure, and consume food. The achievement of this goal is the means by which the biological organism achieves biological existence, or being biologically alive—i.e. biologically existing. The biological organism utilizes the space-time community lattice in order to biologically come to biologically exist and in order to continue to biologically exist for the duration of its biological life. As a fundamental, utilizable means to the biological organism's goals, the space-time community lattice is a resource the biological organism acts to access and utilize so as to achieve these—its—goals. I am before fundamental scientific-epistemological contradictions, and thus scientific-epistemological problems, entirely unacknowledged by the authors. These will become clearer as I proceed.

Now, what about drive? If drive *causes* the individual biological organism's utilization of the space-time community lattice, the authors are chin-deep in scientific-epistemological problems. *Whose* or *what's* drive for nourishment? The individual biological organism's? It's progenitor cell or cells, i.e. biological organisms? It's mother or father, within whom some such progenitor cells can only biologically exist? Quickly I come to aggregates of biological organisms upon whose prior existence the individual biological organism's biological existence is causally dependent. Recall, the individual biological organism *utilizes* the space-time *community* lattice. Yet it is not this aggregate from whom scientifically-epistemologically must come the final act, or cause, of consuming food (even if the aggregate causes food to be

accessible, attainable, and secured in advance, prior to the individual biological organism's utilization of the space-time community lattice). Again, Allee *et al.* are conspicuously silent in regards such scientific-epistemological snarls. The authors, however, continue, none- and nevertheless. I, therefore, continue with them. This is my responsibility to them.

4.5 Ecological community: The space-time community lattice and the biological organism

I learn that the space-time community lattice is a resource at the disposal of biological organisms. Biological organisms utilize it as means for the achievement of their biological goals. These goals are biologically decisive—that is, they are decisive for biologically existing or not. The consumption of nourishment or food is biologically causally decisive (somehow). What, then, do the authors understand space, time, and community to be? I will postpone asking what the authors understand community to be until a subsequent section, for the question is pivotal to what Allee *et al.* understand food web to be. At present I ask: What do the authors understand the *space-time* of space-time community lattice to be?

The biological organism adaptively utilizes the space-time community lattice itself. Scientifically-epistemologically, this is not necessarily the same as the utilization of space itself, or time itself, or space-time itself. Allee *et al.* do not understand biological organisms' utilization of a space-time community lattice as primarily the utilization of space itself, or time itself, or space-time itself. Before there is a space-time *community* lattice, the authors understand there to be temporally and spatially specific space-time lattices. These space-time lattices are the innumerable combinatorial arrays of initial abiotic conditions prior to the colonization by a biological organism of a historically-geographically specific place, whether at the present time, in the past, or in the future.⁵⁵⁸ Of course, there is an important scientific-epistemological consideration, which I will not address: scientifically-epistemologically, once there is one biological organism, this biological organism scientifically-epistemologically necessarily acts upon and—what is identical to this acting—causes the abiotic conditions to shift to some greater or lesser degree, such that resulting abiotic conditions are, to some degree or another, the *effect* of the biological organism's coming-to-existing and continued biological existing until biological death. Any subsequent biological organism to arrive and colonize reacts, to some greater or lesser degree, to the abiotic conditions caused, in greater or lesser part, by the prior biological organism. Allee *et al.* address this consideration.⁵⁵⁹ I will not ask further into how such alterations of abiotic conditions caused by biological organisms occur, or if subsequent abiotic conditions can therefore be scientifically-epistemologically abiotic conditions at all. I note, only, that this is a scientific-epistemological problem requiring scientific-epistemological explanation.

Abiotic conditions, initial and subsequent, for any and every given place or habitat, are *stratified* and *periodic*.⁵⁶⁰ They are stratified *spatially*, vertically (e.g. layers, laminae) and horizontally (e.g. zones, belts, girdles). They are *temporally* periodic (e.g. hourly, forenoon/afternoon, diurnal/nocturnal, seasonal, annual). The patterned, interwoven combination of such spatial and temporal abiotic conditions in a place is the *space-time* lattice of that place—that *particular* place at that *particular* time. This scientifically-epistemologically entails an understanding of what space and time are such that any spatial or temporal abiotic conditions are *in* a place or *of* a place rather than, for example, the scientific-epistemological place or space itself. Allee *et al.* do not pursue such scientific-epistemological ambiguities or problems. While this is itself scientifically-epistemologically problematic for their explanations,

I choose to continue with them rather than explore these scientific-epistemological problems and their implications further.

The space-time lattice is not, then, the space-time *community* lattice. Prior to biological organisms, there scientifically-epistemologically is not and cannot be any biological or ecological community whatsoever. Thus, prior to the effective origination, i.e. the first cause of, or again—what is epistemologically metaphysically the same—the creation of biological organisms (regardless of whether this creation was the effect of a god’s actions or, for example, a complexly supervening effect of the activity of the scientific-epistemological universe’s expansion), there scientifically-epistemologically is not and cannot be a space-time *community* lattice. This is a scientific-epistemological contradiction. Biological organisms—all biological organisms—utilize the space-time *community* lattice to satisfy or attempt to satisfy, before all else, their primordial, primary, and foremost need: nourishment or food. The space-time community lattice is the means by which any and every particular biological organism, and thus all biological organisms, achieve the goal of coming to biologically exist and their continued biological existence until biological death. Without the space-time *community* lattice, the authors understand biological organism to be scientifically-epistemologically impossible. The authors do not write of this understanding, nor do they give any indication that they are aware of it, much less that they understand it and its scientific-epistemological entailments and implications.

To utilize the space-time community lattice is to utilize *the community*. Biological organism, if and insofar as it is to biologically exist and continue to biologically exist until biological death, scientifically-epistemologically necessarily utilizes *the community*. However, the authors also understand that biological organisms form, which is to say, scientifically-epistemologically cause, community—or *their* community, in any particular case. Scientifically-epistemologically, however, community (of space-time community lattice) is not possible without two or more biological organisms’ *prior* existence. I am in the midst of a scientific-epistemological contradiction to which I will return in a later section. Space-time community lattice is entangled in this scientific-epistemological contradiction, both in its scientific-epistemological explanation and as fundamental to Allee *et al.*’s scientific-epistemological explanations throughout their book.

I continue to attend to what the authors write, for they proceed, as I have mentioned, nonetheless. As I have learned, Allee *et al.* understand biological organism to scientifically-epistemologically be a reaction and, thus, to scientifically-epistemologically be an effect or aggregate of effects (somehow causally held together as an aggregate). To be a biological organism is to be an effect or aggregate of effects of a prior cause or causes. Allee *et al.* tell the reader that

[i]nvariably, the survival of the species depends upon its association with foods sufficient to meet these requirements [the need for nourishment]. In the overwhelming majority of organisms this is accomplished by each species becoming a member of a food-eater nexus.⁵⁶¹

If a biological organism adaptively utilizes its community in order to actualize-by-achievement its own goals; and if a biological organism must access, attain, secure, and consume food if it is to biologically exist; and if a biological organism causes, to greater or lesser degree, the community of which it is part to exist; and if a biological organism can neither scientifically-

epistemologically come to exist nor consequently be-existing without a community insofar as this biological organism's fundamental need is nourishment or food; then—overlooking the scientific-epistemological contradictions herein that I have noted previously—I learn that each and every biological organism utilizes itself as *itself* standing reserve as means to its own goals and, causally thereby, biological existence. In other words, insofar as community is standing reserve as resource for a biological organism's goals, the biological organism *itself* stands reserve as resource to be utilized causally by itself, upon over against itself, in order to achieve its own goals and causally thereby realize itself by actualizing itself. A biological organism, somehow, scientifically-epistemologically causes itself to exist, to greater or lesser degree, while simultaneously scientifically-epistemologically utilizing itself in order to biologically come to exist and continue to biologically exist until its biological death. I am before scientific-epistemological contradictions and scientific-epistemological impossibilities. Hence, needless to say, I am before scientific-epistemological problems that Allee *et al.* do not acknowledge, much less solve. Yet they continue onward with scientific-epistemological explanations nonetheless. I continue with them in my efforts to understand.

Any and every ecological community—or what is the same, any and every space-time community lattice—is spatially and temporally structured; that is, any and every ecological community, insofar as it is ecological community, is spatially and temporally organized.⁵⁶² Alternately, I could write that every ecological community, insofar as any one of these is an ecological community, *has* spatial-temporal organization or structure. Any and every ecological community is a space-time community lattice, *and vice versa*. When a biological organism utilizes the space-time community lattice, which is to say, utilizes the community, the organism utilizes the community as it is spatially and temporally arranged. As I have written, Allee *et al.* understand community, or what is scientifically-epistemologically the same, space-time community lattice, to be a resource standing by at the biological organism's disposal for the achievement of its goals—goals that are primary (nourishment) and secondary (e.g. protection, reproduction) to the biological organism's biological existence as biological organism. As resource standing by, the space-time community lattice, or community, is means to the biological organism's goal of biologically coming to exist and perpetuating its biological existence. What do Allee *et al.* understand this spatial-temporal organization to be or to be comprised of?

Stratification—the *space* of space-time community lattice—is “all objectively delimitable vertical or horizontal layers of organisms, their by-products, or the results of their activities upon the environment.”⁵⁶³ Scientifically-epistemologically, by-products are effects of one or more actions; effects are reactions, and vice versa; and activities are each comprised of one or more actions. Scientifically-epistemologically, actions are causes, and vice versa identically. When the total volume occupied by nearly any community is examined, the scientist-epistemologist (including, of course, the ecologist) finds

a well-defined lamination into either (1) a column of strata upon a vertical organismal gradient...or (2) a series of strata on a horizontal organismal gradient...or (3) more commonly the community is at least partially separable into both vertical and horizontal series of strata.⁵⁶⁴

Likewise, periodism—the *time* of space-time community lattice—encompasses the “almost countless periodicities of the constituent plants and animals, at the organismal level, that are results of both environmental and physiological rhythms.”⁵⁶⁵ Again, scientifically-

epistemologically, a result is an effect, and vice versa. Periodism also includes “periodic community responses,” both intracommunity and intercommunity, to abiotic conditions or, stated differently, to the periodic activities “of the interdependent species populations at the level of the relatively independent major community.”⁵⁶⁶ These activities may be grouped in periods as seasonal, lunar, and diel or daily (diel includes both diurnal and nocturnal activity). A periodic activity is “[a]n activity pattern in which the fundamental characteristics for a species population recur through successive [...] periods.”⁵⁶⁷ In other words, a periodic activity is the activity pattern of a biological organism individual or the average activity pattern of biological organisms enumerated and calculated as a species-population. What I learn, then, once more, is that Allee *et al.* understand space-time community lattice to be community, and vice versa. Recall that I have already learned that Allee *et al.* understand *action* to be *cause*, and *to act* to be *to cause*, and vice versa identically in both cases. The activity Allee *et al.* write of is *causing* and oppositely, simultaneously, equally, and causally indistinguishably *being caused by*. An *activity* is one or more *causes* and one or more of these causes’ opposite, simultaneous, equal, and causally indistinguishable *effects*. An effect is an opposite, simultaneous, equal, and causally indistinguishable action (or, misleadingly, reaction) upon over against the action whose effect it is.

Even if the space-time community lattice were merely a utility that *supplied* that which is utilizable, such as nourishment or food, I am coming to understand there is no, nor can there be, any scientifically-epistemologically causal difference or distinguishment between space-time community lattice and ecological (and, thus, scientific-epistemological) community. Nourishment is or is contained in food, and food is most often other biological organisms or detritus derived from them. Even many photosynthetic organisms must live, for example, in soil or approximate to benthic sediment that is, in important part, biotic detritus. The space-time community lattice is a means to goals, adapted by the organism *in order to achieve its own* goals and, in so doing, actualize itself constantly and continually by maintaining itself living biologically, i.e. biologically alive. The biological organism is an actor-unit in a species-population.⁵⁶⁸ The biological organism’s goals, therefore, are not and cannot be scientifically-epistemologically strictly the biological organism’s but, rather, the biological organism’s goals are its goals only insofar as they are valuable for the actualization-by-achievement of the goals of the species-population of which the biological organism individual is an active, functional unit.⁵⁶⁹ Each biological organism’s survival and reproduction scientifically-epistemologically depend upon this actualization-by-achievement, as is now evident from what I have learned of Allee *et al.*’s understanding of time-space community lattice, ecological community, and biological organism. The goals of the species-population are constant and continual self-actualization by means of constant and continual self-achievement, maximized reproduction, and maximized growth.⁵⁷⁰ The means for the actualization-by-achievement of these goals are the reactions to (or what is identical, the effects of) the action of the needs—primordially and primarily, accessing, attaining, securing, and consuming the maximal quantity of nourishment until the need is entirely satisfied, and subsequently accessing attaining, and securing protection and reproduction. The biological organism’s utilization of the space-time community lattice is as a means to actualize-by-achievement *its* goal only insofar as, in striving to achieve its goals, the biological organism is itself a means to actualize itself by achievement as, in turn, a means to actualize-by-achievement the goals of the species-population of which it is an active, functional unit—i.e. an actor-unit.

Biological organisms exist only insofar as they have “the drive for nourishment,” hence “an organism must eat to live,” and to be a biological organism is to biologically live.⁵⁷¹ Without the drive for nourishment, the biological organism is not and scientifically-epistemologically cannot be. Scientifically epistemologically, *to be* is, exhaustively and exclusively, *to exist*. The biological organism, therefore, *is* the ultimate *cause* of its own adaptive utilization of the space-time community lattice. The biological organism is only insofar as it is this drive and, with this drive, causes its own adaptive utilization of the resource standing by for its utilization, the space-time community lattice. If I remove drive from consideration, as I did previously, and consider only the biological organism’s actions: self-activating, coordinating, directing, consuming; accessing, attaining, securing, consuming. In either case, the biological organism must, therefore, scientifically-epistemologically necessarily, be a fundamental *cause* of the space-time community lattice which it utilizes. It must also scientifically-epistemologically *be*, or be *of*—in a primordial scientific-epistemological causal sense—the space-time community lattice which it utilizes.

I know, of course, that a biological organism must eat to biologically exist and, thereby, to biologically live, and that energy it uses or loses must be balanced, at least, with energy intake. Thus, I may understand that “[a]n organism must eat to live, and the food it consumes maintains the balance between physiological input and output of energy” is pure description, including scientific description, of how who and what exists, *exists at all*. Likewise, “energy for life is derived from the environment” is, for many people, a two-cent descriptive truism. Certainly, Allee *et al.* understand in advance these are obviously pure descriptions. They are book and chapter openers. The descriptions, of course, require further scientific-epistemological research and theorization as to *how* and, perhaps, *why* the derivation of energy for life from the environment, for example, functions and proceeds as it does; that energy for life *is* derived from the environment, however, does not. If I so understand, whether consciously or in advance, I would be incorrect. These are not pure descriptions, or even descriptions at all. Within the scope of the very first clause of chapter 27, I am *immediately* carried by—among others—the understandings of ultimate causes, of what causation is, and of the will to scientifically-epistemologically explain these causes. I am, immediately, within the realm of essential scientific-epistemological problems.

I return to the question once more: What do Allee *et al.* understand space-time community lattice to be? The authors tell the reader readily, albeit indirectly. As I may recall from above, “[o]ne of the fundamental causes of the adaptive utilization of the space-time community lattice is the drive for nourishment. An organism must eat to live, and the food it consumes maintains the balance between physiological input and output of energy.”⁵⁷² As I have learned, a drive is a necessity. A drive, however, is a cause. A biological necessity, or a biological need, is a scientific-epistemological (or, thereof, biological and ecological) cause. When Allee *et al.* write of biological necessity, or need, or drive, they are writing in each case of scientific-epistemological, and thereof, biological and ecological causation. Insofar as a biological organism is to live *at all*, the biological organism must eat. If a biological organism is to come to exist and, thus, live, a biological organism must eat. I have already noted this scientific-epistemological contradiction. Before a biological organism exists, *it* cannot eat. Scientifically-epistemologically, to eat is to consume energy. In other words, a biological organism must consume energy if it is going to live *at all*; a biological organism must consume sufficient energy to—at an absolute *minimum*—balance the energy it uses or loses. A biological organism that merely balances the energy it uses and loses is an organism on the cusp of

scientific-epistemological life and death. It is scientifically-epistemologically problematic to assume a biological organism can come to exist at all if it does not have a positive energy balance. Again, I have noted the scientific-epistemological contradiction: Before a biological organism exists, *this* biological organism cannot have energy without scientific-epistemological contradiction, regardless of whether its energy use and loss is offset neutrally or positively.

I continue: A biological organism that lives is a biological organism that exists. Scientifically-epistemologically, to live is to exist livingly. Recall that there are three primordial, scientific-epistemological necessities, or drives, of biological organisms.⁵⁷³ The first is the necessity, or drive, to obtain nourishment, i.e. to feed or to eat. In other words, the first is to consume energy. The remaining two fundamental causes of a biological organism's and its respective species-population's adaptive utilization of the space-time community lattice are, second, the necessity for shelter and protection and, third, the drive to reproduce. These latter two necessities, or drives, while perhaps fundamental, necessarily follow the necessity for a biological organism to have, minimally, a balanced energy budget. Insofar as a biological organism has even the slightest *negative* energy budget, it has ceased to live and, thus, ceased to scientifically-epistemologically exist. A biological organism that does not exist neither needs shelter nor drives (or can be driven) to reproduce.

The authors explain that the food supply of a community, and the relative availability of various food elements for the several species populations cooperating in community maintenance become limiting influences governing community size and complexity and the density of the populations whose intertwining makes up the major community.⁵⁷⁴ A community is necessarily a space-time *community* lattice, and vice versa. The biologically fundamental, principle, and most primordial cause of a biological organism's coming to exist and, subsequently, continuing to exist is, respectively, this organism's initial consumption sufficient energy to have a positive energy budget and, thereafter, at an absolute minimum, this organism's ongoing consumption of sufficient energy to have a balanced energy budget in which energy inputs consumed neutrally offset energy outputs. The fundamental, principle, and most primordial cause of a biological organism's coming to exist and continuing to exist is the necessity of consuming energy. The fundamental, principle, and most primordial cause, then, limiting the community's (i.e. the space-time community lattice's) size and complexity and the density of the populations whose intertwining makes up the community is the necessity, or the cause, of consuming sufficient energy, or food. Yet it is the species-populations intertwining that *makes up* the community. In other words, each individual biological organism actor-unit and their respective species-populations must first come to exist so that these species populations can then intertwine, as they causally must, in order to make up their community, i.e. their spatiotemporally specific space-time community lattice in order to, in turn, adaptively utilize their space-time community lattice to access, secure, and consume sufficient energy in order to, in turn again, come to exist and, thereafter, continue to exist so that these organisms and their species populations might, in turn, intertwine and causally thereby make up, or produce, or cause to exist, their community, i.e. their space-time community lattice, and so on.

Allee *et al.* explain further that a community, or what is ecologically necessarily identical, a space-time community lattice, is a collection (or assemblage) of mutually interdependent and self-sustaining species populations.⁵⁷⁵ These species populations compose the community.⁵⁷⁶ In other words, these species populations put themselves or position themselves together (*compōnere*, or *con- -pōnere*) in such a way that they effectively produce the community as a result.⁵⁷⁷ Their space-time community lattice, i.e. their community, is the

product or, what is the same, the effect of the creative activity of mutually interdependent and self-sustaining species populations composing their community. Once again, I find a scientific-epistemological contradiction. The space-time community lattice is necessary, and thus primordially and fundamentally causal, for the coming to exist and continued existence of individual biological organisms and their respective species populations that, in turn, by means of their activity of putting and positing, or positioning, themselves together, make up or compose and thereby effectively originate, or create, the space-time community lattice, or community that their existing causally depends upon.

Each individual species-population's actions of putting, or positing, or positioning itself together with the other individual species-populations comprises the *activity* of composing, or of compositioning—or what is the same, creating or making up—a community, i.e. *their* community, *their* space-time community lattice. They actively make up the community. The effect, or what is identical, the product or the result, of this activity is a community—again, the product of their joint activity is *their* community. A community, or a space-time community lattice, then, exists at all only insofar as it is an effect; a product; a creation or a creature; a result of the composing or compositioning activity of species populations themselves and, necessarily therefore, the actions of each and every one of these species-populations' individual organismal actor-units. The species populations of a community, in other words, *cause* the community to originate and to be a community at all.

As Allee *et al.* scientifically-epistemologically and, thereof, ecologically and biologically understand in advance: The species populations of a community are, *themselves*, the *causa prima* and oppositely, simultaneously, equally, and *identically*, the *causa sui* of the community; i.e. of *their* community, or what is identical, of their space-time community lattice. The species populations of a community are, *themselves*, therefore, the *causa prima* and oppositely, simultaneously, equally, and identically, the *causa sui* of themselves—i.e. of their coming to exist at all and their continued existing as individual biological organismal actor-units and their respective species-populations until biological death. The very possibility of the existing of any one of the species populations that compose a community is the effect of itself and of the existence of the other species populations.

Allee *et al.* write that a true community, or a major community, which is necessarily a space-time community lattice, and vice versa, is an assemblage or organisms and their respective species-populations that, together with their habitat and given radiant energy, are self-sustaining.⁵⁷⁸ For an assemblage of biological organisms and their respective species populations to be self-sustaining, they must *first* be the effect of the cause, or necessity, of self-activating and thereby self-actualizing themselves as existing at all by, in turn, actualizing-by-achievement a positive energy budget in order to come to exist and, subsequently, at bare minimum, a balanced energy budget in order to continue to exist. Contemporarily, of course, everyone knows that all biological organisms must eat to live, and thus must obtain energy to, at a minimum, neutrally offset the energy I spend on activities or that I lose without active investment. Contemporarily, this is a two-cent truism. “Inevitably,” then,

the survival of the species depends upon its association with foods sufficient to meet these requirements. In the overwhelming majority of organisms this is accomplished by each species becoming a member of a food-feeder nexus. These natural, cooperative groups are relatively self-sufficient, and the component species populations are spatially

integrated and stratified. [...] These subcommunities appear to be a series of interwoven elements...⁵⁷⁹

If a biological organism accesses, attains, secures, and consumes nourishment by means of becoming a member of a food-feeder nexus; if these groups, i.e. if food-feeder nexuses are relatively self-sufficient and the component species-populations, each with their respective periodicities, are spatially integrated and stratified; if these groups, or food-feeder nexuses, or subcommunities appear to be a series of interwoven elements; and if space-time community lattice is the stratification and periodicities of the organisms of a community, and a community is the stratification and periodicities of the organisms of a space-time community lattice; then I reasonably infer that space-time community lattice is scientifically-epistemologically identical to an ecological food web, and vice versa.

*What is a space-time community lattice? What is an ecological community? A space-time community lattice is scientifically-epistemologically is ecological food web, and vice versa identically. An ecological community is ecological food web, and vice versa identically. An ecological food web is both the first cause and oppositely, simultaneously, equally, and causally identically the effect or product of the first cause, i.e. of itself. A biological organism and its respective species population are both *causa prima* of themselves (as well as of their ecological community and ecological food web) and oppositely, simultaneously, equally, and causally indistinguishably *causa sui* of themselves (as well as their ecological space-time community lattice and ecological food web). These are essential scientific-epistemological contradictions which, giving them the benefit of the doubt, Allee *et al.* do not understand with any awareness. I have not been able to find any of Allee *et al.*'s readers that acknowledge and address these scientific-epistemological contradictions, either. Instead, this lawful understanding carries Allee *et al.* in advance into and through the lawfully given sense and sensibility of the world.*

4.6 Scientifically-epistemologically, a food web is an ecological food web

I have learned enough of Allee *et al.*'s understandings—for example, of their understandings of action and reaction, or of cause and effect, or of biological organisms, species-populations and ecological communities—to say that Allee *et al.* understand food web to be exclusively and exhaustively—that is, absolutely, i.e. throughout space and time—*ecological* food web. Community is an *ecological* community. Food web, insofar as food web is at all, is scientific-epistemological, and as scientific-epistemological, specifically ecological. Community, insofar as it is at all, is scientific-epistemological community or, more specifically, ecological community. Ecology is a science-epistemology of and for science-epistemology. That which is ecological is of and for science-epistemology. Allee *et al.* understand-in-advance each and every food web to be an ecological food web. I will not address such scientific-epistemological problems as, for example, whether each species-population, and thereof, each biological organism, becomes a member of a food-feeder nexus. If “each species [becomes] a member,” the species (i.e. the species-population) scientifically-epistemologically must already biologically exist *prior to* becoming a member of a food-feeder nexus. Likewise, each biological organism of the species must biologically exist prior to scientifically-epistemologically becoming a member of an ecological food-eater nexus, that is, of an ecological food web, or a space-time community lattice. What the authors understand in advance may not be scientifically-epistemologically explainable *at all*.

Upon careful reading of the first passage of chapter 27, it becomes clear that, yes, the authors turn their attention in this chapter explicitly to food webs, understood in advance ecologically. That this is so is indicated prominently in the very first web diagram the authors present: “Fig. 165. Diagram of certain inanimate and animate influences involved in the metabolism of a lake community. (After Rawson.)”⁵⁸⁰ Scientifically-epistemologically, *to influence is to act*. *To act* is necessarily *to act on*, or *against*, or *upon over against*. Scientifically-epistemologically, *an influence is an action*. Scientifically-epistemologically *to influence* is the same as, for example, *to factor*. Scientifically-epistemologically, *to factor* is to explanatorily factor in the functionality and dynamics of one or another action or actions, and thus one or another actor or actors, in the production of the scientifically-epistemologically examined and evaluated phenomenon. Scientifically-epistemologically, *to influence* scientifically-epistemologically is *to cause*. The ecological food webs diagrammatically represented by figure 165 exist at all, and scientifically-epistemologically can only exist, insofar as they are the effects of the numerous causes, or influences, likewise represented in the figure’s diagram. An ecological food web, then, both in its component parts and as a whole, is scientifically-epistemologically necessarily active, which is to write, causal and oppositely, simultaneously, equally, an causally indistinguishably, being caused.

Allee *et al.* make a significant contribution, albeit textually brief, to the historiography of the study of ecological food webs. Their contribution is contained in an extensive footnote on page 514.⁵⁸¹ With the exception of this one footnote, chapter 27 is otherwise about *how* the space-time community lattice or *how* the ecological food web functions, or *why* the space-time community lattice or ecological food web functions as it does (where *why?* is understood to be something along the lines of “*how x causes y such that I empirically observe effect y or phenomenon z as, somehow, an epi-effect of y.*”

I have begun to learn and understand that Allee *et al.* understand food webs and communities to be, exclusively and exhaustively, ecological. An ecological food web is a scientific-epistemological food web. Allee *et al.*’s book demonstrates an essential continuity with Power’s own scientific-epistemological research, publications, and scientific-epistemological, and therein, ecological explanations. This continuity evidences its influential contribution in the history of Power’s ecological food web diagrams.

4.7 Allee *et al.*: What is an ecological food web?

In the preceding pages, I have distinguished between food webs and ecological food webs. Likewise, I have also begun to discern and distinguish community from ecological community. With some effort attending closely to Allee *et al.*’s understandings at present, I will become more sensitive to these differences and corresponding discernments. Such differences, in turn, will become more appreciable as—if nothing else—calling me to questions that *remain* open.

Allee *et al.* tell the reader what a food web is in chapter 27 (a chapter with which I have already been involved):

A food web (food-cycle of Elton, 1927, p. 56) is the total complex pattern of feeding relations of an independent, self-maintaining major community in the sense of the concept used in this book. This term embodies the Darwinian web of life or “web of

complex relations” (Darwin, 1859, p. 68) and has been called a ‘food-chain’ by some authors.⁵⁸²

For the time being, I will ignore the references to Elton and Darwin. Allee *et al.* respond to the question before them directly, without ado: *What is a food web?* A food web is the total complex pattern of feeding relations of an independent, self-maintaining major community.

They do not write, for example, “the definition of a food web is...” They do not write “the meaning of a food web is...” They do not write “the concept” or “the notion of a food web is...” They write, simply and straightforwardly: “A food web is...” Their response immediately brings the reader before further questions, such as: (i) What is a relation? (ii) What is to relate? (iii) What or who relates, and what is *this* who or what (such that it relates and can relate at all)? (iv) What is independence? (v) What or who is independent? (vi) What is ‘self-maintaining’? (vii) What or who is a self? (viii) What is *a* self? (ix) What is a pattern? Allee *et al.* have a second response, however, to the question before them. They write, “[t]his term embodies...,” with which they are referring to *food web*. A food web is, then, a term. I am immediately brought before at least two further questions: (x) What is a term? (xi) Is a term, spoken or written, the same as a word, spoken or written?

At present, I return to the question: *What is a major community?* To respond to this question, I must ask the authors in turn: *What is community?* Rather than respond to the latter question, let me seek to further understand what Allee *et al.* understand major community, and thus community, to be. I do so in order to then circle back, if I am able, to what the authors understand food web to be.

I have learned that Allee *et al.* understand that “an organism must eat to live, and the food it consumes maintains the balance between physiological input and output of energy.”⁵⁸³ The authors understand living organism to be biological organism, and thus each and every particular living organism—or, as they often write, simply organism—to be a biological organism.⁵⁸⁴ To be organism is to be living organism, and to be living organism is to be biological organism, and thus likewise for any particular organism, living organism, and biological organism. If an organism is a living organism, and a living organism is a biological organism, a biological organism must eat to live, as the authors tell the reader. Yet there is more to the authors’ understanding. The authors understand *to eat* food to be the same as *to consume* food. To eat is to consume. (To consume may not biologically, exhaustively be to eat, however.) Biological organism, and thus any specific biological organism, consumes food. The food eaten, that is, the food consumed “maintains the balance between physiological input and output of energy.” If a biological organism is to live, it must eat, and to eat is consume energy, whether food is energy or food contains energy. To consume energy (whether food is energy or food contains energy), a biological organism must have energy both readily available, or accessible, and secured, *regardless* of whether or not the organism actively obtains or produces food for consumption at any given moment. Scientifically-epistemologically, to consume energy does not scientifically-epistemologically entail actively acquiring, obtaining, or producing (e.g. via photosynthesis) food, as a fertilized egg or a seed of any biological species appears to demonstrate. If a biological organism has less secured and readily-consumed energy than that immediately biologically required to cover its basic energy outlays and losses, it already biologically is not, and cannot be, alive. It has ceased to biologically live. It has ceased to biologically exist as biological organism.

Upon crossing the existential biological threshold from positive or neutral energy secured and inventoried for immediate consumption to negative energy, a biological organism ceases to live as a biological organism; likewise, a biological organism ceases to exist as a biological organism. I notice, in passing, that I am before a scientifically-epistemologically fundamental problem. This is a biological, which is to say, a *scientific-epistemological* problem. What or who ultimately causes a biological organism? How, in other words, does a biological organism biologically come, or biologically begin, to exist as a biological organism at all? Allee *et al.* write that a biological organism must eat to live. Correct. Everybody knows this. I know this. But *how* does a biological organism eat to live? If a biological organism must eat to live, how does *it* live to begin with? For example: Which is the cause: the biological organism's consumption of energy, or the energy accessible and secured for consumption (regardless, for now, of whether food is energy or food contains energy)? Allee *et al.* do not acknowledge these scientific-epistemological problems, do not address them, and do not solve them. They continue to scientifically-epistemologically explain, however, never- and nonetheless.

Allee *et al.* understand that biological organism must eat to live. I begin to notice that this understanding may be much more than a trifling or pedestrian description, or even a a scientific-epistemological description. A biological organism must eat to live. If this is so—as Allee *et al.* understand—*who* or *what* eats (that is, who or what consumes energy) such that a biological organism can come to biologically live, that is, to biologically exist, at all in the scientific-epistemological first place, and as or in the biological organism's biological beginning? Scientifically-epistemologically, it *cannot be the biological organism under examination* that eats, that is, that consumes energy, for this biological organism is not yet biologically alive and does not yet biologically exist. Speaking of, writing, or diagraming *it*, e.g. writing “it does not yet biologically exist,” is a fundamental scientific-epistemological contradiction. If this biological organism does not exist, it cannot eat, and if it cannot eat, it cannot live, and if it cannot live, it is not alive. If the biological organism does not biologically exist, it cannot biologically cause itself to biologically begin biological existing and, thereby, to biologically come to biologically live. Thus, to say that a biological organism must eat to live in not a description. It is a scientific-epistemological explanation. As a scientific-epistemological explanation, it is tangled in scientific-epistemological problems, if not outright scientific-epistemological contradictions. Food (whether as energy or as containing energy) may be the scientific-epistemological cause. But this energy has not yet been, and cannot be, consumed by the biological organism, for the biological organism does not yet biologically exist.

If a biological organism does not biologically exist, this biological organism biologically, i.e. scientifically-epistemologically, is not. If a biological organism is to scientifically-epistemologically exist at all, and is to scientifically-epistemologically come into existing, it must scientifically-epistemologically *necessarily* consume energy. The biological organism that does not consume energy ceases—*immediately*—to biologically live, to biologically exist, and thereby to scientifically-epistemologically be.

As existing biological organisms, I can and often do stop eating and, nonetheless, continue to biologically live for often astounding periods of time, do I not? The same is true for many if not most biological organisms, is it not? No, and no again. As Allee *et al.* understand: Scientifically-epistemologically, a biological organism cannot and does not biologically exist nor can a biological organism begin to biologically exist if it does not consume food—that is, if it has a negative energy budget, it—whatever it may be—is not and cannot scientifically-epistemologically exist as a biological organism. To feed is to consume food. Food is energy or

contains energy. To consume energy is to *utilize* energy and, simultaneously, to acquire energy for utilization. To feed, then, is to utilize energy. If a biological organism's energy utilization is nil, the biological organism is naught. If a biological organism's energy utilization is nil, the biological organism scientifically-epistemologically is not. If a biological organism's energy utilization is zero, at all, ever, it does not and cannot scientifically-epistemologically exist as a biological organism—at least not without profound, fundamental scientific-epistemological contradiction. I hear that *to consume* can speak senses of both *to take in* and *to utilize*. Here, however, it is scientifically-epistemologically impossible for a biological organism to consume or to take in energy *if it does not already scientifically-epistemologically and, thereof, biologically exist*. Scientifically-epistemologically, it is impossible for a biological organism to consume energy without *first* and *simultaneously* utilizing energy. A biological organism cannot consume if it does not first and simultaneously utilize the energy necessary for the action of consuming. Scientifically-epistemologically, and thereof biologically, for a biological organism to consume energy is both first and ultimately to utilize energy, *not* to take food (as energy or as containing energy) into itself. “An organism must eat to live.” Therefore, if a biological organism is to biologically exist at all, or to biologically come into biological existing, *this* biological organism must consume energy—a biological, and hence a scientific-epistemological, impossibility.

To be a biological organism is to be food for some other biological organism. Is, therefore, a biological organism energy, or does a biological organism contain energy, or is a biological organism the utilization of energy *in order to* biologically exist and, thus, biologically live. Is a biological organism energy, or does a biological organism contain energy, or is a biological organism the utilization of energy *in order to* biologically exist and, thereby, to biologically be at all?

Am I off track? I have derailed into a thicket of tangents or trivialities, have I not? No, I have not. What do Allee *et al.* understand community to be? Allee *et al.* understand that community is, is composed or made up of, is causally by, or—minimally—has something to do with actively existing biological organisms. “Thus,” Allee *et al.* write,

the demand for nourishment must be fulfilled by the environment, and food is a prime ecological influence. The late William Bayliss [...] sums up this general idea by stating that ‘the whole existence of living organisms on the earth depends on the receipt of radiant energy from the sun...’⁵⁸⁵

I have already learned of the authors' understanding of what *to eat* and food are. Their quotation of Bayliss in the above passage affirms what I have learned. Ecologically, food is prime influence. Scientifically-epistemologically and, thereof, ecologically, food is either energy or contains energy. Ecologically, energy is a prime influence. To be qualified as *prime* is to be qualified as being first, foremost, or even original, or similarly, to be of first, foremost, or original importance. As I began to understand in my review of Power's ecological food web diagrams, *to influence* is understood ecologically to be *to cause*, and *an influence* is a *cause*. Food is a prime ecological cause. The existence of all living organisms on earth depends on the receipt of radiant energy from the sun.⁵⁸⁶ Scientifically-epistemologically, is food energy, or does food *contain* energy? For Allee *et al.* this is, once again, a most pivotal—or more pointedly, a *decisive*—scientific-epistemological question. They write, of course, that *food* is a prime ecological influence. A prime ecological influence is a prime ecological cause. As

scientists-epistemologists, they must scientifically-epistemologically discern, identify, and explain scientific-epistemological causes. Which is the prime ecological cause: food or energy? And what, exactly, is its effect or effects? Or, instead, could the biological organism that utilizes the either the food or energy in the food be the prime ecological cause? Is the biological organism's act in order to utilize food the prime ecological cause? Allee *et al.* give no indication that they are aware such questions arise before them nor that their scientific-epistemological description of what everybody already knows (i.e. that a biological organism must consume, which is to write, must utilize food to exist) is scientific-epistemological explanation that pivots decisively upon a scientific-epistemological problem they do not address or solve. As before, let us leave this be for now.

4.8 Allee *et al.*: What is a biological organism?

Allee *et al.* recognize that scientific-epistemological study of any and every biological organism is scientifically-epistemologically *impossible* unless the authors are able to respond to this question: *What is a biological organism?* Unlike with food web, however, their response is neither simple nor straightforward: “The living organism may be defined, though somewhat incompletely, as a physicochemical mechanism that is self-regulating and self-perpetuating, and is in process of equilibration with its environment.”⁵⁸⁷ The scientific-epistemological should be immediate: Are the authors writing in the entirety of their book of a *definition* of biological organism scientifically-epistemologically studied, tested, and explained, or of biological organisms scientifically-epistemologically studied, tested, and explained? The authors' response is dense: Biological organism as definition, as mechanism, as physicochemical mechanism, as self-regulating mechanism, as self-perpetuating mechanism, as process, as process of equilibration, as process of equilibration with the environment, etc.: each aspect of the authors' response leads unavoidably in thickets of scientific-epistemological ambiguities, problems, and contradictions; each suggestively nudges my attention to hear the calls of essential questions. At this time, however, I will not further pursue these questions before which the authors' response calls us—questions that are decidedly not scientific-epistemological.

Instead, I proceed: “The major relations,” Allee *et al.* tell us, “of animals center around nourishment, reproduction and protection.”⁵⁸⁸ “The reaction to these needs,” they continue,

may be summarized by the concept of a “drive” towards favorable ecological position. This usually implies a drive for security of one kind or another, or of all kinds. The partially mystical idea of a “drive” hides the nonmystical one of the survival values furnished by the attainment of nourishment, protection, and sufficient reproduction, even by the attempt to secure them.⁵⁸⁹

I notice that a drive is a *biological organism's* drive.⁵⁹⁰ Furthermore, drive is a biological organism's *reaction* to one of three fundamental biological needs: nourishment, protection or shelter, and reproduction. For a biological organism to react, the biological organism scientifically-epistemologically must first exist. I recall once more that *to scientifically-epistemologically be is to exist*. If a biological organism is not biologically alive, it does not biologically exist, and it cannot scientifically-epistemologically react. This will become important in subsequent discussions. For now, as I have before, I begin simply by leaving aside the problem of drive. I may restate what the authors write, as follows: “The reaction to these

needs is the attainment of nourishment, protection, and sufficient reproduction, even the attempt to secure them. That which nourishes, protects, or is necessary for reproduction is survival value, or individually, a survival value.” Note that Allee *et al.* write *attainment*, not *obtainment*. I will follow the authors, even though *to obtain* or *obtainment* seems, at times, more appropriate. The difference is subtle but important. To attain is akin to achieve, to accomplish, to reach, to gain. To obtain is akin to procure, to get, or to acquire. The authors’ emphasis on attainment, as achievement or accomplishment, is noteworthy for reasons I will come to understand in future chapters. Much more that *to obtain*, *to attain* resonates closely with goals and means to end-goals as well as with achievements and means to achieve such goals.

While my restatement is not what the authors write, it is respectful of the sense of the authors’ statement and helps me focus momentarily. I learn that what biological organisms attain, or attempt to secure, as nourishment, protection, and in order to reproduce, is survival values. Furthermore, I learn any and all such attainment and subsequent securing of survival values is the result of, that is, is scientifically-epistemologically caused by, striving to secure favorable ecological position—whether as or causally by action, reaction, or what is the same, interaction. To secure or fail to secure survival values is to secure or fail to secure a more or less favorable or unfavorable ecological position. Attainment is prior to securement. Access, of course, is prior to attainment. I note that I begin to sense a closeness to what a resource is, and the accessing, attaining, securing, controlling, and utilizing of resources.

More importantly for the present, perhaps, is that the survival values that comprise biological nourishment are scientifically-epistemologically primordial and therein biologically, which is to write, scientifically-epistemologically ultimate, i.e. causally determinative, for living organisms: “ ‘...the whole existence of living organisms on the earth depends upon the receipt of radiant energy from the sun.’ [...] An organism must eat to live, and the food it consumes maintains the balance between physiological input and output of energy.” Biological organisms, as biological organisms, must continually strive, minimally, to access, attain, secure, utilize, and consume nourishment survival values. Biological organisms, as biological organisms, must strive for, continuously, a favorable ecological position. Instead of “continually,” I could write “without out end.” “Without end” I may write as “endlessly unendingly.” To eat, a biological organism must have access to, attain, and secure food so as to take in and utilize this food. Biologically, food *is* a survival value. To consume, therefore, and thus to be nourished by food, is to utilize food. What is food? I have already heard this question: Is food energy, or does food contain energy? Yet I ask again: What is food? Food is survival value. Yet food—the authors understand—for all but photosynthetic or chemosynthetic autotrophs, scientifically-epistemologically *is* one or more, in whole or in part, other biological organisms.⁵⁹¹ I learn, then, that Allee *et al.* understand biological organism to be survival value, and thus any and all particular biological organisms, insofar as they are biological organisms at all, are survival values. Likewise, scientific-epistemological energies some biological organisms access, attain, secure, utilize, and consume by means of photosynthesis and chemosynthesis are survival values. Biological organisms, if they are to biologically come to exist at all, scientifically-epistemologically necessarily must utilize other biological organisms and be utilized by other biological organisms, regardless of whether or not they consume them as food. This is scientifically-epistemologically true even for photosynthetic and chemosynthetic organisms. To be a biological organism is to be a value readily disposed for utilization and to scientifically-epistemologically necessarily utilize such values. If biological organism *is* survival value, then

the question of whether food is or contains energy has imposing scientific-epistemological, causally entailed implications for *any* entangled scientific-epistemological explanation.

I return to the present question once more: What do the authors understand biological organism to be? They respond to this question again in chapter 25, the introduction to the book's "Section IV. The Community":

These three organismal drives, with their various ecological adjustments, are salient features of the organisms, and were included by Wheeler (1911) in his formal definition. Having gone this far in defining an organism, we should realize that if this definition is even approximately sound, then organisms would tend to form natural groups of foods and feeders—in other words, would form communities.⁵⁹²

As before, I shall not attend to at least two questions for the time being. I let be the question of drives (which the authors here leave unqualified by "the concept of," "the definition of," or stand-alone scare quotation marks, yet *do* qualify importantly as salient *features of organisms*). In this book, are the authors writing of a *definition* of biological organism scientifically-epistemologically studied, tested and explained, or of biological organisms scientifically-epistemologically studied, tested, and explained?

Letting these be, I turn to the quotation above. "Having gone this far in defining an organism," the authors write, "we should realize that if this definition..." Here, with "gone this far in defining" and "this definition," the authors refer to the three organismal drives, drawing from Wheeler's definition. In Wheeler's definition, a biological organism is a system of definite, coordinated activities of which the three fundamental activities are directed toward securing nourishment, protection, and reproductive success.⁵⁹³ So as to focus, I assume that, yes, regardless of what the authors understand when they write "biological organism," "living organism," or "organism," biological organisms, insofar as they are or are to be biological organism at all, have the salient feature of the three drives or fundamental orientations of activities of which Allee *et al.* and Wheeler tell the reader. If this were so, then organisms would tend to form natural groups of foods and feeders. They would tend, *Allee et al.* clarify, to "form communities." *To tend to form* is not the same as *to form*. Once again, I let these observations be.

The authors tell the reader that some organisms would form groups of foods and feeders. As I have learned, they understand biological organism to be both feeder and food. Food, in turn, is survival value, and a food (that is, a biological organism) is a survival value. I do not know if the authors understand food to be energy or to contain energy. This all reiterated, I find that Allee *et al.* tell the reader explicitly what community is. *A community is a group of foods and feeders.* Allee *et al.* understand community to be a group of survival values scientifically-epistemologically necessarily readily disposed for utilization (biological food) and scientifically-epistemologically necessarily utilizers of such values at their disposal (biological feeder). Furthermore, they tell the reader that *if* communities of foods and feeders *are* formed (this is an ecological, or a scientific-epistemological, *tendency*, remember, not an ecological necessity), that these are *causally* formed *by* organisms: "organisms would tend to form natural groups of foods and feeders—in other words, would form communities." Scientifically-epistemologically, this causally entails that biological organism, and thus any and all biological organisms, must scientifically-epistemologically necessarily exist *prior to* forming natural groups of foods and feeders, which is to say, communities. Community cannot biologically or ecologically be prior

to biological organism. A community cannot biologically or ecologically be prior to at least two particular biological organisms. Nor is it ecologically possible that communities of food and feeders are formed, i.e. are caused, simultaneously with the biological or ecological coming exist of two or more biological organisms. The biological organisms scientifically-epistemologically causally *must* already exist in order for them to tend to form, or what is the same, to tend to make up or compose a community.

Recall that biological organism, insofar as it is biological organism, and thus all biological organisms, scientifically-epistemologically must strive endlessly unendingly to access, attain, and secure a favorable ecological position. This includes, minimally, endlessly unendingly accessing, attaining, securing, and utilizing nourishment survival values. Furthermore, biological organisms form communities; in other words, scientifically-epistemologically, biological organisms are the causes of their respective communities *if* they form such a community at all. Since community formation by biological organisms is a scientific-epistemological *tendency*, the ecological scientist-epistemologist meets the scientific-epistemological problem: What scientifically-epistemologically causes those biological organisms that *do* cause communities to cause communities at all, and what scientifically-epistemologically causes those biological organisms that do not cause communities *not* to cause communities? I have just come before another scientific-epistemological problem.

A community is a natural group of food and feeders. However, if there are not scientifically-epistemologically *first*, minimally, two or more biological organisms that biologically-ecologically cause community to be, then community scientifically-epistemologically does not and cannot exist. A community is “the obligatory gathering of many organisms for survival.”⁵⁹⁴ Biological organisms’ existing, at all, much less their subsequent biological survival, is scientifically-epistemologically dependent upon utilizing nourishment survival values, and thereafter continuing to access, attain, and secure additional nourishment survival values for utilization. The possibility of a biological organism’s coming to exist, and thus biologically living at all, therefore, biologically depends upon, first, utilizing nourishment survival value, and subsequently continuing to access, attain, secure, assimilate, and utilize further nourishment survival values. In many cases, this entails at least one or another edible biological organism.

I return, then, to the previous quote, for Allee *et al.* again tell the reader what community is: “...a community is, in large part, the obligatory gathering of many organisms for survival.”⁵⁹⁵ Recall that Allee *et al.* write of a *tendency* of organisms to form natural groups of foods and feeders; that is, a tendency of biological organisms to form communities. A tendency is not an obligation or necessity, scientific-epistemological or otherwise. The authors tell the reader again, elsewhere, what community is: “Since communities are composed of organisms and their environments...”⁵⁹⁶ If I were, minimally, to ignore the fundamental scientific-epistemological contradictions I have noticed in prior paragraphs, I would recognize, with good confidence, that Allee *et al.* understand community to be *of organisms* in the sense of causally formed by *organisms*. Biologically, *to form* is *to cause*, and, biologically, *formed by* is *caused by*. First, biological organisms scientifically-epistemologically exist, and thereby they scientifically-epistemologically live. Again, to scientifically-epistemologically be is to exist. Subsequently, organisms scientifically-epistemologically form, or cause, communities in order to achieve a biological-ecological end-goal. Allee *et al.* speak of this as the drive for nourishment, or alternately, as one of three fundamental orientations of biological activity. This goal, I recall further, is of ultimate scientific-epistemological causal primacy, namely eating, which is to say,

consuming food, attaining energy, utilizing nourishment survival value. Any degree of success, or lack thereof, in utilizing, accessing, attaining, securing, assimilating, and further utilizing energy is the same as achieving, securing, and utilizing, or failure thereof, a favorable ecological position. Secondarily, organisms form communities in order to achieve, or attempt to achieve, some degree of their other two fundamental activity orientations, or drives: protection and reproduction.

Elsewhere, the authors write yet again what community is, this time more elaborately. I learn, importantly, that the authors understand *community* to be *major community*.⁵⁹⁷ Thus, when, throughout the book, they write of community, they understand and write of major community. Allee *et al.* tell the reader that,

[in] large, the major community may be defined as a natural assemblage of organisms which, together with its habitat, has reached a survival level such that it is relatively independent of adjacent assemblages of equal rank; to this extent, given radiant energy, it is self-sustaining.⁵⁹⁸

Once again, I scientifically-epistemologically collide with a pressing scientific-epistemological problem, only slightly different from those previous: In this book, are the authors writing of a *definition* of (major) community scientifically-epistemologically studied, tested and explained, or of (major) community and particular (major) communities scientifically-epistemologically studied, tested, and explained? Additionally, if a community is an assemblage of organisms which, together with its habitat, has reached a survival level such that it is relatively independent of adjacent assemblages of equal rank, it ecologically is not and cannot be *merely* a group of food and feeders. Likewise, not only ecologically *must* organisms scientifically-epistemologically exist prior to community, but they must be assembled, eating (i.e. utilizing) each other, being eaten (i.e. utilized) by the others, *and* have reached a survival level such that their assemblage is relatively independent of adjacent assemblages of equal rank. Any ecological explanation that Allee *et al.* give that is, to any degree, scientifically-epistemologically entangled with what they understand community to be is scientifically-epistemologically muddled, if not partially or fully contradictory, until this scientific-epistemological problem is scientifically-epistemologically solved. Allee *et al.* give no indication that they are aware of this problem. Again and again, they progress onwards, never- and nonetheless.

I am called back, then, once again, to same question of remark: What do Allee *et al.* understand community to be? The authors respond differently than before:

The formation of the community may be considered as a resultant of ecological selection, in which the building blocks, or organisms, unable to exist alone, fall into place to produce a self-sustaining whole of remarkable complexity. Organization of such an accumulation is obligatory and the universality of the community is the proof of this general proposition.⁵⁹⁹

Without the scientific-epistemological, and therein the biological-ecological, formation of a community, there scientifically-epistemologically is not nor can there be scientific-epistemological, and therein, biological or ecological community. *This* formation is the result of, i.e. the effect of, ecological selection. Whatever else it may be, ecological selection is the

scientific-epistemological, and therein biological-ecological, *cause* of the formation of community—hence “...as a resultant of...” Biological organisms are the building blocks with which ecological selection scientifically-epistemologically forms, that is, causes community. As building blocks, they biologically exist as a means to actualize ecological selection by achievement; as building blocks, biological organisms *are* functional units existing at all insofar as they valuably exist-standing ready at the disposal of ecological selection for active deployment into ecological community building. Biological organisms do not and cannot scientifically-epistemologically cause community, for they are the building blocks with which ecological selection scientifically-epistemologically forms, that is, causes community to biologically-ecologically come to exist and biologically-ecologically continue to exist thereby. Ecological selection causes community. Biological organisms are entrained, as building blocks, in this biological-ecological causation. Are biological organisms the effect of ecological selection causing communities? Or, are they the complexly supervening effects of their respective community’s prior efficient creation? Or again, are they the building blocks or function value units with which ecological selection causes communities to come to exist at all, in the first place? The authors do not indicate awareness of such problems.

I notice above that Allee *et al.* write that biological organisms are “unable to exist alone.” If biological organisms are unable to exist alone, biological organisms scientifically-epistemologically, and therein biological-ecologically, are not and cannot be either the building blocks of ecological selection nor do they or can they “fall into place to produce a self-sustaining whole of remarkable complexity.” If ecological selection causes community, and if biological organisms are the functional units, i.e. the means utilized by this cause as necessary for the actualization-by-achievement of community, and if biological organisms are unable to biologically exist alone or, that is, prior to their efficiently composing a community or being effectively compositioned into a community, I am before much more than a trivial scientific-epistemological conundrum.

Allee *et al.* scientifically-epistemologically fundamentally contradict themselves, once and again. The authors—scientists-epistemologists—do not acknowledge they are aware of any scientific-epistemological contradiction, nor do they address these contradictions, nor again do they solve any one of them. Most if not all of their book’s scientific-epistemological explanations are fundamentally entangled, in one way or another, with these scientific-epistemological contradictions. *What*, then, do the authors scientifically-epistemologically, and thereof, biologically-ecologically explain? Their book’s title, I remember, is *Principles of Animal Ecology*. To be sure, “a *binding* principle of ecology”—not just of animal ecology, but of ecology in its entirety—deals with “the integration of individual units into larger wholes” (emphasis added).⁶⁰⁰ What Allee *et al.* scientifically-epistemologically explain in this book is none other than the principles of ecology.

The authors say more on community. I must, therefore, in good conscience, return to the question: What do the authors understand community to be? I do so in hopes that I may, if I am able, come to understand more fully what the authors have told the reader food web is. I have learned most recently that biological organisms are the building blocks of community, utilized by ecological selection to cause, that is, to scientifically-epistemologically *create* this, or any, such community. I have learned that community is *of* biological organisms in the sense that biological organisms are prior to and subsequently *cause* to be, that is, scientifically-epistemologically compose, form, or make up and effectively thereby make exist their community. I have learned that biological organisms have, at best, a biological *tendency* to cause, that is, to scientifically-

epistemologically create community, though, as *tendency* indicates, they do not biologically *necessarily* have to cause community or, therefore, join or be part of a community. I have learned that biological organisms scientifically-epistemologically cannot biologically exist alone. I have learned that biological organisms scientifically-epistemologically cannot be either without or prior to community. I have learned, likewise, that biological organisms actively form communities as reaction to, which is to say, as an effect of the fundamental biological need for nourishment. If nothing else, then, I understand that a biological organism is scientifically-epistemologically fundamental to biological-ecological community somehow. Thus, it is not surprising when Allee *et al.* tell the reader that

the ecologist usually regards an individual organism as his smallest unit, except as he needs information about the functioning of the liver, pancreas, muscles, or other organs in order to understand the general environmental relations of the whole organism, or of the community.⁶⁰¹

The authors do not appear to jettison any ballast when they write, immediately following, that “for ecology, supra-individualistic units” such as populations, societies, or other units at or approximate to the community level, are real.⁶⁰² Accordingly, for ecologists, “the problems of this [supra-individualistic units] level are real.”⁶⁰³ Not only are such units as population and community real, but problems associated with them or emergent from them are “so near the center of ecology” that, to convey their import, Allee *et al.* quote V. E. Shelford’s understanding of what ecology is: “the science of animal *communities*” (emphasis added).⁶⁰⁴ If I ignore all of my previous paragraphs entirely, then what the authors write in this last excerpt seems straightforward and ecologically commonsensical.

Consequently, it again comes as no surprise that I feel a twinge of scientific-epistemological, and therein ecological, dissonance when Allee *et al.* write that community, and thus any particular community, “is composed of a variable number of species populations...”⁶⁰⁵ Or when they write that “communities are composed of recognizable population elements...”⁶⁰⁶ Or again when they explain that it is “the populations whose intertwining makes up the major community.”⁶⁰⁷ The authors only worsen their scientific-epistemological tangles and amplify scientific-epistemological contradictions when they tell the reader that any given population “is forged by strong bonds with autecology through the physiology and behavior of animals.”⁶⁰⁸ Autecology refers to *individual*, not aggregate or accumulated, biological units, namely individual biological organisms. These are individual biological organisms which would ostensibly forge (that is, scientifically-epistemologically cause) the populations which would, in turn, compose communities. Which is cause, and which effect? Which cause proceeds which? What causes what? The further compounding of the authors’ scientific-epistemological muddles and contradictions is unfortunate—for me as well as for them—since I am trying to learn what they understand and, subsequently, scientifically-epistemologically explain regarding biological organisms, communities and, therein, food webs. While likewise unfortunate, it is rather remarkable that the authors, given their extraordinary care and depth, show no indication of awareness of such scientific-epistemological problems. They do not acknowledge, address, or solve the scientific-epistemological problems or, at best, clarify the ambiguities of their scientific-epistemological explanations.

Instead, the more decidedly and sincerely I seek to understand both the authors’ explanations and *what* and *who* they explain, the further I find them augmenting their scientific-

epistemological incongruencies and scientific-epistemological contradictions. “Inevitably,” they write, for example,

the survival of the species depends upon its association with foods sufficient to meet these requirements. In the overwhelming majority of organisms this is accomplished by each species becoming a member of a food-feeder nexus...These subcommunities appear to be a series of interwoven elements...⁶⁰⁹

What may qualify as minor quibbles could be, rather, cloaked scientific-epistemological remissness or scientific-epistemological understanding in advance without aware consideration. In any case, my scientific-epistemological expectations should match the seriousness, scope, and depth of Allee *et al.* *Species* is not scientifically-epistemologically the same as *biological organism*. Scientifically-epistemologically, the one cannot be substituted for the other without scientific-epistemological consequence. Allee *et al.* do not acknowledge this. As I noted above, Allee *et al.* understand “supra-individualistic units”—such as aggregations, populations, societies, or communities—to be “real entities,” just as they understand any individual biological organism to be real. If this is so, I find ourselves before very similar scientific-epistemological problems and, perhaps, contradictions as those I noticed earlier for biological organism and community. For instance, if “[i]nevitably, the survival of a species depends upon its association with foods sufficient” to balance its energy output and loss, then it is scientifically-epistemologically impossible, and therein scientifically-epistemologically contradictory, to say that each species accomplishes this causally by—subsequent to the species’ own biological existence—“becoming a member of a food-feeder nexus.” That Allee *et al.* write that the *majority* of organisms do so gives some indication that remissness is not the issue, but rather lack of scientific-epistemological understanding. For I can ask: And the minority? As minority, these species presumably biologically exist, too, though without ever associating themselves with foods sufficient for their biological existence and subsequent biological survival.

Just as *biological organism* and *species* are not mutually substitutable for one another without scientific-epistemological consequence, neither is *species* for *population*, or vice versa. Yet I learn that, while ecology at the turn of the 20th century concerned itself with the ecology of *species* and organisms, ecology by the 1940s had shifted to focus primarily on *populations* and organisms.⁶¹⁰ The difference between species and population, the authors write, is “not great.” I could very well understand “not great,” scientifically-epistemologically, in the sense of *inconsequential*, or without effect worthy of scientific-epistemological attention. By the 1940s, current *definitions* of a species were “in terms of natural populations or groups of populations.”⁶¹¹ I pause, as before, to ask: In this book, are the authors writing of a *definition* of species scientifically-epistemologically studied, tested and explained, or of species and particular species scientifically-epistemologically studied, tested, and explained? Or, in this book, are the authors writing of a *definition* of population scientifically-epistemologically studied, tested and explained, or of population and particular populations scientifically-epistemologically studied, tested, and explained? These questions aside for now, the authors’ substitution of *population* for *species* and their historiographical justification of this substitution strikes me as blithe in light of what they have already, emphatically, told the reader: “For ecology, the supra-individualistic units are real entities.” Species, I should assume, is just such an entity. Judging, for example from chapter 32 (“Ecology and Isolation”) of Section V, “Ecology and Evolution,” it would be scientifically-epistemologically inconsistent were Allee *et al.* not to include *species* as a “supra-

individualistic unit.” Likewise, they stress that “[t]he reality and usefulness of the population as an ecological unit were apparent to us when we outlined the present book...We view the population system, whether intraspecies or interspecies, as a biological entity of fundamental importance.”⁶¹² There is no scientific-epistemological room, according to Allee *et al.*’s own understandings, for *population* and *species* to be mutually substitutable without scientific-epistemological consequence.

Consequently, I should feel a growing scientific-epistemological anxiety when I learn that

[t]he species populations that compose the community are never isolated units, unrelated to each other. Their existence is possible only by the continued existence of other species populations of the community[...]⁶¹³

With persistence, I have sought to learn what Allee *et al.* understand and subsequently respond to the question, *What is community?* And they have responded amply. Yet, they have responded in the same way, for example, for *populations* as they have for *biological organism* and *species*. In accord with scientific-epistemological understandings and criteria they emphasize expressly in, for example, the book’s introduction, such substitution is scientifically-epistemologically contradictory and scientifically-epistemologically untenable. With various biologically-ecologically fundamental units (e.g., biological organism, food web, population, community, species) the authors require the reader—without any overt indication or acknowledgement of their own awareness or understanding that they do so—to countenance, at best, the compounding and amplification of repeated scientific-epistemological ambiguities and muddles. More decisively, I discover myriad scientific-epistemological contradictions—which are numerous and fundamental—at the very center of their most pivotal scientific-epistemological explanations; that is, scientific-epistemological explanations upon which their book of monumental and highly influential ecological import rests, and from which the authors write of commonsensical ecological descriptions and produce further scientific-epistemological explanations. Yet, again, the authors never once acknowledge—or address, or again solve—that, at best, there is the likelihood that their scientific-epistemological explanations are scientifically-epistemologically contradictory—that is, contradictory in light of established scientific-epistemological explanations, as well as in light of scientific-epistemological methods, rules, and criteria of which the authors expressly and emphatically write. If they had been aware of scientific-epistemological problems with any one of their scientific-epistemological explanations, they would have been collectively trusted and expected—at the least—to forthrightly acknowledge such problems. They do not. Thus, if I am to give Allee *et al.* the benefit of the doubt, as I must, I conclude that they were unaware of such problems and the questions to which these problems call them.

Lest I write impetuously or mistakenly conclude what I have learned from the authors, I return to the question again, as I must: “What do the authors understand community to be?” I will attend briefly to remaining responses given by the authors. The first is a composite response, as I well see. The second will be merely to revisit by referral what I have already learned of space-time community lattice and the implications for what the authors understand food web to be. Before I do, recall once more *why* I have pursued this question. I began by asking, I have asked throughout, and I return here to ask again: *What do Allee et al. understand food web to be?* They understand food web, I found, to be “the total complex pattern of feeding

relations of an independent, self-maintaining major community.” The authors immediately scientifically-epistemologically convolute their response, however. I chose not to attend to this convolution at the outset. This allowed me, from the beginning, to give the authors my continual benefit of the doubt that they could—and they would—as outstanding ecologists, respond with scientific-epistemological perspicacity, discernment, and thoughtfully considered and thoroughly reasoned expert ecological understanding, and without scientific-epistemological (and therein, biological-ecological) incongruence, discrepancy, or contradiction. For this reason, I must now give their *entire* response its due attention and consideration. They write:

A *food web* (food cycle of Elton, 1927, p. 56) is the total complex pattern of feeding relationships of an independent, self-maintaining major community in the sense of the concept used in this book. This term embodies the Darwinian web of life or “web of complex relations” (Darwin, 1859, p. 68) [...] ⁶¹⁴

Postponing attending to the authors’ full response allowed me, from the beginning, to give the authors my continual benefit of the doubt. It allowed me, furthermore, to begin and proceed as simply as possible, as if the authors had responded to my question straightforwardly. But, alas, they do not.

Their full response plunges the reader only further and more irreparably into scientific-epistemological bewilderment, scientific-epistemological contradictoriness, and general scientific-epistemological incongruity. I learned that a food web is the total complex pattern of feeding relationships of an independent, self-maintaining major community. Therefore, clearly, if I am to learn what the authors understand food web to be, I must ask: *What do Allee et al. understand major community to be?* I have asked this question doggedly, and I steadfastly followed it to numerous of the authors’ responses, many far afield from one another in the book’s pages. I see now, however, in their full response to what food web is, that the authors respond *immediately* to my necessarily subsequent question, “What do the authors understand community to be?” Here I learn that the major community is a *concept*, and it is a particular concept *as used by* the authors, for their own ends, in their book. As they write in the previous excerpt, major community is also, relatedly, a *term*.

As I continue to ask, I find the same or similar responses given repeatedly:

- p. 9: “A fresh *definition* of the community *concept* is offered in the present work: In large, the major community *may be defined as...*”
- p. 436: “[...] the major community *may be defined as...*”
- p. 436: “This general *definition* [of major community] will be extended and modified.”
- p. 436: “The community *concept* of modern ecology is one of the fruitful *ideas* contributed by biological science to modern civilization.”
- p. 436: “Certain phases of this *concept* [community, i.e. major community] have been developed in previous chapters, and the ground has been prepared for the study of the community in our discussion of interspecific and intraspecific populations.”
- p. 436: “The *term* ‘community’ has been used in other senses, but for present purposes the *concept* of the major community as just *defined* is

exactly expressed by the well-known black oak community on established dunes at the southern end of Lake Michigan...”

- p. 436: “The community *principle* rests upon two diverse considerations: the universality of the *concept*, and the functional integrity of the community.”
- p. 438: “From this point of view, the forest is a *major community as previously defined*, whereas the fungus alone is not.”
- p. 440: “Such exceptions do not impair the major community *concept*...”
- p. 508: “In the particular sense in which the *concept* of the major community is used in this book (p. 436)...This is essential for a full appreciation of the Darwinian web of life concept. It is implied in the community *concept*, from the early views of Möbius (1880) and Forbes (1887) to the present moment.”
- p. 723: “Each part of the whole ecosystem exhibits a degree of independence, and relatively high degrees of independence characterize the major communities of the globe (p. 436 [referencing the major community as *concept* and as *definition*].)”

I have, likewise, asked over and over again, as I do now: In this book, do the authors write of a *definition* of community scientifically-epistemologically studied, tested and explained, or of *community* and particular *communities* scientifically-epistemologically studied, tested, and explained? In this book, do the authors write of a *concept* of community scientifically-epistemologically studied, tested and explained, or of *community* and particular *communities* scientifically-epistemologically studied, tested, and explained? In this book, do the authors write of the *term* “community” scientifically-epistemologically studied, tested and explained, or of *community* and particular *communities* scientifically-epistemologically studied, tested, and explained? In this book, do the authors write of a *principle* of community scientifically-epistemologically studied, tested and explained, or of *community* and particular *communities* scientifically-epistemologically studied, tested, and explained? *The concept of community, the definition of community, the principle of community, the term “community”*: none of these are scientifically-epistemologically substitutable for *community* without fundamental scientific-epistemological consequence. The authors most important scientific-epistemological explanations—explanations pivotal to the book in its entirety—are mired in problems and outright scientific-epistemological contradictions. I recall only the authors’ own words, written clearly in the introduction of the book, that is, as the introduction to all that follows: “For ecology, the supra-individualistic units are real entities.” These include *population, species, and community*, as well as all particular, empirical cases of these and other similar ecological entities. “[T]he problems of this level [the level of the community and those levels approximate to it] are real and lie so near the center of ecology that Shelford [writes] ecology is the science of animal communities.”⁶¹⁵ The authors, like Shelford, understand that “the community must be the natural unit of organization in ecology, and hence is the smallest such unit that is or can be self-sustaining, or is continuously sustained by inflow of food materials.”⁶¹⁶

I will attend by referral only to the last of the authors’ responses to the question *What is community?* that I have found in their book. I have already explored this response closely and at length. In light of my most recent observations and subsequent discussions of *Principles of*

Animal Ecology, it far from insignificant to remember, once again, what Allee *et al.* write of the space-time community lattice:

One of the fundamental causes of the adaptive utilization of the space-time community lattice is the drive for nourishment. An organism must eat to live, and the food it consumes maintains the balance between physiological input and output of energy.⁶¹⁷

I need not rehearse my preceding explorations, close readings, and discussions concerning space-time lattice and space-time community lattice here. I need only recognize, now with much greater perspicacity, the forbidding scientific-epistemological problems into which Allee *et al.* draw themselves—or, perhaps, have been drawn unaware. Along with them go the scientific-epistemological explanations of their landmark book.

4.9 Ecological networks, ecological community, ecological food-web, and an entangled bank: Louis-Félix Bersier (2007)

Similarly to the historiographic chapters Allee *et al.* (1949) wrote of the history of ecology, Louis-Felix Bersier has written a brief historiography on the history of the study of ecological networks. Unlike Allee *et al.*, however, Bersier is a contemporarily active university professor and researcher of ecology. I read his historiography closely that I may learn of *what* and of *who* he writes when he writes of biological organisms, biological species, ecological networks, ecological community, and ecological food-web. Likewise, I seek to learn what and who he and other ecologists research.

A community ecologist in the department of biology at the University of Fribourg, Switzerland, Bersier researches trophic interactions that form trophic networks, or food webs. These trophic interaction networks can be graphically represented as “road maps of energy flows in ecological systems.”⁶¹⁸ With his laboratory group, he analyzes the architecture of such trophic networks and builds models to predict their structure. Bersier appears to have been especially careful in choosing his title, “A History of the Study of Ecological Networks.”⁶¹⁹ His title is modest and specific. Within his historiography, one will not find a historiography of networks generally, trophic or otherwise, or of food-webs of who eats whom. I note in passing that Bersier considers food-webs (as he writes food web) a sub-category of ecological networks. Bersier concerns himself, then, with the history of *the study* of *ecological* networks. As I will learn, he understands *study* to be the *ecological* study of *ecological* networks. For Bersier, ecological study is, simply, the science-epistemology of ecology.

Bersier begins his historiography with attention to Darwin’s *Origin of Species* and then proceeds from—as he writes—the “pioneers” of ecological network research through to contemporary ecologists who ecologically study ecological networks, their research, and their ongoing progress and debates. Within this scope, Bersier concentrates on reviewing and describing the cornerstones, principal contributions, and major developmental trends of ecology through the 1970s. He dedicates some time to the major routes of development since the 1970s, as well. Diagrammatic representations of ecological networks are a salient aspect of this history, but—as is clear from Bersier’s historiography—not every relevant contributor models or even uses this category of representation. Bersier cautions, furthermore, and wisely, that it is beyond the scope of the chapter to comprehensively describe the history of the ecological study of ecological networks.

To open his historiography of ecological networks, Bersier writes: “Ecology is the science of how organisms interact with each other and with their environment.”⁶²⁰ Ecologists, Bersier understands, are scientists-epistemologists. This understanding guides and is thus manifest in his historiography, comprised as it is of the research and contributions of scientists-epistemologists, including ecologists. Yet, with his very next sentence, I meet with problematic scientific-epistemological ambiguity, as Bersier continues: “Given this definition, first proposed by Haeckel...” I am immediately brought back before the question to which Bersier just responded: What does he understand ecology to be? Is ecology the science-epistemology of how organisms interact with each other and with their environment, or is ecology a definition of meaning that one or more scientists-epistemologists formulate, posit, debate, validate, accept, or reject, and if accepted, assign to a term in order to utilize the term willfully in order to achieve goals?⁶²¹ If the latter is the case, then what does Bersier understand an *ecologist* to be? What he responds to these questions is fundamental, determinative, and thus indispensable to the possibility of writing his historiography and to the character his historiography takes. His response may change, of course, but he must respond. This particular scientific-epistemological incongruity, among many others, is fraught, and has long been so, with scientific-epistemological disagreements, contradictions, and circularities.⁶²² That one may or may not accept the validity of one or another side of related arguments, or that one may or may not accept the validity to the argument of whether there is anything scientifically-epistemologically contentious at all in what Bersier writes, indicates the depth of the scientific-epistemological problems—problems as yet all unsolved.

I notice, however, that Bersier proceeds as if none of this was the case. He proceeds willfully with his ecological labors and the ecological explanations these produce; he proceeds at will, despite scientific-epistemological ambiguities and incongruities. I give Bersier the benefit of the doubt. He *is* unaware of the scientific-epistemological entailments of his understandings-in-advance and of what he subsequently writes. Were he aware of them, he would be scientifically-epistemologically obligated, minimally, to acknowledge them and their implications for his historiography as well as for his ecological research and the ecological explanations he produces thereby. Not doing so would be considered a reprehensible breach of scientific-epistemological trust and forthcomingness.

Scientifically-epistemologically or otherwise, understanding that ecology is the science of how organisms interact with each other and with their environment is not the same as understanding that ecology is a term whose meaning I define and assign, collectively or individually, instrumentally or not, and which may or may not correspond to greater or lesser degree to something or someone in the world, even if this something or someone is only a phenomena or effect, or the phenomena or effect of the prior phenomena or effect, and scientifically-epistemologically so on.

Regardless of whether ecology is the science-epistemology of how organisms interact with each other and their environment or a term to which I assign a meaning I define, Bersier preemptively corrects a presupposition: “A non-ecologist may suppose that the study of networks of interactions between species in ecosystems is a mature and well-established domain of ecology. It is not.” He recognizes a reason for this long-unsettled status: “[T]he difficulty of documenting interactions: it is easy to observe organisms, but the examination of interactions of any kind between species is much more elusive.”⁶²³ If I am interested in the history of ecological networks, and these are ecological networks of interactions, I would ask why this examination of interaction is so elusive. And if I wish for a response to this question, I first need to ask: What

are interactions? Ecology, after all, as Bersier understands, either *is* or *is a meaning I invent, define, accept (or reject) and, if accepted, assign to a term as the science of how organisms interact*. And ecological networks are ecological networks *of* interactions, as he writes.

Fortunately, Bersier, like Allee *et al.* (1949), is aware of the basic scientific-epistemological due diligence he must provide. For Bersier, this due diligence takes the form of defining the meaning assigned to terms. Unfortunately, in his due diligence and throughout the chapter, he tangles himself once and again in the same character of scientific-epistemological ambiguities or incongruities, if not contradictions, I have just discussed.

What does he write of interactions? What are interactions for those scientists-epistemologists Bersier chronicles? How do scientists-epistemologists define the meaning they then assign to the term *interaction*? Ecological networks are the real, empirically observable phenomenal structures, or patterns, resulting from the underlying interactions, or processes.⁶²⁴ The processes underlie and are thus *behind* the observed patterns (as he says—I could also say *below* the observable patterns). The latter are empirically phenomenal, that is, scientifically-epistemologically observable, while the former are not phenomenal nor readily scientifically-epistemologically observable, if they are empirically observable at all.⁶²⁵ Bersier continues:

...it is first necessary to go through some definitions. Intraspecific interactions...are of course essential for survival and reproduction. They are very rich and give rise to complex hierarchical patters of structured interactions...I will concentrate only on interspecific interactions...I will not concentrate on just one pair of interacting species, but on communities. A first difficulty lies in the definition of this term...Typically, the term community defines...The term community is sometimes used to...When concentrating on feeding interactions between species, one can define a food-web...⁶²⁶

Bersier is unaware of the scientific-epistemological problems and their corresponding questions: Is he writing what intra- and interspecific interactions, structured interactions, community, and food-web *are*, or is he operationally defining and instrumentally assigning meanings to terms so as to posit and achieve goals *x*, *y*, or *z*? These are not the same, scientifically-epistemologically or otherwise. This discrepancy, however, is a *scientific-epistemological* problem. Without solving it, or without at least acknowledging and addressing it, the scientific-epistemological status of scientific-epistemological explanations—including historiographical—are, at best, in scientific-epistemological limbo. I could mention, as an example, that if Bersier is operationally defining terms, then there are scientifically-epistemologically necessarily *many* more terms that must be operationally defined which, apparently, Bersier does not even consider. (Perhaps a modern English dictionary would suffice.) For, in this case, every term and its operationally defined meaning may scientifically-epistemologically exist, be intelligible, and be utilizable only insofar as each definition and its assignment are validly methodologically accepted and are in inextricable scientific-epistemological relation—relation that is also a meaning necessarily invented, defined, accepted or rejected, and if accepted, then validly methodologically assigned to a term, “relation”—to all other terms and their operationally defined and instrumentally assigned meanings. Then each of the *definitions* and their validly methodologically validated assignment to their respective terms—“intraspecific,” “interspecific,” “interaction,” “community,” “food-web,” “*et al.*”—must be validly methodologically validated as a “term” by means of scientific-epistemological evaluation, tests, manipulations, experiments, comparisons, examinations, etc. in order to subsequently, validly methodologically validate the term’s and its

defined meaning's operationalization and, subsequently again, validly methodologically validated utilization. Otherwise, such definition of meaning, its judgement and acceptance, and its assignment to a term are given an entirely invalid, non-methodological validation that, despite default incorrectness and, thus, falsity, scientists-epistemologists willfully, with the pure rule of their will, rule out and circumvent all of science-epistemology's validly methodologically validated and thereby validly methodologically shared rules, methods, criteria, and other techniques for validly methodologically validating correctness and, thus, true ex-sisting. This would be a willfully ruled but entirely unscientific, un-epistemological procedure for the inventing, defining, accepting or rejecting, and, if accepted, assigning of meanings to terms in order to make, operationalize, and utilize the terminology that is absolutely inextricable from science-epistemology. Again, it suffices presently to recognize and understand that, after centuries of modern scientific-epistemological propositions, theories, disputes and debates, there is *no* scientific-epistemological consensus upon any the scientific-epistemological problems Bersier's vacillations scientifically-epistemologically necessarily raise.⁶²⁷

Very well, but what about *interaction*? Given what Bersier writes in the first pages about ecology, interactions, and ecological networks, surely he also writes directly of what interactions are or how they are defined. Outstandingly, he does neither. Bersier writes neither what interaction and to interact *are* nor does he define them either by assigning operationally utilizable meaning or assigning meaning in more or less probable correspondence to a phenomenal, that is, an empirical object, relation, etc. He tells why interactions are important, but this is not the same as writing what they are or how scientists-epistemologist define them. Even so, I shall attempt to learn what he understands *interaction* and *to interact* to be from what he *does* write. Before I do, however, let me pause and allow what I have just observed to fully settle in: Of what is perhaps most fundamental to all that follows in his chapter—given what he writes of ecology and ecological networks at the outset—Bersier writes nothing of what *interaction* and *to interact* are or are defined to be. Nonetheless, which is to say, regardless, he willfully proceeds apace. Now, what *does* Bersier write of interactions and what may I learn of his understanding?

Bersier tells the reader that he will discuss “some hypotheses of the underlying processes behind observed patterns in network structure.”⁶²⁸ Following, for purposes of definition, as he says, he explains that intraspecific interactions are interactions between members of the same species.⁶²⁹ These interactions are, “of course, essential for survival and reproduction.” Interactions, I learn, are *between* members of the same species or species populations, as he writes later. I infer that Bersier understands a member of a species to be a biological organism. An intraspecific interaction is an interaction *between* at least two biological organisms of the same species and are essential for these biological organisms' and their species' survival and reproduction. Intraspecific interactions, he continues, “give rise to complex hierarchical patterns of structured interactions.” From what he writes in this chapter and in his laboratory group's online research summary, I learn that Bersier understands “underlying processes behind observed patterns in network structure” to be “underlying interactions,” and that these underlying interactions “give rise to complex hierarchical patterns of structured interactions.” Bersier understands hierarchical pattern of structured interactions to be the same as *network*, as in, for example, “the [ecological] study of networks of interactions between species.”⁶³⁰ An *ecological network* is the “observed patterns in network structure” supervenient upon underlying processes, which is to say, supervenient upon underlying interactions. Intraspecific interactions are one class of such interactions. But, he says, he will concentrate not on intraspecific interactions.

Rather, with the exception of cannibalistic interactions, he will focus only on interspecific interactions, and not solely on one pair of interacting species, but on communities.⁶³¹

“Classically,” Bersier writes, “ecological interactions between species are classified according to their reciprocal effects.”⁶³² Here he cites a widely read textbook in ecology. R. E. Ricklefs originally published *Ecology* in 1973.⁶³³ He published, with co-authors, the latest edition in 2019. Bersier cites an edition from 1999. I may re-phrase what Bersier writes as follows: “Classically, ecologists classify ecological interactions between species according to their reciprocal effects.” Bersier explains more about ecological interactions. There are, for instance, five “types of biological interactions between species:” mutualism, predation, competition, amensalism, and commensalism.⁶³⁴ These are either categories of what interactions are, or they are categories of definitions I define and assign to the “interaction” term’s meaning. Of course, if this is the case, then scientists-epistemologists must also define, validly methodologically accept, assign meanings to, and scientifically-epistemologically validly methodologically validate by means of evaluation, examination, experimentation, comparison, et al., the terms “mutualism,” “predation,” “competition,” “amensalism,” and “commensalism,” for example, and then validly methodologically validate their operationalization and valid methodological utilization in each case of such utilization in scientists-epistemologists’ activities. And so on.

Ecologists measure the effect of one species upon another “in terms of the consequences for growth rate, population size, or relative fitness.”⁶³⁵ Typically, however, ecologists research only one type of interaction at a time, with very few studies merging different interaction types at the community level. This is due to the elusive character of interactions for ecological examination, as Bersier has already told the reader, and tells the reader again:

...the discovery of underlying processes is not only a daunting undertaking, the simple description of the interactions between the members of a community is already a difficult exercise. Moreover, competition is observationally more elusive than predation, and it is the probable reason why ecologists have been historically more interested by ecological networks of trophic interactions—food-webs...the main body of research on the network of interactions between species in a community tackled the links between consumers and their prey.⁶³⁶

What can I learn here? First, I emphasize again: Bersier never tells the reader what *interaction* and *to interact* are. Nor—if he understands each to be a term for which I define and assign meanings—does he define these terms’ validly methodologically validated and assigned meanings. Strangely, with what is most fundamental to his historiography (as well as to all of the science, the scientists’ labors and explanations, and the ecological networks that he chronicles), he writes nothing. What, for example, am I to think of ecologists’ categories of interactions if Bersier does not write what he, ecologists, and other biologists understand *interaction* and *to interact* to be, or to be defined as? *What* is his chapter about, after all, if ecological networks *are* networks of interactions? Why would Bersier neglect to include this when his labors as an ecologist—not to mention those labors of all of the scientists-epistemologists whose research he chronicles—center around revealing, examining, evaluating, and explaining biological organisms’ and biological species populations’ interactions with each other and their environments? I am left without response from Bersier. But he continues willfully nevertheless.

I have already learned that for Bersier and, minimally, the scientists-epistemologists he expressly chronicles (such as Charles Darwin, Charles Elton, Robert M. May, or Robert T. Paine, for example) many interactions, if not most, are not readily empirically observable, if observable at all. Scientists-epistemologists must scientifically-epistemologically discern and reveal, identify, examine, evaluate, and subsequently scientifically-epistemologically explain interaction by scientific-epistemological means other than empirical observation. I have learned that interactions are fundamental to biological reproduction and to the survival of biological species and their individual biological members. I learn that in order to discover and identify interactions for examination, scientists-epistemologists (including ecologists) measure the effect of one species upon another. I have learned, likewise, that interactions are between at least two biological organisms or between at least two species populations. I have learned that ecologists classify interactions into one or more of the five interaction types according to the reciprocal effects on the interacting biological organisms and biological species populations. One species interacts with another species, or one biological organismal actor-unit interacts with another biological organismal actor-unit intra- or interspecifically. If scientists-epistemologists measure the effect of one species upon another, and vice versa, in order scientifically-epistemologically explain the causal interactions producing these effects, how do they know which effect to choose for evaluation among all those they discover? How do the scientists-epistemologists know that the effect or effects they reveal and evaluate are the effects of one or another specific, particular individual interaction? How do they know that the effect or effects they choose to evaluate and, perhaps, subsequently test, are the validly methodologically correct effect at all? Are there validly methodologically validated methods for determining that such choice is validly methodologically validated and that, therefore, this or that effect or effects is not only the correct and thereby validly true effect of the interaction, but an effect at all? Ecologists, Bersier tells the reader, classify interactions according to their reciprocal effects. How do they do this if they cannot, in many cases, readily discern and reveal interactions at all? Commonsensically, that is, epistemologically metaphysically understood, the scientific-epistemological cart long ago passed by the scientific-epistemological horse.

Unlike discovering and observing interactions, Bersier writes that it is easy to observe biological organisms. What, then, are biological organisms if they are not, or at least are not produced by and composed of intra- and interactions? Bersier has also told the reader that ecological interactions are *between* biological organisms or species. “[E]cological interactions between species are classified according to their reciprocal effects.” Interactions make, or produce, effects. *An effect* is efficiently effected by *a cause*. More simply and redundantly, an effect is caused by a cause. Interactions cause effects and vice versa oppositely, simultaneously, equally, and causally indistinguishably. Ecological interactions between organisms and species cause reciprocal effects which ecologists classify according to type of effect. I may now say that Bersier understands *interaction* to be *cause*. An interaction is a cause. To interact is to cause. Scientifically-epistemologically necessarily, therefore, an action is a cause. *To act* and oppositely, simultaneously, equally, and causally indistinguishably, *to react* are *to cause*, hence *to interact* and *to intra-act*.

Here I come before another scientific-epistemological problem. Are interactions *between* one or more biological organisms? What is to be *between* two or more biological organisms: in the space separating the one and the other biological organism; or, in the time separating one and the other biological organism; or, the connection or relation oppositely, simultaneously, and equally connecting or relating one and the other biological organism; or, the combining or

countering action and reaction of one and the other biological organism? If scientists-epistemologists are to measure the effect of one species upon another in order to, subsequently, scientifically-epistemologically reveal, identify, and scientifically-epistemologically explain the interaction or interactions productive of this or that effect, they must first *necessarily* say both *what* between *is* and *what* are those which the interaction, if not the effect, is between. Likewise, they must first necessarily say both *what* validly methodologically distinguishes the effect—that is, the reaction and the reactor—from the interaction and interactors and *how* they scientifically-epistemologically, i.e. how they validly methodologically achieve this revelation and distinction.

Bersier writes that “the main body of research on the network of interactions between species in a community tackled the links between consumers and their prey.”⁶³⁷ In other words, the main body of ecological research on the network of interactions between species in a community tackled the links of predation, which he has cited as the interaction most readily scientifically-epistemologically observed, i.e. discerned, distinguished, and observed. Of course, while this particular category of trophic interaction may be more readily observable, the scientist-epistemologist cannot assume that the causes of this interaction, whether proximate or ultimate—that is, the interaction or interactions that produce as their effect the interaction the ecologist most readily discerns, distinguishes, and observes—are likewise observable, if they are observable at all. Bersier would then need to write of the effects of the interaction that is readily observable, but not of the interaction itself, predation, for predation is itself an effect or multiple effects of a prior interaction or interactions that are not readily observable. As an effect, predation is a *reaction*, and thus the unobservable interaction, and the reactor is thus one of the interactors in this prior interaction causative of the effect that Bersier writes is more readily observable, predation. In other words, the predator’s act of consuming the prey is itself caused; the interaction that is predation is the effect or effects of one or more prior causes, or interactions, and is oppositely, simultaneously, equally, and causally indistinguishably the cause of the outcome of these prior interactions. Again, it is only this latter effect or effects—predation—that Bersier tells us ecologists evaluate (i.e. measure) in order to scientifically-epistemologically explain the underlying, elusive causal processes—that is, the interactions producing as their effects one or more complex hierarchical pattern, or structure, of structured interactions. These structured interactions are the actions and reactions, or causes and opposite, simultaneous, equal, and causally indistinguishable effects of the actors and reactors interacting—though to which individual set or sets of interactors I now write of is scientifically-epistemologically difficult to discern, distinguish, identify, and explain, if possible at all. If the actor’s action is opposite, simultaneous, equal, and causally indistinguishable from the reactor’s reaction, however, the scientist-epistemologist cannot distinguish between the cause of, for example, predation and the effect that is predation. To assume the cause is the predator *or* the prey would be scientifically-epistemologically erroneous. To measure the effect of one species upon another as a means to reveal, identify, evaluate, and explain the cause or causes of the interaction producing the effect is scientifically-epistemologically fraught with scientific-epistemological problems, if not outright scientific-epistemological contradictions. As Bersier demonstrates amply, when scientists-epistemologists, including ecologists, explain *interaction* or *to interact*, they explain the action and reaction of, at least, two prior objects, bodies, relations, events, etc., such as, for example, two individual biological organismal actor-units or two species populations. *Are* each of these objects, bodies, relations, events, etc. a complex hierarchical pattern of readily empirically observable and, therefore, readily validly methodologically

evaluatable structured interactions, or empirical phenomena, i.e. empirical patterns, or are they each an actor or a reactor structured in interactions, or a cause or an effect structured in complex hierarchical processes, and thus interactors, and therefore interacting? If I give Bersier the benefit of the doubt, as I should, I must conclude that he is unaware of such scientific-epistemological and, thereof, ecological problems needing solution if scientists-epistemologists and, thereof, ecologists are to validly methodologically validate his scientific-epistemological and, thereof, ecological explanations as in valid ecological standing (regardless of whether ecologically conclusive).

I have written that scientists-epistemologists, including ecologists and historiographers, understand that *to interact* is *to cause* and *interaction* is *cause*. This is scientifically-epistemologically correct, but not scientifically-epistemologically complete. *To interact* is both—oppositely, simultaneously, equally, and causally indistinguishably—*to cause* and *to be caused by*. Likewise, *interaction* is both *cause* and *effect*, oppositely, simultaneously, equally, and causally indistinguishably. Scientifically-epistemologically consequently, it is scientifically-epistemologically contradictory, if not scientifically-epistemologically impossible, to scientifically-epistemologically reveal, distinguish, and identify, evaluate, and scientifically-epistemologically explain action from reaction, or cause from effect, actor from reactor. It is scientifically-epistemologically contradictory—if not validly methodologically, i.e. scientifically-epistemologically impossible—to discover, identify, evaluate, and ultimately scientifically-epistemologically explain the spatiotemporal direction of an interaction such that there is, at all, a consumer that causes predation (the predator) and one or more survival values, or prey, whose consumption by the predator is the effect of the predator’s act, or causal consumption.

Bersier, as have all of the scientists-epistemologists he chronicles, proceeds apace in scientific-epistemological (historiographical and ecological) explanation, none- and nevertheless. So, putting all the above aside, I follow him right along. I gather my senses a bit. I am reading a historiography of the ecological study of ecological networks. Bersier is historiographically chronicling “some hypotheses of the underlying processes behind observed patterns in network structure.”⁶³⁸ These processes, or interactions, “give rise to complex hierarchical patterns of structured interactions.” This network structure, or hierarchical pattern of structured interactions, is an ecological network. The ecological network is the same as the network structure, which is the same, in turn, as the hierarchical patterns of structured interactions, and vice versa in each case. If processes—that is, if interactions—are often not scientifically-epistemologically observable but cause scientifically-epistemologically observable structures of interactions, or patterns, which are hierarchical patterns of structured interactions—structures both *of* and oppositely, simultaneously, and equally *by* these same interactions—which are, therefore, not scientifically-epistemologically observable, I am before yet another scientific-epistemological problem, not to say scientific-epistemological contradiction. What ecological scientists-epistemologists—those who ecologically study ecological networks—scientifically-epistemologically observe is very difficult to scientifically-epistemologically articulate. What these scientists-epistemologists scientifically-epistemologically explain is scientifically-epistemologically, and thus validly methodologically, problematic to scientifically-epistemologically explain. Scientifically-epistemologically, I am not able to proceed apace very far—yet scientists-epistemologists, including ecologists, progress willfully, constantly, consistently, and continually with astounding scientific-epistemological productivity of scientific-epistemological explanations. What, then, for example, am I to conclude of the

scientific-epistemological interaction categories: mutualism, predation, competition, amensalism, and commensalism? For each type of interaction, Bersier gives the reader ecologically standard diagrams of actor (that is, of the cause), the direction of the cause, the causally affected (and thus scientifically-epistemologically necessarily the reactor), and the effect. He progresses onwards, unphased and unaware. Answers—even strictly scientific-epistemological answers—have been understood in advance.

I have yet to review Bersier's discussions of the cornerstones and major developments of the study of ecological networks and the scientists-epistemologists that correspond to them. I recall that Bersier writes specifically of ecological food webs. By far the majority of scientists-epistemologists and, therein, ecologists Bersier chronicles have dedicated their careers to the ecological study of ecological feeding interactions. For, due to competition's unusually elusive character, "ecologists have been historically more interested by ecological networks of trophic interactions – food-webs." As Bersier relates, while Lorenzo Camerano (1880) was the first to graphically link species of a community in order to represent the community's trophic interactions in a diagram, recognition among scientists-epistemologists' of the importance of ecological networks was undoubtedly first galvanized by Darwin's *Origin of Species* of 1859.⁶³⁹ For example, Darwin, in closing, described an entangled bank in which biological organisms, dependent upon each other in remarkably complex ways, "have all been produced by laws acting around us."⁶⁴⁰ It is this complex web of interdependent ecological and biological interactions that scientists-epistemologists have persistently willed to scientifically-epistemologically research and, thereby, explain.

There are only two passages that Bersier quotes at length in his historiography. The passage I discussed above concerning the entangled bank, from Darwin's *Origins*, is one of them. The second passage Bersier quotes at length is also from *Origins*. Excerpted from Darwin's third chapter, "Struggle for Existence," it contains the first time (of only two occasions) Darwin invokes an entangled bank. Bersier quotes the entire paragraph *except* the first two sentences. To better understand Bersier, and perhaps community ecology and the ecological study of ecological food webs in general, I reproduce the same excerpt below. I restore, however, the first two sentences, distinguished below by italics.

In the case of every species, many different checks, acting at different periods of life, and during different seasons or years, probably come into play; some one check or some few being generally the most potent, but all concurring in determining the average number or even the existence of the species. In some cases it can be shown that widely-different checks act on the same species in different districts. When we look at the plants and bushes clothing an entangled bank, we are tempted to attribute their proportional numbers and kinds to what we call chance. But how false a view is this! [...] [Here Darwin gives a brief example of what ecologists would later call forest succession, in this case on "Indian mounds," which Darwin also names "ruins," in the "Southern United States." Bersier includes the example; we do not.] What a struggle between the several kinds of trees must here have gone on during long centuries, each annually scattering its seeds by the thousand; what war between insect and insect – between insects, snails, and other animals with birds and beasts of prey – all striving to increase, and all feeding on each other or on the trees or their seeds and seedlings, or on the other plants which first clothed the ground and thus checked the growth of the trees! Throw up a handful of feathers, and all must fall to the ground according to definite laws; but how simple is this

problem compared to the action and reaction of the innumerable plants and animals which have determined, in the course of centuries, the proportional numbers and kinds of trees now growing on the old Indian ruins!⁶⁴¹

There is much here that calls one to, that is, that asks one for slow, attentive thinking. For the present, however, I consider what Bersier writes of this paragraph: “Competitive and trophic interactions lie clearly at the heart of Darwin’s concept of the entangled bank.” Yes, Darwin understands competitive and trophic interactions to lie at the heart of any and every entangled bank. This, however, is not what Bersier writes. Bersier writes that interactions lie at the heart of Darwin’s *concept of* the entangled bank. If the entangled bank is merely a concept, then the entangled bank and the interactions that lie at the heart of it are merely concepts, notions, postulates, hypotheses, ideas. *This is not* what Darwin writes! Darwin writes: “When we look at the plants and bushes clothing an entangled bank...” Darwin’s invitation to his reader to look at an entangled bank covered with plants and bushes is not scientifically-epistemologically the same as to look at or consider *a concept of* an entangled bank. Darwin writes of an entangled bank and asks his readers to look at and consider an entangled bank—not some one or another concept, notion, postulation, idea, or representation, etc., of an entangled bank. Bersier, however, writes of a concept. He never acknowledges the scientifically-epistemologically consequential distinction between these two. Again, as a scientist-epistemologist, were Bersier aware of such scientific-epistemological problems and the implications they had for his scientific-epistemological explanations—as well as for his historiography of ecological networks—he would be obligated to acknowledge them, if not attempt to solve them. As before, he progresses forward never- and nonetheless.

Regarding the excerpt from *Origins of Species*, Bersier continues:

But together with this admirable description comes the warning of the complexity of the task! And the discovery of underlying processes is not only a daunting undertaking, the simple description of the interactions between the members of a community is already a difficult exercise.⁶⁴²

Bersier’s distinction between scientific-epistemological description with scientific-epistemological explanation is ambiguous at best. Is “the simple description” that of *how* the interactions between members of a community function or of *how* the actors and reactors act and react, or cause and get caused by one another as they do? Is “the simple description” that of *how* the scientists-epistemologists reveal, discern, identify, evaluate, and explain the interactions as interactions at all or of *how* the scientists-epistemologists reveal, discern, identify, evaluate, and explain the actors and reactors as actors and reactors at all, acting and reacting, causing and being caused by one another? Is “the simple description” that of *why* the interactions between members of a community function as they do or *why* the actors and reactors act and react, or cause and get caused by one another as they do? Is “the simple description” that of *why* the scientists-epistemologists reveal, discern, identify, evaluate, and explain the interactions as interactions at all or of *why* the scientists-epistemologists reveal, discern, identify, evaluate, and explain the actors and reactors as actors and reactors at all, acting and reacting, causing and being caused by one another? Is “the simple description” a description of the complexly supervening properties of the interaction, or perhaps of the supervening effects, i.e. of the complex patterns or the complexly patterned structures of the interactions? Or is “the simple

description” that of the interaction itself, the interactors themselves, and thus the actors and reactors themselves acting and reacting? If Bersier intends to scientifically-epistemologically describe, perhaps he (or, for that matter, Darwin or the other ecologists he chronicles) scientifically-epistemologically must necessarily describe the interactions in a strict empirical fashion without speaking of, much less explaining, the interactions, or mechanisms, making or producing scientifically-epistemologically observable effects at all, whatsoever. If he writes of these mechanisms (*regardless* of whether any given mechanism is brute mechanical or circularly causally mechanical, i.e. feedback regulatory or feedback controlled mechanical), which as interactions are themselves (insofar as they validly methodologically exist at all) largely or entirely scientifically-epistemologically (i.e. empirically) unobservable, much less evaluable and explainable, then Bersier would have to clarify that scientifically-epistemologically interaction and *to interact* do not necessarily correspond to anything validly methodologically existing other than the validly methodologically validated models that these mechanical descriptions are—models, that is, that are valuable for putting such effects or theories about such effects to trial in order to judge these modeled causes and effects. But Bersier, however, like the other scientists-epistemologists he chronicles, is not aware that “[t]he problem of determining the mechanism [action and reaction, cause and effect, i.e. interaction] required to establish a given species of connexion between the motions of the parts of a system [e.g. an ecological network, an ecological food web, an ecological community, an ecosystem, etc.] always admits of an infinite number of solutions” and that, “of these, some may be more clumsy or more complex than others, but all must satisfy the conditions of mechanism in general”?⁶⁴³ If, however, Bersier wills to scientifically-epistemologically explain the world directly, in the world’s full giving of senses as and in the world’s sensibility—rather than epistemologically invent, formulate, posit, order, test, and thereby describe empirical models, however or other empirical representations and re-representations—he will speak of scientific-epistemological interactions. Either way he will find himself tangled in scientific-epistemological problems and contradictions that, at the *very* least, he scientifically-epistemologically *should* acknowledge *if* he is aware of them. He does not acknowledge them. The absence of an indication that, in this chapter on the history of the ecological study of ecological networks, Bersier is aware, minimally, much less consciously understands, these scientifically-epistemologically fundamental scientific-epistemological distinctions is *astonishing* and quite scientifically-epistemologically unnerving, to say the least. This unawareness is not scientifically-epistemologically uncommon – entirely the opposite.

There is another aspect of what Bersier writes in response Darwin’s passage that is relevant at present. As I have already noted, Bersier’s writes:

Competitive and trophic interactions lie clearly at the heart of Darwin’s concept of the entangled bank. [...] And the discovery of underlying processes is not only a daunting undertaking, the simple description of the interactions between the members of a community is already a difficult exercise.⁶⁴⁴

I have learned that Bersier understands that processes are interactions. Processes cause the observable, phenomenal structures that I empirically ubiquitously observe, including my bio-physical self as a ecological-biological organism. Again, these observable structures are “complex hierarchical patterns of structured interactions,” or what is the same, the complexly supervening effects of interactions, i.e. of ecological processes. Scientific-epistemological structures of interactions and, therefore, ecological and biological structures *are* interacting-

interactions as well as structures of and causally by underlying interactions. This is a scientific-epistemological contradiction, as I have noted above. A process is an interaction, and vice versa. An interaction is a cause *and* oppositely, simultaneously, equally, and causally indistinguishably an effect of the effect it causes. *To interact is to cause and to be caused* oppositely, simultaneously, equally and causally indistinguishably. Bersier understands interactions, or actions and reactions, or again causes and effects to lie either at the heart of an entangled bank or at the heart of a Darwinian (but not Darwin's) concept of an entangled bank. And, as I have already discussed, if the interactions are *between* members of the community, Bersier must write what *to interact* is, what or who is that which interacts, and what, when, where, and how *between* is.

I return once more to the one of the passages Bersier quotes from *Origins of Species*, with the two sentences I additionally quoted in italics:

In the case of every species, many different checks, acting at different periods of life, and during different seasons or years, probably come into play; some one check or some few being generally the most potent, but all concurring in determining the average number or even the existence of the species. [...] Throw up a handful of feathers, and all must fall to the ground according to definite laws; but how simple is this problem compared to the action and reaction of the innumerable plants and animals which have determined, in the course of centuries, the proportional numbers and kinds of trees now growing on the old Indian ruins!

For Darwin, *checks* necessarily go causally hand-in-hand—oppositely, simultaneously, equally, and causally indistinguishably—with *balances*, and vice versa. *To check is to cause and to be caused*, and *to balance* is oppositely, simultaneously, equally, and causally indistinguishably *to cause and to be caused*. Darwin's theory of evolution by natural selection is a theory of the *mechanisms* of, or what is the same, the interactions driving the evolutionary emergence and development of biological species. Efficiently causal checks and balances are essential and inextricable to Darwinian evolution by natural selection, including all biological science that succeeds the modern synthesis (which is, without exception, contemporary biological science in its entirety). Darwin focuses primarily on biotic checks and balances; that is to say, on checks that causally originate and are causally propagated between biological organisms, intra- or interspecifically. While Darwin acknowledges abiotic checks in *Origins of Species*, he does not give them priority of place as *ultimately* causal. Biotic checks and resultant balances are efficiently causally *ultimate*. This is to say, they are *scientifically-epistemologically causally* ultimate. The prioritization of biotic checks and balances over or even opposed to abiotic checks—exquisitely articulated by though not originated with Darwin—will ramify and ripple unabated and undiminished through the heart and history of ecology right up until Power's ecological, i.e. scientific-epistemological research, ecological explanations and, thereof, ecological food web diagrams of the Eel River's ecological food webs. A system of a check and a balance, or a system of checks and balances, is a system of feedback control or feedback regulation. Feedback control and feedback regulation is scientific-epistemological causation—that is, it is efficient causation. Feedback control or feedback regulation *scientifically-epistemologically must necessarily* have spatiotemporal direction. To reveal, discern, and identify, much less to evaluate, examine, manipulate, compare, or otherwise test such direction,

is scientific-epistemologically contradictory: every cause is oppositely, simultaneously, equally, and causally indistinguishable caused by the effect that it causes.

Casually, feedback control or feedback regulation is *neither* time symmetric nor time invariant. At best, this is a scientific-epistemological problem for, for example, the scientific-epistemological explanations of community ecology and community ecological food webs, ecological food networks, and ecological food chains—as well as for the rest of biology and ecology, without exception (scientific-epistemological entropy notwithstanding). For example: A scientific-epistemological density-dependent or density-independent check is scientifically-epistemologically opposite, simultaneous, equal, and causally indistinguishable from a scientific-epistemological density-dependent or density-independent balance as the *effect* of such a check. A scientist-epistemologist cannot scientifically-epistemologically explain which spatiotemporal direction the chain of causation progresses or the circle of causation loops. An ultimate cause is absolutely—i.e. universally (space) and eternally (time)—opposite, simultaneous, equal, and causally indistinguishable from a proximate cause. An efficient effect is an efficient reaction. A reaction is an opposite, simultaneous, equal, and causally indistinguishable efficient cause of its cause. Unlike a limit, checks and balances are scientific-epistemological dynamics; they are, in other words, the total activation and mobilization that is efficient causation—that is, the total mobilization that is force forcing and being forced.

Chapter 5 Action, active motion; practice, practical motion

5.1 Actions and activity, reactions and reactivity, interactions and interactivity

Three ecologists that have researched the Eel River and other northern California rivers understand the river and its environment both to be actors-reactors and their actions-reactions and to be oppositely, existentially simultaneously, equally, and, thus, scientifically-epistemologically causally indistinguishably *by* actors-reactions and their actions-reactions. In this chapter, I attempt to understand whether such actors-reactors and their actions-reactions are causes. A *causa* is a legal or judicial trial. A *causa* is also that which makes *actively* move; that which *actively* puts into motion. A *causa* actively puts justice in motion in each case. To cause is to act. To judge is, likewise, to act. A judge speaks justice validly and, thus, truly. A judge speaks the law lawfully. Epistemologically metaphysically, to speak lawfully is to give lawful human voice to epistemological metaphysics. What or who validly grounds the validation of the validity of the judge in the first place? Epistemologically metaphysically, a theory—in the case of a judge, a methodology. Theorizing is an activity productive of theories. A theory, however, to be valuable, must be commonsensically practical, i.e. applicable experientially. What is experience? To experience is to apply particular techniques in order to put to the test, or to make a trial of, or to put on trial, or to try as means, in turn, to actualize-by-achievement an end-goal. Techniques belong to one or another domain of activity, whether theoretical or experiential. Experiential techniques belong to the activities of putting on trial or trying in order to validly methodologically validate an action, reaction, or interaction—including judgments. Yet: What is action? Technique belongs in essence to action. Action is not practice, nor vice versa. The opposite of action is passion; the opposite of activity is passivity. What, then, are sympathy and compassion? These are questions on the way of understanding what human-being-subject is. As I begin to understand, I come to sense epistemological metaphysics as it lawfully gives senses to the world's sensibility.

5.2 What are the ecological food webs of the Eel River? Ecologists respond

This is the question to which I give my voice as this question, coming before us, opens and initially orients this dissertation. I have yet, for example, to heed the calling of questions of food and of rivers. Even so, I have begun. The moving of thinking is essentially of the moving of practicing—different and distinct from the moving of acting and its activity. I honor and revere with thankfulness the moving of thinking in slowing, settling, and thus coming to rest so that I may, with all I am, as I am, listen and respond once again to the call of questions in giving myself, faithfully and trustingly, to the questions—or as I have written above, in pouring myself thoughtfully and thankfully toward the sending source of the questions themselves. I rest.

Though I rest, I may still *listen*. I may, listening, ask others what the ecology is. I may ask others what the ecological food webs of the Eel River are. I do so. I ask those who are, contemporarily and lawfully, called and gathered in common sense as ecologists. I ask, in particular, those ecologists that have spent years, at least, studying the ecology of the Eel River. What do these ecologists respond to these questions?

5.3 Keith Bouma-Gregson

Keith Bouma-Gregson is a freshwater ecologist at the California Water Science Center of the United States Geological Survey. In this capacity, he researches “how [algae and cyanobacteria] impact the flow of energy and cycling of nutrients through aquatic ecosystems.”⁶⁴⁵ “The goal of this research,” he writes, “is to identify the processes, and relevant spatial and temporal scales, that control the community composition of algae and cyanobacteria, and when blooms may produce toxins.”⁶⁴⁶ I spoke with Bouma-Gregson in March of 2020. At that time he was the Freshwater Harmful Algal Bloom Coordinator for the California State Water Resources Control Board of the California Environmental Protection Agency. Bouma-Gregson received his doctorate in 2017 from the Department of Integrative Biology at the University of California, Berkeley, where his doctoral advisor was Professor Mary E. Power.⁶⁴⁷

In his doctoral research, Bouma-Gregson “focused on pattern description [of “Benthic Toxigenic *Anabaena* and *Phormidium* (Cyanobacteria) in the Eel River, California”]...and cataloging and documenting these patterns.”⁶⁴⁸ However, although he focused his dissertation on pattern description, categorization, and documentation, he understands “species interactions and mechanisms of interactions” to be “the real core of ecology.”⁶⁴⁹ The real core of *what* ecology is, Bouma-Gregson says, is species interactions and mechanisms of interactions. A few moments later, however, he returns to the question, telling me again what ecology is: “Ecology,” he says, “being [is] how organisms interact, the way those interactions generate those patterns around us.”⁶⁵⁰ This not the same response as his prior reply. In this second response, ecology is *how* organisms interact and *how* these interactions generate those patterns we observe around us which he researches.

The question arises, then: What does Bouma-Gregson research? Does he research the patterns around us that are reactions to (i.e. generated by) species interactions and mechanisms of interactions? Or, does he research the patterns around us and *how* these patterns are the reactions to *how* organisms interact and *how* these interactions generate those patterns we observe around us? If the core of ecology is species interactions and the mechanisms of interactions, does Bouma-Gregson understand ecology to be these interactions and the mechanisms of interactions, or does Bouma-Gregson understand ecology to be the study of or, more particularly, the scientific-epistemological study of these interactions and the mechanisms of interactions?

Regardless of what Bouma-Gregson would respond to these latter questions, in both of his prior responses he speaks of interactions and the patterns these interactions generate. For Bouma-Gregson, these interactions, the actions and reactions of these interactions, these interactions’ respective actors and reactors, and the patterns these actors and reactors interactively generate are very important—*very important* being an understatement, probably—to what he understands, to what he researches, and to his explanations of his research findings.

Bouma-Gregson understands that species interact. One can plausibly assume that Bouma-Gregson speaks of species of organisms, and that he speaks, furthermore, of biological organisms. He then says that organisms interact. Likewise, one can plausibly assume that when he speaks organisms, he speaks of individual organisms, or of species of organisms, or both, and that he speaks of a biological organism, or biological organisms, or species of biological organisms.

These organisms interact, and their interactions generate the patterns we observe around us. These patterns are the reactions to the interactions that generate them and may or may not be involved in the generative interaction or interactions. One may ask whether or not one or more

of these organisms is also generated by such interactions and, thus, whether the biological organism is either (i) a reaction to the interaction or interactions that generate it, or (ii) if the biological organism is (a) an actual reaction to one or more spatiotemporally prior interactions or (b) an actual reacting-reaction to one or more spatiotemporally simultaneous actual interacting-interactions.⁶⁵¹ In other words, is the biological organism a pattern of prior interactions or a simultaneously actual patterning by actually interacting-interactions? When Bouma-Gregson speaks of biological organisms' interactions, one may ask whether he speaks of their interactions with other biological organisms, or their interactions with the environment that is not biological organismal, or of their interactions with both. If he speaks of biological organisms' interactions with other biological organisms, one may ask whether one or the other individual biological organism or group of biological organisms interacting existed prior to their interaction and whether or not this organism or group or biological organisms continues to exist *in* as well as *throughout* the interaction in question. If he speaks of biological organisms' interactions with the environment that is not biological organismal, one may ask whether this environment or any relevant part of this environment existed prior to the interactions generative of the biological organism or organisms and whether this environment or any relevant part of it continues to exist *in* as well as *throughout* the interaction in question. Bouma-Gregson's responses to these and similar questions would indicate his understanding of spacetime, spatiotemporal specificity (if any), and the spatiotemporally specific directionality of actions, reactions, and interactions or the lack thereof.

One may ask whether the patterns Bouma-Gregson researches are spatiotemporally specific patterns in the sense of each respective pattern, insofar as it exists actually, existing spatiotemporally uniquely to its spacetime and its simultaneously spatiotemporally actual and uniquely existing context. As with patterns, one may ask whether the interactions that generate these patterns are spatiotemporally specific interactions. This spatiotemporal specificity could be in the sense of each respective interaction, insofar as it actually exists, existing actually absolutely uniquely throughout all discrete, continuous, or contiguous spacetimes. Or, this spatiotemporal specificity could be in the sense of each respective interaction, insofar as it actually exists, existing actually and uniquely in its particular spatiotemporality, with its simultaneously actually and uniquely existing spatiotemporal context, but without either interaction or context existing absolutely as what they are throughout all discrete, continuous, or contiguous specific spatiotemporalities. If the latter is true, then the same interaction that is specific to its specific spatiotemporality, and its context is simultaneously specific to this specific spatiotemporality, could likewise be simultaneously repeated and equally specific to another discrete, continuous, or contiguous yet differently spatiotemporally specific spatiotemporality. But perhaps an actual pattern is an actually reacting-reactions to spatiotemporally prior interactions that no longer actually exist spatiotemporally specifically or, perhaps, no longer exist at all. I could, then, ask this same set of questions for the interactions that generated these actually spatiotemporally existing patterns—interactions that do not actually exist spatiotemporally specifically, or perhaps do not exist at all, but did previously exist spatiotemporally specifically in a previous, simultaneously existing spatiotemporally specific context that likewise no longer actually spatiotemporally specifically exists, if it exists at all. Again, if the spatiotemporally specific interaction and its simultaneously spatiotemporally specific context are only specific to a specific spacetime, rather than absolutely specific throughout all particular, discrete, continuous, or contiguous spacetimes, then this does not preclude that this spatiotemporally specific interaction in its spatiotemporally specific context

could exist again in a spatiotemporally novel spacetime exactly as the *interaction* previously existed in a prior specific spatiotemporality that no longer exists actually. Or perhaps the patterns Bouma-Gregson researches and the interactions that generate them either are spacetime or are simultaneously generating spacetime and either its absolute spatiotemporal specificity or its spatiotemporally distinct (but repeatable), continuous, or contiguous spatiotemporal specificities. The same could be said for spatiotemporally specific interactions.

Insofar as Bouma-Gregson does research spatiotemporally specific patterns or interactions in their respective, simultaneously spatiotemporally specific contexts, then once the spatiotemporality of this or that spatiotemporally specific pattern or interaction and its simultaneously spatiotemporally specific context is no longer actual and, thus, no longer actually exists spatiotemporally specifically—if it continues to exist at all—then the spatiotemporally specific pattern or interaction likewise no longer exists spatiotemporally specifically, if it exists at all. If, then, Bouma-Gregson researches spatiotemporally specific patterns or interactions, one may ask, for example, if the *very first* spatiotemporally specific interaction Bouma-Gregson has with any given spatiotemporally specific pattern or interaction generates either an entirely or a partially novel spatiotemporally specific pattern or interaction. If Bouma-Gregson's very first spatiotemporally specific interaction with the spatiotemporally specific pattern or interaction to be researched does generate a novel spatiotemporally specific pattern or interaction only partially, then one may ask what of the prior spatiotemporally specific pattern or interaction *endures* non-spatiotemporally specifically through this very first interaction between Bouma-Gregson and the pattern or interaction to be researched and is, therefore, *not* spatiotemporally specific at all, not generated by this interaction, and not novel. Perhaps the very first interaction Bouma-Gregson has with a spatiotemporally specific pattern or interaction in its simultaneously spatiotemporally specific context is *prior to* his observatory interaction of this spatiotemporally specific pattern or interaction—if for, example, the ripples of his feet in the water ripple the water ahead of him and, therewith, ripple the algal mass in this water before he can observe the algal mass in the water ahead of him. If this were so, then the spatiotemporally specific interaction or pattern and its simultaneous spatiotemporally specific context of Bouma-Gregson's *very first* spatiotemporally specific *observational* interaction with a spatiotemporally specific pattern or interaction is *not* and cannot be the spatiotemporally specific pattern or interaction and its spatiotemporally specific context of his *very first non-observational* (i.e. prior to observation) interaction with a spatiotemporally specific pattern or interaction and its simultaneously spatiotemporally specific context. The spatiotemporally specific pattern or interaction and its spatiotemporally specific context that *first* interacted with Bouma-Gregson no longer actually spatiotemporally specifically exists and cannot be actually existentially observed. If the spatiotemporally specific pattern or interaction that interacted with Bouma-Gregson's first spatiotemporally specific interaction was absolutely specific throughout all space-and time, then this spatiotemporally specific pattern or interaction cannot be observed now or ever or anywhere again, existentially absolutely—it cannot be repeated spatiotemporally existentially.

Insofar as the interactions that generate the patterns *and* (or *or*) the patterns that Bouma-Gregson researches are absolutely spatiotemporally specific, then the here (the where) and now (the when), or the there (the where) and then (the when) of these spatiotemporally specific interactions *and* (or *or*) patterns did not exist prior to Bouma-Gregson's very first interaction with them. But perhaps this is merely a problem of defining or specifying spatiotemporal scale. Insofar as spatiotemporal scale is a qualitative, or a quantitative, or both a qualitative and quantitative perspective or technique of the observer from which and by which to posit research

hypotheses, to research, and then to explain research results, *this* spatiotemporal scale-perspective or scale-technique either (i) has already interacted with or is actually interacting with one or more other possible scale perspectives on or scale techniques for *this* spatiotemporally specific interaction *and* (or *or*) interactively generated pattern around us; or (ii) *this* spatiotemporal scale-perspective or this scale-technique is actually spatiotemporally specifically interacting with the simultaneously actually spatiotemporally specific interacting-interaction and (or *or*) the actually spatiotemporally specific generated pattern to be researched. Insofar as spatiotemporal scale is an evaluation of any type or of any function—including perhaps a perspective, a view, a stance, or a tool or technique—of what or who the researcher observes or wills to observe, one may repeat the same or similar questions (among others). Insofar as scale interacts with the spatiotemporally specific pattern-generative interaction and (or *or*) pattern—regardless of what *this* scale is or of what scale is in general—then *this* spatiotemporally specific scale is *also* an interacting actor and an interacting reactor both generative of *this* spatiotemporal specific pattern-generative interaction and (or *or*) *this* spatiotemporally specific pattern generated.

Insofar as any one of the above interactions regarding spatiotemporal scale are the case, the scientific-epistemological researcher—as with any other student, scientific-epistemological or not—would need to distinguish between *what* the following are: interaction, action, reaction, process, pattern, scale, observer, observed, actor, reactor, interactor, *here* or *there* (the specific where), *now* or *then* (the specific when), space, and time—and I am sure to forget some. Even if *what* this researcher or student understands any or all of these to be *is*, for example, a word, a term, a noun, a verb, a definition, an enactment, a performance, a concept, a notion, an opinion, a belief, an understanding, a perspective, a view, a frame, a worldview, a stance, a game, a tool⁶⁵², a technique⁶⁵³, a strategy⁶⁵⁴, a power play or ploy⁶⁵⁵, an exercise of force⁶⁵⁶, a weapon⁶⁵⁷, a logic⁶⁵⁸, a tactic⁶⁵⁹, a method⁶⁶⁰, an illusion, a meaning, a vehicle of meaning, a process, a pattern, a structure, a cause, an effect, a probability distribution, a field, something, nothing, a statistical average, a value, a function, a model, a resemblance, a phenomenon, a noumenon, an experience, an encounter, a thing, an object, a subject, a rule, a law, a being, an existence, a presence, an idea, a matter, a relation, an emergence, *et al.*; and even if *what* this researcher or student understands any or all of these to be *is* operating or operationalizable; and/or empirically, reasonably, or otherwise logically testable; and/or empirically, reasonably, or otherwise logically confirmable or falsifiable; and/or functionally relative to the how, why, when, and where of one's needs and desires and use and utilization; and/or evaluable, valuable, or re-evaluable as value relative to the how, why, when, and/or where of one's needs, desires, use, and utilization—even if *what* one understands (for example) an interaction to be *is* any of the above (or otherwise, if not included above), the researcher or student *should* be able, after thoughtful consideration of whatever temporal duration, to say or write—in response to the question, *What is x?*—what he, she, or they understand (for example) an interaction to be. If the researcher or student purposefully does not respond to this question or purposefully does not distinguish what one or another of these are (e.g. interaction, action, reaction, pattern, scale, observer, actor, reactor, and interactor, the specific where, the specific when, space, and time) for whatever considered reason; then the researcher or student has already understood, at least, that *what* any of these *is* or may be *is such that* the researcher or student can—at his, her, or their will; as he, she, or they wills; for their own willful purposes and goals, or for their own needs or desires, whatever these are—postpone responding (definitely or indefinitely), ignore the question (definitely or indefinitely), or dismiss the question (definitely or indefinitely). Insofar as the researcher or

student does not sense with awareness the need to respond to the question *What is x?* or the need to distinguish what (as examples) an action, a reaction, or an interaction are, and thus cannot choose to postpone, to ignore, or to dismiss the question, the need to respond, or the need to distinguish what this or that is, the researcher or student has nonetheless already understood *what* these are in advance. Only given to this understanding in advance can they continue without sensing with awareness the need to distinguish what any one or more of the above *are*. The questions *How?* and *why?* (even if only to ask *why?* of a prior answer to *how?*), as well as any response to these questions, can each only follow a response to *what?*—regardless of whether this response is one given by one with awareness, or taken up by one with awareness, or a response one is given to understand in advance without awareness.

When I ask Bouma-Gregson what the ecology of the Eel River is, he replies that the ecology of the Eel River is “interactions between organisms and patterns in the landscape, [interactions] that generated distribution [and] abundances of organisms.”⁶⁶¹ I have already noted that one could ask if a biological organism is a pattern generated by interactions. I have already noted that one could ask if a biological organism is either an interaction or a pattern of interactions rather than merely generated by interactions. I have noted that one can ask the same questions for landscape. I have noted that one can ask whether the organisms, the patterns, and (or *or*) the landscape exist prior to the interactions between one or another of them. One can likewise ask the same questions for the *distribution* and (or *or*) the *abundance* of organisms. And one can ask the same questions for any other of the actions, reactions, and interactions involved in such patterning.

Bouma-Gregson understands that the ecology of the Eel River is the interactions between organisms and patterns in the landscape, interactions that generated the distribution and abundance of organisms, where the distribution and abundance of organisms is necessarily one or more interactions and (or *or*) patterns in the landscape. I recall that Bouma-Gregson may understand the core of ecology to be species interactions and mechanisms of interactions. In the case of the ecology of the Eel River, Bouma-Gregson would, therefore, understand that the interactions between organisms and patterns in the landscape *are* the mechanisms by which the patterns of distribution and abundance of organisms are made to exist as well as, simultaneously and equally, the mechanisms to which the patterns of distribution or abundance of organisms react and, thus, the mechanisms to which the organisms react. One notes that is circle of interactions and mechanisms either *of* organisms, organismal distribution and abundance, and patterns in the landscape *as interactions* or *of* the interactions *between* organisms, organismal distribution and abundance, and patterns in the landscape. In either case, perhaps this is what Bouma-Gregson elsewhere understands to be a feedback loop. Insofar as there are distributions and abundances of organisms, these distributions and abundances are each reactions to the mechanism which, simultaneously and equally, interactively makes these patterns exist. Interactions are mechanisms, and vice versa. Interactions generate patterns of distributions and abundances of organisms; interactions generate patterns of or in the landscape; interactions generate organisms. Or distributions and abundances of organisms are interactions; landscape is an interacting dynamical aggregate of interactions; and organisms are each one or more interactions. The patterns, I may understand, then, of organismal distributions and abundances in the landscape are the reactions to the interactions of organisms in the landscape and, thereby—simultaneously, equally, oppositely, and scientifically-epistemologically indistinguishably—both are and are made to exist by these organisms acting and reacting, both with each other and with the landscape—that is, with *other* patterns of the landscape. Patterns, Bouma-Gregson may

understand, are *also* mechanisms, which is to write, a pattern is, at least, an interaction generative of a interactive pattern. A pattern, again, exist at all only insofar as it is simultaneously, oppositely, equally, and scientifically-epistemologically indistinguishably both a reacting-reaction to the mechanisms that actively make it exist and a reacting-reaction, or mechanism, actively generating patterns, including its self-pattern. Patterns, as Bouma-Gregson indicates, are active—that is, patterns are interacting in the interactions between organisms and their respective species. Patterns, too, then, are the core of ecology insofar as they too are reacting-reactions, interacting-interactions, and, as interacting-interactions, mechanisms generating themselves and other patterns which actively composition (or compose) the patterns in the landscape interactively generated by organisms' interacting.

What seem to be pleonastic repetitions in the prior paragraph are necessary to understand what Bouma-Gregson understands. Bouma-Gregson does not say that the ecology of the Eel River is a material, conceptual, reasonable, rational, or logical originating, creating, producing or representing, nor an ordering, utilizing, and testing of concepts, logics, rules, models, notions, terms, or definitions, nor that it is a framework, a perspective, a view, a worldview, a language game, a stance, a belief, an opinion, a knowledge, *et al.* He says the ecology of the Eel River is interactions between organisms and patterns in the landscape, [interactions] that generated distribution [and] abundances of organisms.

Bouma-Gregson's doctoral research studied the case of *Anabaena* and *Phormidium* alga in the Eel River of northern California. The water of the Eel River, in this case, "is a kind of currency."⁶⁶² This currency is both a currency of and for interactions and, as currency, interacts with organisms; or, in other words, water acts (for example) on organisms, is acted upon by organisms, and reacts to the action of organisms. There are "interactions between organisms and water that are...that have a big control on the water that makes it into the channel [of the river]."⁶⁶³ The interactions of water and organisms actively control the water that makes it into the Eel River's channel. Are these the interactions between organisms, water, gravity, etc.—interactions which are mechanisms, as vice versa—or are these the interactions that are organisms, water, gravity, etc.? In any case, actions, reactions, and thus interactions control quantity of the water in the channel of the Eel River. To control, in other words, is to act, react, and thus interact with determining strength—in this case, an interaction forceful enough, and thus powerful to determine the quantity of water that flows into the channel of the river.⁶⁶⁴ Yet this control is the reaction to actions of one or more organisms upon over against one or more other organisms as well as upon over against the varying actions of water. This control, then, is a reaction to interactions of organisms with each other and to interaction with water. Organisms are actors. Water (H₂O) is an actor. Organisms and water are each reactors and interactors. Even the control—as an interaction forceful enough and, thus, powerful enough to actively, dynamically determine the quantity of water that enters the river—is an actor, a reactor, and thus an interactor.

Bouma-Gregson summarizes: "And so," he says, "I would sort of sum that up [as] the ecology [...] of the river involves the interactions between water [...] to affect other physical environments, sediments, erosion, temperature, and then the organisms."⁶⁶⁵ Scientifically-epistemologically, and thus ecologically, *to affect* and *to effect* are both *to act on* and—oppositely, simultaneously, equally, and scientifically-epistemologically indistinguishably—*to act upon over against*, i.e. *to react*. Water *acts* upon other physical environments or parts thereof, sediments, erosion, temperature (i.e. heat evaluated into quantity of heat), and organisms. These physical environments, sediments, erosion, heat, and organisms oppositely,

simultaneously, equally, and indistinguishably react to, i.e. act on water. As I have already learned, the physical environments (such as water itself, as currency), including sediments, erosion, and quantity of heat are also acting on organisms, thereby generating as reaction the patterns of distribution and abundance of these organisms on the landscape—indeed, as an inseparable part of the totality that is landscape. And these patterns, in turn, act on and react upon over against each other as well acting on the water which is an interactive currency of such interactions.

Bouma-Gregson circles around for clarification in a manner that would be sufficiently succinct, he says, for a professor: The ecology of the Eel River is “the flow of energy, the cycling of nutrients, and the flow of matter [...] from the watershed, through the forest, into the channels and out to the ocean.”⁶⁶⁶ First, note again that this response is not the same as responding that ecology is the study of or the scientific study of the flow of energy, the cycling of nutrients, etc., nor is it the same as saying that ecology is the study of or the scientific study of *how* energy flows, *how* nutrients cycle, etc. The flow of energy, the cycling of nutrients, the flow of matter: These are modalities or categories of action and reaction and, thus, of interaction. As modalities of interaction, these are modalities or categories of mechanism that are the core of ecology—including, of course, the ecology of the Eel River. In the cases of energy, matter (general), and nutrients (specific category of matter), *to flow* and *to cycle* are categories of actions and opposite, simultaneous, and equal reactions to these actions. Yet *to flow* and *to cycle* are also reactions, direct or indirect, to previous actions and interactions.

When Bouma-Gregson speaks of the interactions of or the mechanisms of the patterns of the abundances and distributions of organisms that are on the landscape or that are part of the landscape—including the modalities of interaction of energy flow, nutrient cycling, and the flow of matter—he speaks of the *processes* that interactively generate such patterns as organismal distributions and organismal abundances. Bouma-Gregson, recall, researches “how [algae and cyanobacteria] impact the flow of energy and cycling of nutrients through aquatic ecosystems” with the goal of identifying “the processes, and relevant spatial and temporal scales, that control the community composition of algae and cyanobacteria, and when blooms may produce toxins.”⁶⁶⁷ *To process*, in other words, is to act on, to act upon over against (i.e. to react), and thus to interact. *To process* is *to interact*, and vice versa. A *process* is an action, a reaction, and thus an interaction. The patterns generated are reacting-reactions—which is identical to acting oppositely, simultaneously, equally, and scientifically-epistemologically indistinguishably upon over against—the processes which generate them, as well as other processes in the opposite spatiotemporal direction. Patterns, too, are processes of ecology and, thus, are processes of the Eel River’s ecology. Processes are, then, also mechanisms. Likewise, patterns are processes—i.e. patterns are interactive, or what is the same, processual.

Interactions between organisms, and thus between patterns and processes, can be “direct and indirect.”⁶⁶⁸ There can be, in other words, spatiotemporal chains of actions, reactions, and thus interactions. Likewise, interactions between organisms have different strengths, that is, different interaction strengths.⁶⁶⁹ Bouma-Gregson also speaks of fear and refugia as actors affecting organisms’ interactions and these interactions’ strengths.⁶⁷⁰ Fear and refugia “drive” organisms to, for example, “be consumed by something else.”⁶⁷¹ *To drive* is *to act on* or *to act upon over against (to react)*, and vice versa. *To drive* is *to interact*. An organism driven by fear—i.e. reacting to and thus interacting with fear—may be so driven that it is eaten by another organism. This would be a spatiotemporal chain of direct and indirect actions, reactions, and thus of interactions.

Once more, later in the interview, I asked Bouma-Gregson if it was possible to say what ecology is without intentional reference whatsoever to any particular place at some specific time. He responded, that, yes, it is: “I would sum it [ecology] up [as] interactions between organisms and their physical environment that drive the patterns of abundance and distribution of those organisms and then possibly, at times, also feedback...that can feedback into the shape of the physical environment as well.”⁶⁷² As before, this response is not the same as responding that ecology is a study or a scientific study, nor is it the same as saying that ecology is a study of or a scientific study of *how* interactions between organisms and their physical environment drive the patterns of abundance and distribution, etc. Bouma-Gregson understands that patterns are active, reactive, and thus interactive mechanisms as well as, what is the same, acting-actions, reacting-reactions, and thus interacting-interactions. Again, *to drive* is *to act on*, *to act upon over against* (*to react to*), thus is *to interact*. Patterns of the abundance and distribution of organisms feedback into the shape of the physical environment.

The interactions between organisms and their physical environment feeds back into the shape of the physical environment as well, and thus into the patterns of organisms on or as part of the landscape. *To feedback* is not spatiotemporally linear action and reaction, or interaction (*if* such linear action and reaction can coherently and consistently scientifically-epistemologically exist at all, absolutely).⁶⁷³ *To feedback* is spatiotemporally *circular*—*not* spatiotemporally *spiral*, whether through one spacetime or multiple discrete spacetimes, as spatiotemporal spiraling through either would preclude feedback interaction entirely—and, thus, spatiotemporally circular activity in its absolute or relative spatiotemporal specificity (again, *if* either of these spatiotemporal specificities can coherently and consistently scientifically-epistemologically exist at all). *To feedback* is *act back upon*, or *to react to by acting back upon* a simultaneously contiguous actor or actors acting such that the actor’s or actors’ reaction to this action back upon them is to maintain or vary their acting on the actors and reactors that are spatiotemporally simultaneously contiguous in the feedback loop.⁶⁷⁴ One cannot say, however, with consistent scientific-epistemological accuracy or precision, or even with general scientific-epistemological explanatory coherency and consistency, that other actors and reactors of the loop are *further along*, or *earlier*, or *later* in the loop. *To feedback* is *to act* and *to react* and, thus, *to interact*, and vice versa spatiotemporally circularly, i.e. in a spatiotemporal circuit of a chain of actions, reactions, and thus interactions that each have, in both spatiotemporal directions, opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable forcefulness and, thereby, power.⁶⁷⁵ Typically a feedback loop’s chains of actions, reactions, and thus interactions have opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable forcefulness, and thus opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable power, or strength, in both spatiotemporal direction, hence feedback control or feedback regulation. A reaction to feedback interactions with opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable force and, thus, an opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable power (or strength) is control. Likewise, a reaction to feedback interactions with an opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable force and, thus, an opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable power (or strength) is regulation. The only possible epistemological metaphysical and, thereof, scientific-epistemological method of epistemologically-metaphysically experiencing and, thereby, determining the spatiotemporal directionality of any feedback looping interaction would be to validly scientifically-

epistemologically identify and validly scientifically-epistemologically validate the *āctus prīmus* and—opposite, simultaneous, equal, and epistemologically-metaphysically *identical*— *āctus suī* of the interaction *as well as* its interactive spatiotemporality, regardless of whether space and time are (classically) existentially *absolutely passive* (not to be confused with *inertial* passivity) or (relativistically) spacetime is existentially *absolutely active*.⁶⁷⁶

To feedback regulate is, with opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable force and thus power (or strength), to act on in reaction to that which the actor acts on. *To be feedback regulated* is to react to, with opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable force and thus opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable power (or strength, or effectivity) by acting on that which a reactor reacts to. Likewise, *to feedback control* is the same as *to feedback regulate* and *to be feedback controlled* is the same as *to be feedback regulated*. To feedback control and to feedback regulate are spatiotemporally *circular*—necessarily within *this* or *that* specific discrete spacetime—*modalities* of action, reaction, and thus interaction. This circularity within a single, specific and *discrete* spacetime presents scientific-epistemological problems yet to be solved. One may ask whether such a circular interaction chain with opposite, equal, simultaneous, and scientifically-epistemologically causally indistinguishable spatiotemporal forcefulness and, thus, power (or strength, or effectivity) also feeds back into its own feedback looping or another feedback loop in its simultaneous spatiotemporally specific and spatiotemporally discrete context. One can begin to sense that the dynamism of feedback interaction may only be dynamic at all within *its* specific discrete or absolutely specific discrete spatiotemporality. Existentially beyond *this* or *that* specific discrete spacetime, whether absolute or not, this circular, active-reactive and, thus interactive (or processual) dynamism is perfectly and without exception static and unchanging, including spatiotemporally.

Later in the interview, I asked Bouma-Gregson what a river was. He replied that “it’s a collection, it’s...the accumulation of water that’s flowing downhill due to the pull of gravity.”⁶⁷⁷ I recall that *to flow* is *to act* and *to react* and, thus, *to interact*. Gravity, one of the four fundamental interactions of the scientific-epistemological universe, “gives [water] its energy and power to move things,” such as “carrying sediment and other objects.”⁶⁷⁸ Moving sediment and other objects, or carrying sediment and other objects, is an interaction. A process, recall, is an interaction. Moving sediment and other objects, the river is “conducting erosion.”⁶⁷⁹ Erosion is a process. The river conducts this process; in other words, the accumulation of water that’s flowing downhill due to the pull of gravity conducts the process that is erosion. Erosion is actions and reactions and, thus, an interaction of interactions conducted by the flow of water. In a sense, then, the total process of erosion is a reaction to the flow of water that is the river. This flow of water is the moving or motion (“flow”) of water. This moving or motion is activity, reactivity, and thus interactivity *enacted by* gravity (“due to”). This moving or motion, which is activity, is activity with a sufficient force and thus a sufficient power, or strength, to determine the activity not only of the sediments and other objects of erosion, but of each molecule of water, or each H₂O. Likewise, this flow of matter, or H₂O as well as sediments and other objects, is also, as flow, activated energy or energy moving, or energy acting, reacting, interacting. Classically this is kinetic energy. H₂O, in turn, is a molecule that is chemically bonded. I shall not pursue what scientific-epistemological chemical bonding is here. It sufficient to write that water, or H₂O, scientifically-epistemologically exists *at all*, absolutely, only insofar as it is the reacting-reaction to and is actively determined by the forces and thus, spatiotemporally, the

active power (or strength, or effectivity) of the actions and reactions of, and thus the interactions between two or more electrons and two or more protons. And so on. One may continue to the interactions of fundamental particles, and to the activity and interactivity of the four fundamental interactions *of* and that—simultaneously, equally, and scientifically-epistemologically indistinguishably—*are* the scientific-epistemological universe. One may continue to the excitation activity and interactivity of quantum fields, etc. Minimally, each of these latter actions, reactions, and thus interactions of quantum fields are originative, creative, productive, constitutive, principle, primordial, fundamental, essential, processual, emergent, supervening, and ending. Originative, creative, productive, constitutive, principle, primordial, fundamental, essential, processual, emergent, supervening, and ending are not necessarily the same, much less identical. Each of these, however, is a different and—in several but not all cases of mutual comparison (e.g. a comparison of what to be creative or productive is)—perhaps even a mutually exclusive modality of act, react, and interact; that is, of action, reaction, and interaction.

The downhill flow, or motion, of water of which Bouma-Gregson speaks is a reacting-reaction to the activity of the force that is gravity. Regarding water's motion, i.e. water's reaction to the interactive force that is gravity, Bouma-Gregson later clarifies: "if gravity wasn't at play and you just had a bunch of water, then it doesn't [...] then it wouldn't have that energy. It wouldn't have that force in it."⁶⁸⁰ He further explains that "it's that gravity, [the] pull from gravity [that] gives it [i.e. water] energy and power to move things." Bouma-Gregson understands gravity to be force and, as force, necessarily acting, i.e. forcing: "its gravity, [the] pull from gravity." Classically, push and pull are modalities of force acting. Force is force insofar as it acts forcefully, i.e. insofar as force forces. Bouma-Gregson understands, scientifically-epistemologically correctly, it seems, that, in classical mechanics, at least, both energy and power not only exist, but are what they are only insofar as they either are (i) ultimately force forcing interactively (i.e. force acting, i.e. force forcing and thus force working in a system of at least two bodies) or are (ii) interacting with force, whether potentially or kinetically, or whether derivatively or otherwise.

According to the second law of classical mechanics, i.e. the second law of motion, force *equals* the rate of change of the momentum of a body, or—as momentum is the product of the inertial mass and velocity of a body, and the instantaneous rate of change of velocity is acceleration—force *equals* the inertial mass of a body times the body's acceleration.⁶⁸¹ Newton wrote that "[t]he alteration of motion is ever proportional to the motive force impressed; and is made in the direction of the right line in which that force is impressed."⁶⁸² *To be equal to* or *to be proportional to* is not the same as *to be the same as*. *To be equal to* or *to be proportional to* is not the same as *to be identical to*. The understanding that any force (i.e. that what force is) either is the same as or is identical to the product of a body's inertial mass and its acceleration is, at least, scientifically-epistemologically incorrect: a scientific-epistemological force is only and strictly *equal to* or *proportionate to* this product. One may wonder, then, whether the pull of gravity, as Bouma-Gregson says, or rather whether the force of gravity, i.e. the force *that is* gravity, "gives water energy and power to move things." For this force, gravity, is equal to the product of the inertial mass and acceleration of body, but is not this body. What about water's opposite, simultaneous, equal, and scientifically-epistemologically causally indistinguishable reaction to gravity? Water's reaction, that is, water's motion is not *later* or *elsewhere* to gravity's action upon it. Water's reaction is not a *reaction* at all, but an opposite, simultaneous, equal, and scientifically-epistemologically causally indistinguishable action upon...upon what? In other words, to what does water react: the *action* of the force that is gravity, the *interaction* of

the force that is gravity, the *force* that is gravity, the *product* of a body's inertial mass and acceleration, a *body* that is accelerating, or the *action* of the Earth (or the Earth's center of mass, perhaps) upon the bodies of water (H₂O) of the river? The product of a molecule of H₂O's inertial mass and acceleration, too, is equal to a force that is neither the same as nor identical to this body's inertial mass, this body's acceleration, the product of this body's inertial mass and acceleration, and so on. What Bouma-Gregson seems to understand, ultimately and broadly, is that without the interactivity of at least one actor *A* and another opposite, simultaneous, equal, and scientifically-epistemologically causally indistinguishable actor *B*, as the system of interaction between these two bodies, water not only would not move, but would not have the energy or power to move anything or anyone else. Whether or not he understands gravity to exist outside of a system of interaction between at least two bodies, or if there is anything or anyone outside of such a system at all, he does not say.

Bouma-Gregson says that without gravity, that is, without the force that is gravity, or what is the same, without the interaction that is gravity, water would not have the energy or the power to move other bodies. Scientifically-epistemologically, power is often understood to be one or the other of the following: (i) power is the rate of work of a force with respect to time or the rate of energy transfer by work from one body to another with respect to time; or (ii) power is the quantitative value resulting from, i.e. the quantitative value that is the reaction to the activity of calculating the rate of work with respect to time or the rate of energy transfer by work between two bodies with respect to time.⁶⁸³ Scientifically-epistemologically, work is often understood to be either (i) the product of a force on a body and the displacement of this body in the direction of the force, or (ii) the quantitative value that is the result of, or what is the same, that is the reaction to the activity of calculating the product of a force on a body and the displacement of this body in the direction of the force. In other words, scientifically-epistemologically, a body's power is either (i) how much work a body does over time or (ii) a derived, quantitative value of work with respect to time. In light of these understandings of power and work, one may ask whether it is either (a) a body acting oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably to or (b) the force which is proportionate to but not the same as this body's inertial mass multiplied by its acceleration and which acts oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably from (i) a molecule of H₂O or (b) the force equal to this molecule of H₂O's inertial mass multiplied by its acceleration that gives *water* its respective force ("force in it [water]") and, thereby, water's respective energy ("have that energy") and power to move things.

The scientific-epistemological answer is that it is the *force* equal to the product of one body's inertial mass and acceleration—not the body—that works on another rigid body.⁶⁸⁴ In a two body system, for the force proportionate to the product of one body *B*'s inertial mass and acceleration to work on another body *A*—insofar this force will work on *A* at all—this force must *first* act, or force, over the distance between *B* and *A*. Yet, insofar as a force is to exist at all, it must exist oppositely, simultaneously, and equally to another, and vice versa. Both forces, in other words, must act oppositely, simultaneously, and equally over a distance *first* if they are to force the opposite body in a two-body system and thus both forces must act oppositely, simultaneously, and equally over a distance *first* before the respective opposite body of each is forced at all. This scientific-epistemological problem of simultaneity over a distance is solved, scientists-epistemologists understand, by Einstein's general relativity. Technically, spacetime is not a force nor does spacetime act over a distance. Spacetime *does* act, but it acts locally (or so the theory of general relativity explains). Bouma-Gregson, however, speaks of gravity, pull,

force, power, and energy. Bouma-Gregson is *not* speaking of the interaction of spacetime actively determining how matter moves and matter actively determining how and where-when spacetime curves. To avoid confusion, it is important to recall, too, that “[w]hen two or more forces act on a [rigid] object, the net work done on the object is the sum of the works done by the individual forces.”⁶⁸⁵ Likewise, if one brings to mind the third law of motion, it helps to remember that “a single force that has the magnitude and direction of the net force has the same effect on the body as all the individual forces together.”⁶⁸⁶ Let us avoid, arbitrarily but for simplicity, speaking of cause and effect. In other words, then, the opposite, simultaneous, equal, and scientifically-epistemologically causally indistinguishable *reaction* of the body upon which a single force acts—a single force with the same magnitude and direction as the net force (or resultant force) acting on this body—is the same, quantitatively and qualitatively, as the reaction of this body to the action of the net force (or resultant force). A body *B*’s reaction to a superposition of forces vectorially summed into a net force acting on *B* is equal to and, insofar as it is simultaneous, scientifically-epistemologically causally indistinguishable from, a single force with the same magnitude and direction acting on the *B*.⁶⁸⁷

When I sought clarification, asking Bouma-Gregson what energy is, he noted that “[e]nergy and mass are, you know, Einstein showed us that energy and mass are effectively the same thing.”⁶⁸⁸ Again, I disagree that, scientifically-epistemologically or otherwise, *to be equal to* or *to be proportionate to* is the same as *to be the same as* or *to be identical to*. One might attend closely to Bouma-Gregson’s qualification: *effectively*. What is to be *effective*? To be effective is to achieve an effect. To achieve an effect, or outcome, is to effect. An outcome or effect is a reaction to the activity of making something, whether this activity is shared among actors or of a single actor. To effect is, and thus speaks of, *efficiō* (*efficere*) bringing out into existing (*ex-*) by means of making, fashioning, constructing, composing, etc. (*-faciō*).⁶⁸⁹ What are the activities of, and what are the one or more actors that, singly or jointly, effect the equality or proportionality of energy and mass times the speed of light squared? What force or forces work on what bodies such that energy is equal to the product of a body’s inertial mass and the speed of light squared? And recall that the bodies’ whose respective inertial masses multiplied by their respective accelerations that are equal to the forces that give water its power and energy—these bodies are accelerating *within* an inertial frame of reference. That is, they are accelerating within a frame of reference which is *itself* not accelerating. Energy, then, is equal to the product of the inertial mass of a body and the speed of light squared within any and every inertial reference frame. Energy increases by a constant net force acting on the mass and thereby increasing its speed in some direction and, thus, its momentum. Momentum is the product of mass and velocity. As the speed of a mass in some direction approaches the speed of light, the constant force adds increasing proportions of mass to the body and decreasing proportions of speed in some direction. As this constant force continues to act on the mass, the mass’s speed in some direction ceases to increase at the speed of light. This mass’s mass, however, continues to gain mass, or increase, and can increase indefinitely. Thus, in an inertial frame of reference, the interaction between the constant force (which is equal to the product of the inertial mass of some body and this mass’s acceleration) working on the mass of another body that moves with some velocity approaching but not greater than the speed of light transfers more and more energy to this mass, or $E = mc^2$. Note that, as Bouma-Gregson says, the mass *has* energy, but is not energy. The constant force acting transfers energy to the mass proportionately to the product of mass and the speed of light squared where, as the mass’s speed in some direction approaches the speed of light, this mass increases as its acceleration decreases. In any of inertial reference

frame, likewise, the total mechanical energy of the two-body system is also equal to sum of the negative work done on the inertial masses at their current position, state, or shape in a (force) field (i.e. in a system of two or more bodies with accelerating velocities), or potential energy, and the kinetic energy of these masses' motions.⁶⁹⁰ In both non-relativistic classical and relativistic classical systems, the systems are systems of the *interactivity* between two or more bodies and the forces that are, respectively, proportionate to the product a corresponding body's inertial mass and this mass's acceleration. Regardless of what scientific-epistemological energy is, it scientifically-epistemologically cannot exist at all, whatsoever, much less be transferred and transformed without interactivity, including the self-interactivity of an activity-field at zero-point energy, for example.⁶⁹¹

Water, Bouma-Gregson says, acted on by gravity has energy. One can plausibly infer that Bouma-Gregson has kinetic energy in mind. Water acted on by gravity has kinetic energy. That water *has* energy (whether potential or kinetic, for example) is not the same as water *being* energy (whether potential or kinetic). That water acted on by gravity has energy is water's reaction to the action of gravity. Yet water having energy is oppositely, simultaneously, equally, and scientifically-epistemologically indistinguishably also water-having-energy's action on the interaction that is gravity. As with energy, water acted on by gravity has force. Here Bouma-Gregson is slightly more specific: Water acted on by gravity has force *in it*. That water *has force in it* is not the same as water *being* force, nor can one assume that it is the same as as water actively or reactively, and thus interactively, *forcing*. Yet water having force is oppositely, simultaneously, equally, and scientifically-epistemologically indistinguishably also water-having-force's action on the interaction that is gravity.

What, then, is the difference between the energy the water has and the force the water has when water—acted on by gravity and oppositely, simultaneously, equally, and scientifically-epistemologically indistinguishably acting on gravity—reacts by actively moving, or flowing (actively moving *downhill*, i.e. always towards a still lower elevation of the surface of the earth than its present [classical] spatiotemporal position)? For now it is sufficient to understand that energy and force may not be scientifically-epistemologically distinguishable and, thus, that these two might be scientifically-epistemologically the same or even scientifically-epistemologically identical. The absurdity of such a statement slowly loses its degrees of absurdity as one follows carefully what energy and force are scientifically-epistemologically understand to be. Bouma-Gregson understands that water acted on by the interaction that is gravity has, in reaction to gravity's action, energy and force (if these are distinguishable). Yet if water's reaction to gravity is water's activation into active motion, i.e. to have kinetic energy, then would gravity likewise be activated into active motion, i.e. have kinetic energy, as an opposite, simultaneous, and equal reaction to the action of water, regardless of any difference in strength between the two (i.e. of power, of effectivity)? Likewise, if water's reaction to gravity is to have force, then would gravity—as its opposite, simultaneous, and equal reaction to water's action upon it—have force?

Bouma-Gregson says that a river is “a collection, it's...the accumulation of water that's flowing downhill due to the pull of gravity...if gravity wasn't at play and you just had a bunch of water, then it doesn't [...] then it wouldn't have that energy. It wouldn't have that force in it.” Yet what of the *downhill*? What of the earthen ground, regardless of its inclination or lack thereof? One can imagine a water accumulated, like a puddle, in a concave upon an otherwise flat ground. Gravity, as Bouma-Gregson describes, is surely scientifically-epistemologically at play here, too, yet the liquid water will not flow downhill, if it flows anywhere at all. One could ask more carefully about the *flow* of water. Water flows, Bouma-Gregson seems to suggest, as a

reaction to the play of gravity, i.e. to either the force that is gravity or, distinctly, perhaps, the interacting activity that is gravity. Water likewise *has* energy as a reaction to gravity. One might ask: since water has energy, and water flows downhill due to the interacting activity of gravity or, distinctly, due to the force of gravity, due gravity also act on the energy that water has such that the *energy's* reaction to gravity is energy's conversion from potential to kinetic, from actively motionless to actively mobilized into active motion? And perhaps one could ask the same of the force that water has in it as a reaction to the interacting activity of gravity or, distinctly, the force of gravity.

Recall what my questions for Bouma-Gregson were: What is ecology? What is the ecology of the Eel River? Can you say what ecology is without any intentional reference to a specific spatiotemporality, that is, to a specific place at a specific time? What is a river? It seems that, as Bouma-Gregson understands, all of these scientifically-epistemologically exist at all only insofar as each one is, respectively, a distinct and different modality of action, reaction, and thus interaction; that is, of activity, reactivity, and thus interactivity.

5.4 Philip Georgakakos

Philip Georgakakos is a post-doctoral community ecologist in Professor Theodore Grantham's laboratory group at the University of California, Berkeley.⁶⁹² He focuses on "how environmental conditions influence species distributions and organismal interactions, with an emphasis on freshwater and anadromous fishes."⁶⁹³ Since 2013, Georgakakos has researched "threats to native aquatic biodiversity in the Eel River" in northern California.⁶⁹⁴ He received his doctorate in the fall of 2020 from the Department of Integrative Biology at the University of California, Berkeley, where he was in the laboratory group of his advisor, Professor Mary E. Power.⁶⁹⁵

In his doctoral dissertation, Georgakakos explains that, "[a]s organisms undergo life history transitions, track resources, avoid stress, and evade death, they distribute themselves across landscapes."⁶⁹⁶ Organisms co-occur across the landscape. So, too, then, do their distributions. "Organismal co-occurrence," Georgakakos writes, "sets the stage for biotic interactions, which can feed back to control the distribution and abundance of interacting species in ecological communities."⁶⁹⁷ Biotic interactions can be biotic feedback interactions. In other words, biotic feedback interactions are a modality of biotic interactions. As a modality of biotic interactions, biotic feedback interactions are, for example, those biotic interactions whose very interacting works with a prevailing strength, or power, upon the distribution and abundance of interacting species in ecological communities such that the distribution and abundance of one or another species is each a reaction to (as actively controlled by) this biotic feedback interaction. Feedback interactions can control the distribution and abundance of interacting species and, thus, feedback interactions can control to some significant degree ecological communities. Insofar as the distribution and abundance of interacting species are controlled by feedback interactions, the distribution *itself* of species and abundance *itself* of species are *also* feedback interactions in the loop of feeding back interactions, as are the intra-acting and interacting species *of* the distributions and abundances of species. As already discussed, a feedback loop's chains of actions, reactions, and thus interactions has a determining forcefulness, and thus a determining power, or strength, in one spatiotemporal direction, hence feedback control or feedback regulation. A reaction to feedback interactions with a determining force and, thus, a determining power (or strength), or, in other words, a reaction to the interactive control of such feedback

prevaillingly strong feedback interactions is the distributions and abundances of interacting species. *To feedback control* is the same as *to feedback regulate* and *to be feedback controlled* is the same as *to be feedback regulated*. *To feedback control* and *to feedback regulate* are spatiotemporally *circular*—necessarily *within this* or *that* specific *discrete* spacetime—*modalities* of action, reaction, and thus interaction. As already noted, this circularity within a single, specific and discrete spacetime presents scientific-epistemological problems yet to be solved.

Georgakakos explains that, while “competition and bottom-up forces have been thought to be the most important drivers of community structure, examples of predation, parasitism, mutualism, and facilitation highlight the ubiquity and importance of these other interactions.”⁶⁹⁸ Georgakakos understands competition to be a driver. To compete is to drive. Georgakakos also understands that competition is a modality of interaction, as are predation, parasitism, mutualism, and facilitation. If competition is a driver, then predation, parasitism, mutualism, and facilitation are likewise drivers. Georgakakos understands competition, predation, parasitism, mutualism, and facilitation to each be a particular modality of interaction. As a modality of interaction, each of these is a modality of driving. An interaction is a driver; to interact is to drive.

For each of the modalities of interaction Georgakakos mentions, if the interaction is a driver, then the actor and the reactor are each drivers, for these are the interactors of the interaction (a case of mutualism, for example, or of facilitation, as another example). If an actor is a driver, then the actor’s action is, likewise, a driver. If a reactor is a driver, then the reactor’s reaction is a driver. At least for the actions and reactions, or interactions, that Georgakakos mentions, to act is to drive. Likewise, to react is to drive. Thus, the actor’s action and the reactor’s reaction, if distinguishable from the interaction, are also both drivers. And, as Georgakakos writes, the interactivity, or interaction, of the actor and the reactor is a driver of ecological community structure.

What is to drive? To drive is to mobilize someone or something directionally; to drive is to put someone or something into motion directionally; to drive is to make someone or something move directionally; to drive is act on someone or something such that they move directionally. Each of these speaks of a nuance of degree of what to drive is. For each of these, as for other such cases of nuance, to drive is to force someone or something to move directionally. To drive is *forceful*—regardless of whether mobilizing, putting into motion, making move, or otherwise acting on such that the reaction is active directional movement. This force may be equal to the product of the inertial mass of the body driven and its acceleration, but it need not be so, nor need this force be limited to or exhausted by either being or answering functionally to this equality. The force enacted by the driver as a means to make oneself or another move, or to put oneself or another into motion, during the spatiotemporal worldline of the driving, nihilates other possibilities of both motion and rest, whether these are possibilities of active-passive motion and its correspondingly existentially relative rest; or possibilities of practical motion and truthful, essential rest including, perhaps, but not exhausted by existential rest or existentially relative rest; or possibilities of both; or other types of possibilities.

Insofar as a human-being-existing drives herself, she directionally forces herself to move toward, into, and upon possibilities without choosing, first, to come to a practical rest necessary and adequate to sense, understand, feel, consider, and choose among all the possibilities given to her, some of which may not be sensible at all *unless* she first chooses to allow herself to come to a practical rest and, thus, to essentially rest. More generally, if one drives *another*, one forces the other toward and into possibilities *regardless* of whether or not the other—if this other is a

being-existing that has the faculty and capacity to sense, understand, attend to, to consider, and choose among such possibilities—would have chosen to move towards and into the possibility into which this other is driven. The driver is the one that mobilizes, or that makes move, or that puts into motion directionally.

Interactions such as competition, predation, parasitism, mutualism, and facilitation are drivers; these interactions drive the reactions to them *as well as* those that are the reactors. An interaction, then, can be a driver. But is a driver an interaction? Is to drive to interact? I noted that a human-being-existing in the world, if not driven by a driver (including, possibly, herself actively driving herself without sufficient practical rest to respond to, or perhaps even to sense and understand, the possibilities given to her) could *otherwise* choose among other possibilities than those towards which and upon she is driven, or even drives herself. Differently, one can drive a car. The car is driven, but the car does not sense, understand, attend to, consider, and choose among possibilities. If, for example, a driver drives a car in a perfectly straight line at a constant speed the driver makes the car move at a constant velocity. If the driver drives a car at a changing speed in a straight line, or at a constant speed in a constantly changing direction, the driver not only puts the car into motion, or makes the car move, but makes the car accelerate, for example. To drive a car, then, is an interaction between the action of the driver and the reaction of the car; or, what is the same, to drive a car is an interaction between the reaction of the driver and the action of the car. Yet the car does not move, and cannot move, unless it is driven by a driver. This is often the case for the interaction between the driving-actor and the driven-reactor, but not nearly exhaustive of all cases. A human-being-existing in the world can drive herself to posit goals and achieve these goals, for example; a human-being-existing in the world can even drive himself with ruthlessness or to exhaustion. This, too, however, would be an interaction within himself between the driving and thus prevailing (self-) expectations, fears, intentions, will, desire, goals, and means to achieve such goals and the driven. For both the person driving herself and the person driving a car, to drive is an interaction. Any and every time there is a driver and a driven, this driving and being driving *is* interactivity. To drive, then, is to spatiotemporally directionally interact. A driver is a spatiotemporally directional interaction.

Georgakakos understands at least some interactions to be drivers, at least some interactors to be drivers, and *to interact* to be at least sometimes *to drive*, as in the cases of competition, predation, parasitism, mutualism, and facilitation, for example. As noted above, the interactors, then, are *also* drivers. The driver of the car, for example, is an actor and the car is a reactor. Both the driver and the car are interactors. The driver interacts with the car, and vice versa. Strangely, then, scientifically-epistemologically the car is *also* a driver—an opposite, simultaneous, equal, and scientifically-epistemologically causally indistinguishable driver of the actor. Commonsensically, including scientifically epistemologically in this case, the enactor of the interaction is understood to be the driver, or actor, that drives the car and not the car, or reactor, that drives the driver. In any case, to drive is necessarily an interaction of actors and reactors, of drivers and the driven. To interact, then, is at least sometime to drive. To drive, however, is always to interact directionally. A drive is always a directional interaction.

Above I wrote that to drive is always forceful; in other words, to drive is always to force—though not necessarily or exhaustively in the sense of $F = ma$ (or $F = m dv/dt$). Scientifically-epistemologically, a force is equal to the product of a body's inertial mass and this mass's acceleration. Scientifically-epistemologically, at least, if not more generally, a force is a force at all only insofar as it is *directional*. A force forces, or acts, directionally. A force that does not force is not a force at all; a force that does not act is not a force at all. Scientifically-

epistemologically, a force that does not force directionally is not a force at all. *Bottom-up* is the direction of at least some of the forces of which Georgakakos writes. As he says, a force is a driver. To force is to drive. To drive is to interact directionally. If to force is to drive, and a force is a driver, then to force is to interact directionally, and a force is a directional interaction. Competition, predation, parasitism, mutualism, and facilitation are modalities of directional interaction. If to drive is to interact directionally, and likewise to interact is to drive, then all interactions, insofar as they are interactions at all, have direction. If to force is to drive, and to drive is to interact, and all interactions have direction, then a force is a modality of interaction, and to force is modality of interacting. Whether or not competition, predation, parasitism, mutualism, and facilitation are not only modalities of interaction, but more specifically, modalities of force, is an essential question.

Georgakakos' dissertation is comprised of three case studies undertaken on the Eel River investigating how “anthropogenic impacts, especially species introductions and climate warming, have resulted in novel species assemblages, with altered webs of interactions compared to historic conditions.” Together, he writes, “these case studies emphasize the need to consider ecological interactions, and in general, community ecology thinking, as we try to restore and manage ecosystems.”⁶⁹⁹ What is to impact? To impact is to strike against or into, to impinge upon, to drive against or into. To impact, in each of these cases of sensory nuance, is to force upon or to force into. To impact is a modality of forcing. An impact is a force working on another being-existing. As a modality of forcing, to impact is a modality of interacting. Species introductions and climate change are impacts. Species introductions and climate change are modalities of *forcing*; they are each a modality of *driving*. As such, they are modalities of interaction. These interactions act forcefully upon species assemblages and community ecological webs of interactions, such as food webs. As Georgakakos understands, the drivers, or the forcers forcing, are anthropogenic—i.e. they are human-beings-existing in the world.

I interviewed Georgakakos in March of 2020. I asked him what ecology is. Ecology, he responded, is a definition.⁷⁰⁰ A definition, as the result of the action of defining, is the reaction to this action of defining. In other words, as a reaction, the definition actively results from the action of defining. Ecology is a definition, or ecology is the diachronic action of defining the meaning of the actor(s) or agent(s) who, individually or collectively, then assign their definition to the term “ecology” in order to utilize this term as a means to effectively communicate this definition of their meaning to others. Georgakakos understands ecology to be “ecology,” which is the vehicle that carries his meaning as he defines it. He defines his meaning for “ecology” as follows: “the study of how organisms are distributed.”⁷⁰¹ Note that Georgakakos's definition of his meaning is not the same as other possibilities of the meanings he could define and apply to “ecology,” such as: “the distribution of organisms,” “the study of the distributions of organisms,” “the study of what the distributions of organisms are,” “the study of why the distribution of organisms are, and why they are as they are,” etc. From above, one can recall that the distributions of organisms are a reaction to biotic interactions feeding back interactively to control the distribution and abundance of organisms. These feedback interactions, recall, are themselves reactions to the activity of organismal co-occurrence. Organismal co-occurrence entails both a distribution of at least two organisms and an abundance of at least two organisms occurring together in one or more specific places at one or more particular times. And this brings us back to how Georgakakos defines his meaning for the term “ecology.” Insofar as Georgakakos means “the study of how organisms are distributed,” then, according to what he has written, as quoted above, he simultaneously defines his meaning of “ecology” as “the study of

how one or more interactive feedback control loop of actions and—oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably— reactions controls organismal distributions.”

I also asked him what the ecology of the Eel River is. “I would say,” he responded, “that the ecology of the Eel River is...I mean, the river itself is dominated by a very seasonal hydrograph and that hydrograph and the other physical conditions really drive the distribution and phenologies of the animals that occur in the river.”⁷⁰² The river is dominated by a seasonal hydrograph. In other words, a seasonally-specific hydrograph of the Eel River corresponding to one or more measurement points in the river diagrammatically represents an overarching reaction composed by innumerable sub-reactions to seasonally-specific events that dominate the river, such as quantity and rate of precipitation, quantity and rate of evaporation, quantity of atmospheric heat, wind velocity, and so on. Each of these examples is a *driver*. As a driver, each of these dominates the river itself. To dominate is to drive. Someone or something that dominates another drives this other. To dominate, then, is a modality of forcing. As a modality of forcing, to dominate is a modality of interaction. A physical condition, such as any one of those mentioned above, is a dominator and, thus, a driver. These physical conditions are forces acting on the river; they are forces forcing the river. Each individually is a modality of force and their total action on the river is, likewise, a modality of force distinct from each individual modality of force acting alone. As such, each of these physical conditions is a modality of interaction.

Yet it is not only the river itself that is dominated by these seasonally-specific physical forces; in other words, it is not only the river itself that is dominated by these seasonally-specific actions. These actions also drive the distribution and phenologies of the animals that occur in the river. Insofar as these actions drive the distribution of animals in the river, they drive the animals themselves, whether considered individually and collectively. Yet these physical conditions, or physical actions, *also* drive the phenologies of the animals in the river. A phenology of an animal is the various distinguishable life-cycle stages of an animal, including biological conception, birth, growth, maturation, breeding, reproducing, perhaps caring for offspring, and biological death. Such physical conditions, or actions, as those mentioned above *drive* the very coming to exist, existing, and ceasing to exist of each and every animal that occurs in the river. In other words, each and every animal that occurs in the Eel River—its coming to exist, its existing, and its ceasing to exist—is a reaction, or a chain of reactions, to such physical conditions. These physical conditions are forces forcing, and as such, they are modalities of interaction. The animals that occur in the Eel River—their very existence, the possibility of their coming to exist, their birth into existing, and their death—are reactions to forces forcing. These forces forcing are, again, modalities of interaction.

All such physical forces whose action on biological organisms is arguably independent of these biological organisms—such as precipitation, heat, light, wind, sub-surface rock composition, and so on—Georgakakos also understands to be *factors*: “density independent factors,” for example.⁷⁰³ Recall that such physical conditions *dominate* and, as dominators, *drive* the river itself, as well as the animals that occur in it. These physical conditions are physical factors. These physical factors are physical drivers; these physical factors, then, are physical forces. A physical *factor* is a *force forcing*; a physical factor is of a modality of force forcing. *To factor is to force*. A physical *factor*, as a force forcing, is a modality of interaction. *To factor* is a modality of interacting. Accordingly, physical factors “impact” that upon which they act, such as impacting Pikeminnow in a manner that determines when Pikeminnow migrate

upstream.⁷⁰⁴ This determination of *when* as well as the migration itself are reactions to these physical factors' impact on Pikeminnow. In any given case, whether or not an impact is a factor or a factor is an impact, both an impact and a factor are drivers, and as drivers, each is a force forcing. *To impact* is a modality of force forcing. As a modality of forcing, *to impact* is a modality of interaction.

A short time later, after explaining some of the details of how physical factors and biological organisms interact, Georgakakos returns to the question directly: "the ecology [of the Eel River], which I would define as, you know...I would say, the distribution of organisms within the river and how they interact with each other and their environment."⁷⁰⁵ Similarly to "ecology," Georgakakos understands the ecology of the Eel River to be "the ecology of the Eel River," a rule-ordered sequence of terms to which, together as a multi-termed vehicle of meaning, he assigns his meaning as he has defined it. Unlike his meaning for "ecology," however, when Georgakakos defines his meaning for "the ecology of the Eel River" it is not "the study of how the organisms of the Eel River are distributed." Instead, his meaning for "the ecology of the Eel River" is "the distribution of organisms within the river and how they interact with each other and their environment." When Georgakakos defines his meaning for "the ecology of the Eel River," he does not include "the study of" or "the study of how;" he means, simply, "the distribution of organisms" and "how they interact."

As I did with Bouma-Gregson, I asked Georgakakos whether the Eel River has energy or is energy. "So I think that it's probably important to start with a definition of energy, okay." Georgakakos understands energy to be "energy." In other words, energy is the diachronic action of one or more actors or agents defining their meaning, individually or collectively, and then assigning their definition of their meaning to the term "energy" in order to utilize this term, including but not limited to utilizing it as a means to effectively communicate this definition of their meaning to others. Georgakakos continues:

And I guess we can talk about it [i.e. "energy"] in two different ways. There's...your classic physics definition of energy, which is like, if I remember correctly, it's like a potential to do work. But there's also a more colloquial kind of use of energy that refers to maybe like a spiritual energy or like an affinity for certain places. So I think that in the more colloquial spiritual definition, rivers certainly have this charismatic, I mean, they're charismatic, there's movement. And...that [the movement] might be a result of...so there's...the water in the river has potential energy, right. So it starts at higher elevation, and then moves downstream, down elevation, because of gravity acting on it. So I would say in that respect, it does have energy.⁷⁰⁶

Notably, Georgakakos defines his and others' meanings for "energy" into two sub-meanings and these two meanings' respective definitions. The second definition, as a colloquial definition, is a broader collective reaction to, or more commonsensically, a generalizable result of a collective of diachronic actions of people defining their meanings for "energy" as spiritual energy. Colloquially, "energy" is spiritual energy, and spiritual energy is "spiritual energy." Again, as the reaction, or result of, the collective of diachronic actions of people defining their meanings, which they then assign to "spiritual energy," requires that they again define their meanings for and assign these meanings to the terminological phrase "spiritual energy." The reaction of these collective defining actions is their meaning, which they assign to "spiritual energy": charismatic. Georgakakos understands that, colloquially, energy is "energy," and "energy" is spiritual energy,

and spiritual energy is “spiritual energy,” and “spiritual energy” is charisma, and charisma is “charisma.” Or, in other words, a river has “charisma” and is, therefore, “charismatic.” Colloquially, when people say or write “energy,” what they understand and, perhaps, know is not what charisma is, but rather how they have defined their meaning and assigned their definition of their meaning to “energy,” thereby defining what “energy” is. Likewise, when people speak or write of “spiritual energy,” they understand and, perhaps, know how they have defined their meaning and assigned their definition of their meaning to “spiritual energy,” thereby defining what “spiritual energy” is. And again, when people speak or write of “charisma” or of being “charismatic,” they understand and, perhaps, know how they have defined their meaning and assigned their definition of their meaning to, respectively, “charisma” and “charismatic,” thereby defining what “charisma” and being “charismatic” are. Yet, instead of telling me how people colloquially define their meaning for “charismatic” and then assign this meaning to the term “charismatic,” as this point Georgakakos tells me how he defines his own meaning and assigns this meaning to the term “charismatic”: “I mean, they’re charismatic, there’s movement.” It seems that Georgakakos’s meaning, his defining of his meaning, and his assigned of his definition of his meaning to “charismatic” is the same as the colloquial definition of “charismatic”: again, “*I mean, they’re charismatic*” [emphasis added]. What, then, does he mean when he says or writes “charisma?”

When Georgakakos says or writes “charisma,” he has defined his meaning and assigned it to “charisma” in order to communicate that “there’s movement.” So, when he says or writes “charisma,” he means for the term “charisma” to convey his meaning communicatively as he has defined and assigned it to “charisma,” which—as a result of, i.e. as reaction to his activity—means: “there’s movement.” Here, however, something striking occurs. Instead of providing me with one or another definition of his or others’ meaning for “movement,” he proceeds, without qualification, to speak of movement *as if* it were more than the reaction, or result, of his or anyone else’s meaning and his or anyone else’s activity of defining and assigning their meaning to the term “movement” in order to utilize this term to, for example, actively communicate this meaning to me.

To understand why I have written *as if* above, one must ask what Georgakakos understands movement to be. What does Georgakakos understand movement to be? He does not qualify *movement* as “movement is defined as” or “a definition of movement is,” etc. He says, simply: “there’s movement.” Now something else of note occurs. Recall that Georgakakos is still explaining to me how “spiritual energy” has been defined and, thus, how “charisma” has been defined. As he has defined it, the definition of “charisma” is something like *there’s movement*, where what *movement* is, is not merely or, perhaps, not at all the reaction to, i.e. the result of Georgakakos’s or others’ defining of their meaning and assigning this definition of their meaning to the term “movement.” So, to continue telling me how “charisma” is defined, he not needs to tell me what movement is. Only through so doing can he successfully communicate to me what he means when he or others utilize the term “charismatic,” and thus what he or others mean when they utilize the term “spiritual energy,” and thus what he or others mean when they utilize the term “energy.” Yet to tell me what movement is, Georgakakos turns back to the *physicists’* definition of “energy.” As he says, “[t]here’s...your classic physics definition.” In other words, people’s colloquially defined meaning for “energy,” and thus people’s colloquially defined meaning for “spiritual energy,” and thus again people’s colloquially defined meaning for “charismatic” are each respectively reactions to, or what is the same, the result of and interactively supervening on *physicists’* definition of their [i.e. *physicists’*] own meaning for the

term “energy.” What movement is, is the result of, i.e. is the reaction to the water in the river having potential energy: “And...that [the movement] might be a result of...so there’s...the water in the river has potential energy, right.” And does Georgakakos understand energy to be? Energy is “energy.” And “energy” is physicists meaning and how they define their meaning and assign their meaning to the term “energy” such that they can utilize this term to, for example, communicate their meaning. And physicists’ have defined their meaning for “energy” to be: “a potential to do work.”

Thus, what Georgakakos and the rest of us (the *colloquial*) understand and, perhaps, know movement to be is a reaction to, that is, a result of how physicists have actively defined their meaning and assigned their definition of their meaning to the term “energy.” Movement, too, then, is “movement.” In other words, movement is a definition assigned to “movement.” And if our definition of our meaning and assignment of this meaning to “movement” is a reaction to, i.e. a result of how physicists have defined “energy,” then our definition of our meaning for “movement” is a reaction to, i.e. a result of the physicists’ defining of their meaning and assignment of their definition of their meaning to the term “movement.” Georgakakos, however, does not tell me how physicists define “movement.” Instead, he explains *why* “there’s movement” (quotation marks indicating my quotation of Georgakakos) and *how* “[the movement] might be a result of” (quotation marks indicating my quotation of Georgakakos) “energy” (quotation marks indicating that the term “energy” conveys the meaning defined for it and assigned to it by physicists). From Georgakakos’ explanations of this *how* and this *why* one can infer with plausibility what he understands physicists to define “movement” to be.

As quoted above, Georgakakos says:

And...that [the movement] might be a result of...so there’s...the water in the river has potential energy, right. So it starts at higher elevation, and then moves downstream, down elevation, because of gravity acting on it. So I would say in that respect, it does have energy.⁷⁰⁷

First it is important to notice that Georgakakos no longer gives me definitions. Rather, he speaks candidly and frankly *as if* movement, result, water, the river, potential, energy, potential energy, gravitation, and acting, among others, were not merely terms for which someone or some group has defined their meaning and to which they have assigned this meaning in order to utilize these terms to achieve their goals, including communicating the meanings they have assigned to these terms. As before, I write *as if* because, if Georgakakos were to be scientifically-epistemologically consistent, he would first have needed to tell me, at least, the definitions for each one of the above words-understood-to-be terms that he utilizes; in other words, he would first have needed to tell me the definition of “movement,” “result,” “water,” “river,” “potential,” “energy,” “potential energy,” “gravitation,” and “acting.” He does not do this. Yet, he has already told me that energy is “energy.” Likewise, he has defined “spiritual energy” (as the colloquial definition of “energy”) and “charismatic” (as the the definition of “spiritual energy”). I have inferred he understands movement to be “movement” since “movement,” as he says, “might be the result of,” i.e. the reaction to, “the water in the river [having] potential energy.”

To begin to understand what meaning physicists have defined and assigned to “movement,” and thus what meaning Georgakakos understands when he utilizes the term “movement,” I will proceed *as if* Georgakakos did not need, for scientific-epistemological

consistency, coherency, and continuity, to either define or state the definitions of, at least, the aforementioned terms.

“The water in the river has potential energy.” If water has potential energy, this energy’s storage (as standing-reserve) in a body H_2O is a reaction to and, only thus, a result of negative work upon this body by some force that is equal to the product of some other body’s inertial mass and acceleration.⁷⁰⁸ This potential energy might be, for example, the gravitational potential energy of the body H_2O —the potential energy transferred to the body through the work on this body by the force that is gravity. That this body H_2O has potential energy is the reaction and, only thus, the result of the interactivity in a two-body system of H_2O , another body whose inertial mass multiplied by this mass’s acceleration is equal to the force that is *this* gravity, and the second body. The movement of the body H_2O is this body’s reaction to the work done on it by gravity as gravity transfers kinetic energy to and gravitation potential energy from the body H_2O .⁷⁰⁹ The work done on H_2O by the net force of gravity (i.e. the force that is proportionate to the product of the second body’s mass and acceleration) equals the change in kinetic energy, i.e. the transformation of the gravitational potential energy of the two-body system to the kinetic energy of the body H_2O by the work of gravity upon this body.⁷¹⁰

Water having energy is not necessarily the same as water being energy. Water that has energy, for example, may have energy as a property. Or, for example, water that has energy could have energy attached to it or infused into it, where energy is not a property of water, or a property at all, but rather something existing separately and independently that attaches to or infuses into water. Water that *is* energy, or perhaps energy that *is* water, however, is distinct from water that has energy. Georgakakos, as he says, understands the water of the Eel River *to have* energy. The two-body system has potential energy or the body H_2O has kinetic energy.

River water at an elevation higher than that of the Eel River estuary’s mouth into the Pacific Ocean has stored gravitational potential energy of the two-body system, for example, of H_2O -Earth’s center of mass. The river water at any of these higher elevations *moves* downstream toward the lowest elevation at the river’s mouth to the Pacific Ocean. This movement results from “gravity acting on it.” This movement, or result, is a reaction to the acting of gravity. As a reacting, the river water’s movement, or motion, is an opposite, simultaneous, equal, and scientifically-epistemologically causally indistinguishable acting upon the center of mass of the Earth. This is an interaction.

A potential is a scalar quantity *associated with a field*; i.e., with a force field or, what is the same, with an interaction field.⁷¹¹ Epistemologically metaphysically and, thereof, scientifically-epistemologically, insofar as there is a force field, this field is an interaction field, and vice versa identically. Without a field, whether the field of a force (e.g. classically) or that of an interaction (e.g. classically or quantumly), there is no potential of any kind, including a potential of energy. This can be said differently so that its importance is not passed over: Without a field, energy is not conserved—not even kinetic energy, for without potential energy, kinetic energy cannot come into existence as potential energy of a system transferred as kinetic energy to one or more bodies of this system. Scientifically-epistemologically, without potential energy, kinetic energy is not, and cannot be, where to be, or being, is understood to be exhaustively and exclusively to exist, or existing, respectively. At the microscopic level, i.e. as quantized, for observing scientists-epistemologists, bodies such as particles have quantum uncertainties in position and momentum. For this reason, the force or forces acting on them are not, and seemingly cannot be by this or any other observer, well defined by physicists. For this reason—because physicists have not been able to either observe or define the force or forces

acting between particles at the quantum scale, and thus such forces, as well as the particles' positions and momentums that would define them, remain uncertain—physicists usually prefer to speak of *interactions* (interaction fields, whether classical or quantum) rather than *forces* (force fields), such as the four fundamental types of *interactions* rather than *forces*.⁷¹²

The storing of potential energy in one of the bodies of a two-body system—such as, for example, (*B*) a molecule H₂O in a two-body system of H₂O-Earth center of mass—is the reaction to to, as Georgakakos understands, gravity working on *B*. This reaction is, for example, the body H₂O's position in the gravitational force field equal to (*A*) the Earth's center of mass and this mass's acceleration. When Georgakakos tells me that the river's water at higher elevation flows downward because of gravity acting on it, he is speaking of gravitational potential energy of a system converted into kinetic energy and transferred to a body H₂O in proportion to the work of the net force of *A* acting on (i.e. forcing) *B*. Insofar as *B* flows, and insofar as *B* has stored potential energy (rather than *being* potential energy), *B*'s flow, i.e. downhill motion *has* kinetic energy in proportion, again, to the work of the net force that is equal to the inertial mass of the Earth and its acceleration.

The two bodies working on each other are (*B*) a molecule H₂O positioned at the highest elevation of the Eel River and (*A*) the inertial center of mass of the Earth. The gravitational force of each body is not only what it is, but exists at all strictly and only in the interactivity of the two bodies of the system; in other words, the net gravitational force of each body is not only what it is, but exists at all only *as* the action of one body *A* upon the other *B* and the opposite, simultaneous, equal, and scientifically-epistemologically causally indistinguishable action of the other body *B* upon *A*. Yet the gravitational interaction of each body *A* and *B* with the other is not only what it is, but exists at all strictly and only in the net gravitational (force) field of each respective body action on the opposite body; in other words, the gravitational interaction is not only what it is, but exists at all only as the net gravitational force of body *A* acting on body *B* and the net gravitation force of body *B* acting oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably on body *A*. It is for this reason that gravitational force (one of the four fundamental forces of the scientific-epistemological universe) is also, *identically*, the gravitation interaction (one of the four fundamental interactions of the scientific-epistemological universe), and vice versa.

If we generally relativized both *A*'s and *B*'s rest and motion, gravity is no longer understood to be a force field of *B* that acts, i.e. that forces another body *A* oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably from the action upon *B* of the force field proportional to the product of *A*'s mass and acceleration upon *B*. Relativizing the rest and motion of *A* and *B*, spacetime acts on *A* and *B* and *A* and *B* act oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably on spacetime. *A* and *B* would still interact with each other indirectly, and still do so oppositely, simultaneously, equally, and scientifically-epistemologically causally indistinguishably. As J. A. Wheeler summarizes succinctly, spacetime acts locally on mass (i.e. matter, e.g. the fundamental particles), *making it* move how it does, and mass (i.e. matter, e.g. the fundamental particles) acts locally on spacetime, *making it* curve how it curves.⁷¹³

Scientifically-epistemologically relativistically, gravity—a force field necessarily *between* two bodies, and necessarily an interaction between bodies, and vice versa *identically*—does not exist. Spacetime exists and mass exists, and these necessarily interact locally, constantly, and throughout spacetime absolutely—mass *A* acting on spacetime, and spacetime acting oppositely, *existentially* simultaneously, equally, and scientifically-epistemologically

causally indistinguishably on mass *A*. And the same for mass *B* and space time. How *A* acts on spacetime, locally making spacetime curve, spacetime changes how it acts on *B*, making it move differently, and vice versa. *A* indirectly—by means of how it acts of spacetime locally, making spacetime curve—interacts with *B*, and in the same way, *B* indirectly, oppositely, *existentially* simultaneously, and scientifically-epistemologically causally indistinguishably interacts with *A*. Spacetime acts locally on all masses in all frames *and* on all frames regardless of whether these are inertial or non-inertial (i.e. accelerating). And all masses in all frames and all frames, whether inertial or non-inertial, act both locally on spacetime and *non-locally* and indirectly—though still oppositely, *existentially* simultaneously, equally, and scientifically-epistemologically causally indistinguishably—on other masses and frames of reference.

Existential simultaneity of frames of reference, regardless of whether each of these is inertial or accelerating relative to one or another frame, is that reference frame *A necessarily exists simultaneously* with reference frame *B* insofar as there is to be any relativity whatsoever, including but not limited to special and general relativity of motion and of rest of all existing masses and frames of reference.

There are scientific-epistemological problems that seem as if, and perhaps they do, drop deeply down, beyond our present sensibilities, into an endlessly unending scientific-epistemological regress and—oppositely, simultaneously, equally, and scientifically-epistemologically indistinguishably—progress of unsolved scientific-epistemological problems, including scientific-epistemological contradictions. I am not interested in solving these problems here. I am interested in come to sense them with awareness, understand them with awareness, attune myself to the questions that they call me to take up as my own, and let these epistemological-metaphysical and, thereof, scientific-epistemological problems be what they are. These problems are not—I *cannot overemphasize this*—these problems are *not* Georgakakos's, or Bouma-Gregson's, or Grantham's, or Power's, or Newton's, Einstein's, Plank's, Schrödinger's, or Feynman's, or anyone else's—individual or collective—epistemological-metaphysical and, thereof, scientific-epistemological problems, nor are these epistemological-metaphysical and, thereof, scientific-epistemological problems' as-yet unsolved status, and likely scientific-epistemological and, perhaps, otherwise insolvability, due to anyone's—individual or collective—negligence, lack of awareness, lack of intelligence, lack of sensitivity, or lack of knowledge, scientific-epistemological or otherwise, or lack of anything else. They are gifts *to us* that we might let them be, as they are, without demanding anything of them or commanding that they be any other way, and that we let ourselves be among them, belonging to them as we do, that we let ourselves be as we are among them, and that turn our sensitivities and sensibilities towards and give our attention, our awareness, and our love and kindness to the questions that, through these epistemological-metaphysical problems, call us beyond to sense and think beyond them with thankfulness for them as they are, as what they are.

Epistemologically-metaphysically, gravity is a force forcing; identically, gravity is a force acting. Epistemologically-metaphysically, any two existings (i.e. existences, whether corpuscular or not), throughout all existing whatsoever, can interact at all, whatsoever, by force. Any and every existing (i.e. existence), insofar as it exists at all, is a forcer forcing. Identically, in existing (i.e. commonsensically one or another existence), whatsoever, absolutely throughout all existing, including classically mechanically inert corpuscles, is an actor acting. Water is, then, scientifically-epistemologically *necessarily*, a force forcing. Water is, scientifically-epistemologically necessarily, an actor acting. Neither Bouma-Gregson, nor Georgakakos, nor I am alone in this epistemological-metaphysical sensibility and this sensibility's understanding-in-

advance. Nor is Bouma-Gregson, Georgakakos, or I among company of ill scientific-epistemological repute. Isaac Newton, for example, understood the same.⁷¹⁴ So did Michael Faraday, James Clerk Maxwell, and Albert Einstein, with some indispensable and justly famous scientific-epistemological innovations in each case, of course.⁷¹⁵ Many, too, of equal or near stature as Newton, denied the experiencing human-being-subject-independent existence of force in light of the absence of scientifically-epistemologically empirical evidence, such as Berkeley and Hume, Mach, P. W. Bridgman, and Richard Feynman (though not without consistent scientific-epistemological ambiguities and inconsistencies), or to the ecologist Robert Peters, for example (though, in Peters' case, also with some very serious scientific-epistemological ambiguities indeed).⁷¹⁶ While this is not at all tangential—especially to what Bouma-Gregson and Georgakakos say ecology, energy, and the ecology of the Eel River are, i.e. our definitions of the meanings we assign these terms and our subsequent operationalizing of these definitions—it is beyond the scope of this dissertation to pursue presently.

Yet Georgakakos, perhaps unknowingly, understands, speaks, and writes as did Berkeley, Hume, Mach, P. W. Bridgman, R. P. Feynman, and Robert Peters, among many others. Force is “force.” Action is “action.” Force acting is “force acting.” Spacetime is “spacetime.” Mass is “mass.” Speed is “speed.” Velocity is “velocity.” Acceleration is “acceleration.” Momentum is “momentum.” Inertial is “inertial.” Frame of reference is “frame of reference.” Scalar is “scalar.” Vector is “vector.” Field is “field.” Particle is “particle.” Wave is “wave.” Interaction is “interaction.” And so on. Recall that *all* of what I written above—every word, every phrase, every sentence, every paragraph—must be placed with quotation marks, and—if I am to be scientifically-epistemologically consistent and coherent—these quotation marks must be within further quotation marks, and so on. This is likewise so if what Georgakakos explains is to be scientifically-epistemologically consistent, coherent, and continuous. Recall that I have, however, chosen to proceed through these last several paragraphs *as if* Georgakakos did not need, for scientific-epistemological consistency, coherency, and continuity, to either define or state the definitions of, at least, such words and phrases whose voices have been terminated and which I may, properly, call terms—*as if*, then, Georgakakos did not need, for scientific-epistemological consistency, coherency, and continuity, to either define or state the definitions of, at least, the *terms* and *terminologies* of “movement,” “result,” “water,” “river,” “potential,” “energy,” “potential energy,” “gravitation,” and “acting.” He does not do this. Yet, he has already told me that energy is “energy.” Likewise, he has defined “spiritual energy” (as the colloquial definition of “energy”) and “charismatic” (as the definition of “spiritual energy”). I have inferred he understands movement to be “movement” since “movement,” as he says, “might be the result of,” i.e. the reaction to, “the water in the river [having] potential energy.” And so on. These inconsistencies provide us endlessly unending epistemological metaphysical and, thereof, scientific-epistemological problems and, thereby, the potential—i.e. the power—to progress endlessly unendingly—with all our will, with endless labor, and the unfathomable productivity of our greatest efforts—towards the goal of their methodologically validated and, actively thereby, valid solution.

Yet, even a definition is the result of the action of defining, and as the result of this action, a definition is the reaction to this action of defining. In other words, as a reaction, the definition actively results from the action of defining. Ecology is “ecology,” a definition, or ecology is the actor's or actors' diachronic action of defining their meaning and who, individually or collectively, then assign their definition of their meaning to the term “ecology” in order to utilize this term as a means to effectively communicate this definition of their meaning

to others. This, too, is, and is exhaustively and exclusively, an *interaction*. As an interaction, this, too, is a forcer *A* forcing and another forcer *B* oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably forcing *A*; this definition and its assignment to a term is, too, the product of an actor oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably acting upon a reactor; and a reactor oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably acting upon the actor. Without interactivity, there is not only no defining, there is no existing or, thereof, existings (i.e. commonsensically existences) to actively define.

5.5 Theodore (Ted) Grantham

Ted Grantham is an Associate Professor of Cooperative Extension at the University of California, Berkeley.⁷¹⁷ Grantham received his doctorate in 2010 from U.C. Berkeley's Department of Environmental Science, Policy and Management, the department in which he now resides as a professor.⁷¹⁸ Currently, he heads his laboratory group of doctoral and post-doctoral researchers, or the Grantham Lab: Freshwater Science & Management.⁷¹⁹ While Grantham does research the Eel River specifically, his research cases include various northwestern California rivers, stream, and tributaries.⁷²⁰ He knows professor Mary E. Power well. Together with professors Stephanie M. Carlson and Albert Ruhi, Grantham and Power head the joint weekly meetings of the Freshwater Lab, in which these professors' doctoral and post-doctoral students participate.

Grantham is no stranger to the Eel River—just the opposite. He grew up in the city of Eureka, in Humboldt County, California.⁷²¹ He attended Eureka High School.⁷²² Growing up, his family owned land (and still owns this land) near the South Fork Eel River. He and his family would “spend a lot of our weekends and pretty much all of our summers and most of our holidays” on the property.⁷²³ During the summer, they would regularly go to the Eel River. Grantham knows very well, for example, the swimming hole at Redway Beach on the South Fork of the Eel River, where he spent many summer days playing in and out of the water.⁷²⁴ Indeed, he remembers these days along the Eel River—as well as on the Mattole and Trinity rivers, which also flow through Humboldt County—as enormously influential in guiding him to his doctoral research as well as continuing to inform his research program at U.C. Berkeley.⁷²⁵

I interviewed Grantham in March of 2020.⁷²⁶ I asked him what the ecology of these rivers is. He began by telling me what he understands ecology in general to be: “ecology...in my mind...is the study of the...relationships of organisms and their environment.”⁷²⁷ Grantham does not seem to understand ecology to be “ecology,” as did Georgakakos, for example. Yet Grantham does qualify what ecology is: Ecology, he says, as he understands it, is what ecology is “in [his] mind.” Grantham continues:

And so, when I think of the ecology of the Eel River, I think...of the full web of relationships that exist between...physical processes through [to] food web...dynamics, thinking about how...geology, hydro, you know, rain, rainfall, runoff, erosion dynamics, really kind of create the physical template for...structuring the environment in this very dynamic way. And then you have...these...biotic relationships responding, or biotic communities responding to those physical dynamics and...in some cases affecting...those physical dynamics. But really predominately responding to those physical dynamics as

well as responding to biotic interactions with one another... I guess, for me thinking about the Eel in particular, I think about it being such a very dynamic physical environment, where we have, you know, mass, you know, tectonic activity and really active geology. And you know, these massive, massive variations and high flows and low flows. You know, I think it's a place where physical processes are really important for kind of defining...the environment for, for controlling the environment, and controlling what ultimately [are] the ecological, are the biotic interactions that, that occur there.⁷²⁸

In response to my subsequent question, *What is the ecology of the Eel River?*, Grantham's answer is consistent in two regards with what he understands ecology in general to be. Ecology is what he understands it to be "in [his] mind." The ecology of the Eel River, likewise, is what he thinks about it, that is, what this ecology is in his thoughts. This does not entail, however, that he understands the ecology of the Eel River to be the "ecology" of the Eel River, the "ecology of the Eel River," or "the" "ecology" "of" "the" "Eel" "River," and so on. In other words, Grantham does not say that ecology is a definition of "ecology," or that ecology is a meaning of "ecology," and so on. Grantham understands ecology in general to be, in his mind, *the study of* the relationships of organisms and their environment. The ecology of the Eel River is, likewise, in Grantham's thoughts, *the study of* the full web of relationships that exist between physical processes through to food web dynamics, hence Grantham's "[a]nd so, when I think of the ecology of the Eel River, I think of" (emphasis added).

Grantham understands biotic relationships to be the same as biotic interactions, and vice versa. Biotic relations are biotic interactions, and vice versa. Biotic interactions are *both* (i) biological organisms' actions on and opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable reactions to one another ("biotic interactions with one another") *and* (ii) biological organisms' actions on and opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable reactions to the physical dynamics of the physical environment ("the biotic interactions that occur there ["there," i.e. the environment of and around the Eel River that is structured, defined, and controlled by physical dynamics]").

Grantham understands physical dynamics to be the same as physical processes, and vice versa. Physical dynamics are physical processes, and vice versa. These physical dynamics include rainfall, runoff, erosion, and variations in high flows and low flows of water in the river. These physical dynamics also include tectonic activity and an active geology. Here I assume that Grantham does not understand geology as he understands ecology, for he speaks of geology as one or more *physical* dynamics. Even if Grantham were to understand what ecology is without the qualification "in [his] mind," ecology as *the study of* the relationships of organisms and their environment would be the study of these relationships *by* biological organisms, human or otherwise (Grantham does not specify). Such study is not strictly or merely by physical dynamics. As Grantham speaks of it, he seems to understand the geology is a physical dynamic or set of physical dynamics. Geology, as one or more physical dynamics, is *active*. From Grantham's understanding that the physical dynamics of tectonic movement is activity and that the physical dynamics that are geology are active, I inferentially extrapolate that Grantham understands physical dynamics of the environment in general to be actions of one kind or another and the activities comprised of such actions. Examples of such activities would include tectonic motion; geological dynamics; precipitation; runoff; erosion; quantity, velocity, and acceleration of water flow in the river, and so on. Presumably, Grantham would also consider quantity of

sunlight per unit time, wind velocity, quantity of heat per unit time, cloud cover, *et al.*, physical dynamics. Physical dynamics are physical activities, and vice versa. Physical processes, too, therefore—which are the same as physical dynamics, and vice versa—are physical actions and the physical activities comprised of these actions, and vice versa. Physical dynamics and what is the same, physical processes, are physical actions and the physical activities these actions comprise.

Together, the physical dynamics, that is, the physical activities—again, such as tectonic motion; geological dynamics; precipitation; runoff; erosion; quantity (e.g. mass, volume), velocity, acceleration, and momentum of water flow in the river, etc.—create the physical template that structures the environment. Recall that Grantham understands, in his mind, ecology to be the study of the relationships of organisms and their environment. The environment of one biological organism includes all of the other biological organisms and their intra- and interspecific biotic interactions with one another. The environment also includes the physical activities' actions on biological organisms. While biological organisms, in turn, act oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on these physical activities, or physical dynamics, they do so *only in some cases*, as Grantham explains. This *in some cases* is epistemologically metaphysically, and, thereof, scientifically-epistemologically contradictory. Action without an opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable action (epistemologically metaphysically commonsensically, a *reaction*) is epistemologically metaphysically and, thereof, scientifically-epistemologically impossible. Even a scientific-epistemological quantum vacuum at zero-point (scientific-epistemological) energy is replete with the activity-reactivity of at least one *existing* quantum field self-interacting with, from, by, and upon over against itself.⁷²⁹ (An epistemological-scientific quantum vacuum and a quantum field are not *no-thing*—they *ex-sist*.)

Grantham explains that, although in some cases biotic organisms, biotic relationships, and biotic communities act on the physical dynamics that act on them, predominately organisms, biotic relationships, and biotic communities *respond to* physical processes, i.e. to physical dynamics, i.e. to physical activities. Grantham is differentiating *action-reaction* from scientific-epistemological *physical stimulus-biotic response*. Biological organisms interact with one another. Biological organisms and their biotic communities, in some cases, act oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably upon the physical activities that act upon them. What does Grantham understand these predominating responses of biological organisms to physical activities to be? Note that physical dynamics not only create the physical template that structures the environment, but also are not only important, but *predominate* in defining and controlling not only the physical environment, nor only the physical-chemical-biological environment, but also the interactions between biological organisms and the interactions within biological organisms. To structure, to define, and to control are *actions* and the activities comprised of these actions. Insofar as biological organisms and their biotic communities predominately respond to physical dynamics as well as their own intra- and interspecific interactions, I am hard-pressed to imagine what else Grantham could understand biological organisms' response to physical dynamics to be other than actions and reactions—that is, other than a modality of action-reaction (i.e. opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable actions, that is) and the activity these actions-reactions comprise.

That biological organisms and biotic communities responding to physical dynamics *affect* physical dynamics in some cases would indicate that Grantham understands responding to be acting-reacting. Causation in epistemological metaphysics and, thereof, in science-epistemology is—nearly if not entirely exhaustively and exclusively—efficient. Scientific-epistemologically, efficient causation is the validly methodologically validated judgement of action and reaction, activity and reactivity, interaction and interactivity by a validly methodologically validated judge, where to judge is itself an action-reaction and the judge an actor and, thus, a reactor.⁷³⁰ Whether I write of, for example, Kant, Whitehead, or perhaps even of Marx’s interactive dialectics, *epistemological metaphysical* and, thereof, *scientific-epistemological* sensibilities and ensuing understandings of final, end, or teleological causation depend primordially and in essence upon the efficiency and effectivity of activity, reactivity, and interactivity (and, note, relationality is often sensed and, thereof, understood in advance to be—exhaustively and exclusively—activity, reactivity, and interactivity); of actuality and actuality’s actualization; of enacting and enactments; and so on.⁷³¹ *To affect* is, and thus speaks of and from, *afficiō* (*afficiere*): to produce a physical effect on, make an impression on, to do something to someone or something, to cause to be affected by a physical agency, to cause a person to be involved in, to stir the emotions, to move strongly.⁷³² *Afficiō* is, and thus speaks its senses of and from, *ad- -faciō* (*ad- -facere*): *to make, construct, fashion, frame, build, erect, produce, compose, render; to cause to be made, constructed, produced, framed, et al.*⁷³³ The essential closeness of the senses that *affect*, *effect*, *afficiō*, *ad- -faciō*, *efficiō*, and *ex- -faciō* speak into the world is unmistakable.⁷³⁴ *Efficient cause* is, and thus speaks of and from, *causa efficiens*. *Causa efficiens* is the Latin translation, perhaps by Cicero, of the ancient Greek *poiētikon aition*.⁷³⁵ Even Aristotle, however, tended to speak of *to poiētikon* for the efficient cause of qualitative change.⁷³⁶ I will return below to what *poiēō* (ποιέω) is and, thus, of and from what it speaks its senses into the world, giving them to our sensibility. *To affect* is to cause such an effect, or reaction. Scientifically-epistemologically, this effect of the affectation, i.e. of the cause, is a reaction. This reaction is and can only be opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable to the affectation, or the cause that acts. In other words, the effect is a reaction that is scientifically-epistemologically necessarily an opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable action upon that which affects. Again, I am hard-pressed to imagine that Grantham understands *to respond*, and thus biological organisms responding or physical dynamics responding to be anything other than a modality of activity and reactivity and, thus, of interactivity.

Grantham explains that physical dynamics, or what is the same, that physical activities such as tectonic motion; geological dynamics; precipitation; runoff; erosion; quantity, velocity, acceleration, and momentum of water flow in the river, and so on, *create* the physical template for structuring the environment in a very dynamic, which is to write, in a very active-reactive and, thus, interactive way. The physical template is created. This physical template, in turn, structures the environment. The same physical processes, which is to write, the same physical activities that create the physical template that structures the environment are also important for defining and controlling the *physical environment* as well as the biotic interactions that occur there—in other words, those interactions within each individual biological organism as well as those interactions between biological organisms of the same and different species. The total environment is *both* the physical environment and the biotic environment. It is this total

environment that the physical template structures. The physical environment is the physical actions and the physical activities these actions comprise.

Grantham understands physical processes to be the same as physical dynamics, and vice versa. Physical dynamics, or physical processes, are physical actions and the physical activities these actions comprise. Again, these physical activities *create* the physical template that structures, defines, and controls the total environment. Grantham does not speak of the *entire* or the *total* environment. However, I write *total* or *entire* environment to emphasize that Grantham *does* explain that the created physical template structures, defines, and controls *all* physical, chemical, and biological activities, reactivities, and interactivities, including those within biological organismic individuals.

This physical template of the entire environment is the creature of its creation jointly by all of the physical activities (e.g. tectonic motion; geological dynamics; precipitation; runoff; erosion; quantity, velocity, acceleration, and momentum of water flow in the river, and so on) of the environment. This creature, however—i.e. the physical template of the total environment—is the *reaction* to the physical actions and the physical activities these actions comprise. As the reaction to these physical activities, the physical template is an opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable action on the physical activities that create the physical template of the total environment. This physical template of the total environment is oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably an action *on* the physical activities that create it *as* these are creating it. In other words, the physical template that is the created result of all of the physical activities of the total environment *also* oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably structures, defines, and controls those physical activities *as* these physical activities are creating the physical template that structures, defines, and controls the total environment.

What might Grantham understand *to structure* and the structure that results from the physical processes, or the physical dynamics, of structuring to be? I did not ask him, but I can plausibly infer from what he did explain to me. The physical template *structures* the total environment. The physical template is a creature. This creature is an action-reaction. This creature, the physical template, as an action-reaction, acts on the total environment. This physical template, is an actor. The result of the physical template's action on the total environment is the structure of the total environment. To structure, then, is a modality of action and, necessarily therefore, of reaction. As a modality of action-reaction, to structure is a modality of interactivity. The structure of the total environment is a reaction to this action—i.e. a reaction to the action of structuring by the physical template. As a reaction to the physical template, the structure of the total environment is an opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable action on the physical template *as* the physical template *is structuring*. The total environment is an *actor* acting on the physical template that is acting on it, structuring it. This *structuring*, then, by the physical template is oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably a reaction to and, thus, a result of the total environment acting on the physical template.

What might Grantham understand *to define* and *to control* to be? In other words, what might Grantham understand the defining and controlling of the total environment by the physical activities that create the physical template that, in turn, structures, defines, and controls the total environment, to be? As with structuring and the resulting structure of the total environment, it

did not occur to me at that moment to ask him. Yet, again, I can plausibly infer what he understands this defining and controlling to be from what he did explain to me. The physical activities of the total environment—such as, again, tectonic motion; geological dynamics; precipitation; runoff; erosion; quantity, velocity, acceleration, and momentum of water flow in the river, and so on—define and control the total environment, including all of the environment's biological interactions. *To define* and *to control* are modalities of activity-reactivity and, thus, of interactivity. Any definition or control that results from the physical activities that define and control are reactions to these activities. Any definition or control, then, that results from the physical activities defining and controlling the total environment is an opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable action on the activities of defining and controlling and, therefore, on the actor or actors that are defining and controlling. What is the actor or actors that are defining and controlling the total environment? The actors are the physical activities of this total environment *as well as*, necessarily, the biological activities of this total environment. These biological activities, recall, scientifically-epistemologically necessarily act oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on the physical activities that act on them *as* these physical activities are acting on the biological activities and, thereby, defining them and controlling them. Who or what are the actors? Biological organisms, including humans, are the reactors that are defined and controlled by the activities of they physical environment. Biological organisms, including humans, are also the opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable actors acting on the physical activities that define and control them. The defining and controlling of the total environment of the Eel River and its basin by the physical activities that actively create the physical template that, in turn, actively structures the total environment in and as which physical activities are defining and controlling the total environment, and vice versa at each interaction, are context specific, case-particular modalities of activity-reactivity and, thus, interactivity.

Grantham understands that the physical activities of the total environment of the Eel River and its basin *create* the physical template that actively structures, defines, and controls the total environment of the Eel River and its basin. What is *to create*? What is a *creature*? *To create* is, and thus the word speaks its senses of and from *creō* (*creāre*): to bring forth, give origin to, to be born, to be born of or to spring from, produce, beget, endow with existence, call or bring into being, to cause to exist, to cause to be.⁷³⁷ To create does not essentially or necessarily have anything to do with action, reaction, and interaction; nor with activity, reactivity, and interactivity; nor, thereof, with actuality and actualization; nor, thereof again, with enactment and enacting. Insofar as any of the following are activities—including practical activities, if there be such activity—to create does not essentially or necessarily have anything to do with making and being made, fabricating or being fabricated, fashioning or being fashioned, composing or being composed, crafting or being crafted, constituting or being constituted, manufacturing or being manufactured, building or being built, constructing or being constructed, framing or being framed, rendering or being rendered, positing or being posited, effecting or being effected. To create does not essentially or necessarily have anything to do with force forcing and being forced forcefully. To create does not, then, essentially or necessarily have anything to do with causing or being caused, efficiently or otherwise. To create does not essentially or necessarily have anything to do with ex-sisting and being ex-sisted. To create does not essentially or necessarily have anything to do with presencing or being-presenced. To create essentially and necessarily does have to do with, and speaks its senses into the world of and

from, being, being born, being borne, and being a being—for example, a being-pre-sencing (*praesum, prae- -sum, prae- -esse*) in the world or, as another example, a being-ex-sisting (*existō, ex- - sistō, ex- - sistere*) in the world. That which is a *creature* is that which is borne by and born of and from creating and the creator that creates. A creator is not essentially or necessarily, if at all, an actor, much less a reactor or an interactor. A creator is not essentially or necessarily, if at all, an agent.

What to create is, however, is essentially close to, and thus does necessarily speak of and from, what to produce is and, thus, the senses that to produce speaks into the sensibility of the world. To produce is, and thus the word speakingly gives its senses to the world of and from, *prōdūcō (prōdūcere)*: to lead forth, to bring out, to lead or bring forward or out, to bring to awareness, to bring to notice, to present, to bring into being, to bring in existence, to beget.⁷³⁸ *Prōdūcō*, in turn, is and, thus, speaks its senses into the world of and from, *prō-* and *dūcō (dūcere)*: forward, forth, in front of, before; and, respectively, to lead, to bring, to guide, to conduct, to draw.⁷³⁹ As with to create, to produce does not essentially or necessarily have anything to do with action, reaction, and interaction; nor with activity, reactivity, and interactivity; nor, thereof, with actuality and actualization; nor, thereof again, with enactment and enacting. Insofar as any of the following are activities—including practical activities, if there be such activity—to produce does not essentially or necessarily have anything to do with making and being made, fabricating or being fabricated, fashioning or being fashioned, composing or being composed, crafting or being crafted, constituting or being constituted, manufacturing or being manufactured, building or being built, constructing or being constructed, framing or being framed, rendering or being rendered, positing or being posited, effecting or being effected. To produce does not essentially or necessarily have anything to do with force forcing and being forced forcefully. To produce does not, then, essentially or necessarily have anything to do with causing or being caused, efficiently or otherwise. To produce does not essentially or necessarily have anything to do with ex-sisting and being ex-sisted. Essentially and necessarily, to produce *does* have something to do with with presencing or being-presenced. To produce *may* have to do with, and speaks its senses into the world of and from, being, being born, being borne, and being a being—especially, for example, a being-pre-sencing (*praesum, prae- -sum, prae- -esse*). That which is a *product* is that which is lead, guided, brought, or drawn forth or forward, even into presencing or existing. A producer is not essentially or necessarily, if at all, an actor, much less a reactor or an interactor. A producer is not essentially or necessarily, if at all, an agent.

What does Grantham understand to create to be? As before, it did not occur to me during the interview to ask him. Yet, also as before, I can plausibly infer what he understands creating to be from what he did explain to me. The physical activities of the total environment of the Eel River and its basin *create* the physical template that structures the total environment of the Eel River and its basin. These activities, once again, include, for example, tectonic motion; geological dynamics; precipitation; runoff; erosion; quantity, velocity, acceleration, and momentum of water flow in the river, and so on. The physical template is the creature of these activities' creation. The physical template, however, is also the reaction to the physical actions comprising the physical activities of the total environment. As such, the physical template is an opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable action upon the activities that create it. As before, I find myself at a loss to imagine what else Grantham could understand *to create* to be other than a modality of activity-reactivity and, thus, interactivity. I find myself at a loss to imagine what else he could understand the creature to be that is the physical template of the total environment of the Eel

River other than a action-reaction to the activities' that create it and, thus, to the activity of the actors and agents that make this physical template exist as what it is.

If, as it would seem, Grantham understands creation to be a modality of activity-reactivity and, thus, interactivity, I need to consider attentively what is particular and, perhaps, exceptional of the character of this modality of activity-reactivity. What is created? The physical template that structures the total environment is created. To create, if Grantham understands creation to be a modality of activity-reactivity, is a modality of activity-reactivity that actively *makes something exist*. To create is a modality of activity-reactivity that actively originates the very existing of that which is made to exist. To create, then, is the modality of activity-reactivity that originates the physical template of the total environment of the Eel River and its basin. This creation actively makes the physical template exist as what the physical template is at all. Epistemologically metaphysically, and thus scientifically-epistemologically, *to be* is exhaustively and exclusively *to exist*. What is the creator of the physical template? What makes the physical template of the total environment of the Eel River and its basin exist? As Grantham explains, the physical activities of the Eel River and its total environment create the physical template of the total environment. The physical template, once created and thereby existing, structures the total environment. The very first act of the physical template as the physical template is the *actus primus* of the dynamic structuring and, thus, of the structure at any given spatiotemporal specificity, of the total environment of the Eel River and its basin. The physical template that structures the total environment is the *actus primus* of this total environment's structure. The *actus primus* of the physical template, however, is a first reaction or, what is identical, an opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable action upon the physical activities that create the physical template *as* these activities are creating the physical template. Likewise, the *actus primus* of the physical template is the action that structures the total environment, including all of the physical activities of and as this environment.

This total environment of the Eel River and its basin, then, includes all of the physical activities that, as Grantham explains, define and control this total environment. These physical activities both define and control the total environment *and* create the physical template that structures this total environment. The total environment that is structured by the activity-reactivity of the physical template is the total environment that is defined and controlled by these same physical activities of the total environment that create the physical template that structures, defines, and controls them. And recall that each activity and each of the actions that comprise such activity are, each, opposite, existentially simultaneous, equal, and scientifically-epistemologically causally indistinguishable actions upon that which acts on them. For example, the physical template acts oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on the physical activities that create it as the physical template acts on the total environment, structuring it and this total environment acts oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on the physical template that is structuring it. Each and every action and reaction, and thus each and every actor and reactor acts and reacts oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably in classical space and time. Or, each and every action and reaction, and thus each and every actor and reactor, acts and reacts oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably as, of, from, by, and upon over against itself as the quantum mechanical field self-interacting it is. Distinctly and *perhaps* scientifically-

epistemologically irreconcilably, in relativistic spacetime, the *actus primus* is the *actus sui* of itself, and vice versa. There can, therefore, be no spatiotemporal worldline of reference frames, inertial or non-inertial, spiraling *through* absolute spacetime nor even a spatiotemporal worldline in absolute spacetime spirally connecting discrete, contiguous, particular spacetimes—each with its own inertial and non-inertial reference frames—with each other.

The total environment of the Eel River and its basin, however, is not a closed system—classically or quantumly. Yet, whether classically supervenient or fundamentally quantumly, the epistemological metaphysical and, thereof, the scientific-epistemological *total* universe—with however many worlds it may have, classically interacting or non-interacting—is, in its epistemological metaphysical totally, an epistemologically metaphysically and, thereof, scientifically-epistemologically necessarily a closed system.⁷⁴⁰ In this epistemological metaphysical and, thereof, scientific-epistemological system, the physical template structuring the total environment of the Eel River and its basin is the *actus purus* of this total environment and, thus, of itself and, identically, the *actus sui* of the physical template.

The *actus primus* of the physical template—which is the act of structuring the total environment—is the *actus sui* of the physical template, and vice versa identically. In other words, the first act of the physical template is the non-reacting, non-interacting act that actively enacts, activates, mobilizes, and actualizes itself into existing as the physical template. Likewise, the *actus primus* of defining the *actus primus* of controlling are each, respectively, the defining *of the total environment* and the controlling *of the total environment*. The total environment includes the physical activities that define and control the total environment as well as the biotic activities that act oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on these physical activities which in turn define and control the total environment. These total activities, reactivities, and, thus, interactivities, both abiotic and biotic, *are*, perhaps, the total environment. If these total activities, reactivities, and, thus, interactivities *are* the total environment, then (i) the *actus primus* of defining and (ii) the *actus primus* of controlling the total environment are, respectively, (i) the *actus sui* of defining non-reactively and, thus, non-interactively actively enacting, activating, mobilizing, and actualizing itself into existing as the activity of defining and (ii) the *actus sui* of controlling non-reactively and, thus, non-interactively actively enacting, activating, mobilizing, and actualizing itself into existing as the activity of controlling. The physical template, the activity of defining, and the activity of controlling are, respectively, the *actus primus* and *actus sui* of themselves. This, however, at the least, is not epistemologically-metaphysically and, thereof, scientifically-epistemologically possible. As epistemologically-metaphysically impossible, it is *also* an epistemologically-metaphysically and, thereof, a scientifically-epistemologically *logical* contradiction for any scientific-epistemological hypothesis, explanation, or description.

Admittedly, I was unable to understand all of this at the same time that I was listening to Grantham respond to my questions. As I listened, however, I did notice that I was not sensing or understanding what he was explaining and describing, at least as he seemed to be. So, after a question or two on different themes, I decided to return to the question of the physical template, biotic activities-reactivities, the total environment of the Eel River and its basin, and the predominance of physical activities-reactivities, physical structuring, physical defining, and physical control in a different way. I asked: *Are the abiotic factors, in the ultimate instance, determining of the river? Are they what ultimately is most important in controlling or regulating or shaping what the river is, including the biotic relations? Or is it the reverse? Or is it more*

*complex than that? What determines, controls, or shapes the river?*⁷⁴¹ Grantham responded lucidly:

Yeah, it's not, it's not either, or, I think when we might think of rivers sort of, broadly, there's often...an interplay of...biotic and abiotic forces that ultimately...give rise to the...emergent properties that we...have to appreciate or recognize, right,...in terms of the...animals that live there, and the quantity of the water and the physical features, right, that we would recognize...when we visit a river. I was saying that at the Eel the physical forces, abiotic forces are particularly pronounced.⁷⁴²

Here, to help me understand, Grantham offered a hypothetical example where physical forces are not as pronounced:

And I think there are other systems where it might be less the case. I mean, just as an example, some of them are tropical rivers that...are much more stable, predictable environments. And it's really the abiotic, or sorry, the biotic interactions that are responsible for these, sort of driving these emergent properties, whether that's the distribution of...animals distributing seeds from which vegetation was grow, or animals that are somehow processing nutrients, or...cleaning the water or not. Now, it's not to say that physical processes aren't important, but they're sort of...there's this dynamic interplay...⁷⁴³

In other words, he continues, “depending on...where you are in the world, and what may be its...geologic history and evolutionary history...you might end up in a place where that balance [between abiotic and biotic forces] gets shifted in some way [relative to another place in the world].”⁷⁴⁴

What Grantham explains eloquently is that, at any given place in the world at or during a period of time, whether short or long, the current interplay between physical (or abiotic) and biotic forces is *relatively* unique *because* it is contextually dependent upon the history in that place of the prior interplay between physical and biotic forces as these force and get forced and, thereby, balance, disturb and get disturbed, balance differently, disturb and get disturbed differently, balance differently again, *ad infinitum*. Of a place in the world at or for a specific time, this relatively unique history of the interplay of physical and biotic forces makes emerge into existing the properties that we can epistemologically-metaphysically commonly sense (e.g. which we can commonly sense visually, tactilely, auditorily, gustatorily, olfactorily, vestibularly and kinesthetically), recognize, and appreciate. These senses are *epistemologically-metaphysically* common senses because each one is understood in advance to be, first and essentially, a modality of activity-reactivity, their respective actions-reactions, and the modalities of interactivity these activities-reactivities comprise. Examples of spatiotemporally contingent emergent properties in any one place in the world at or during any time are the animals that live there; the distributions of these animals; the interactions between animals and vegetation (e.g. animals distributing seeds); the distribution of vegetation; the nutrient content of the physical and biotic properties (e.g. the nutrient content of an animal, a plant, a soil sample, a water sample, a rock, etc.); the micro and macro physical features (e.g. the quantity of water in a river channel; the shape of a ravine; the height, slope, and shape of a mountain or hill; the types, strata, and arrangement of the strata of bedrock); the quality of these physical properties i.e. features (e.g.

the clarity or turbidity of a river's water); and so on. Grantham understands the emergent properties of a place at or during a specific time to be identical to the common-sensibly observable, recognizable, and appreciable physical, chemical, and biological features of the place at or during the specific time, and vice versa. Emergent properties are epistemologically-metaphysically commonly sensible physical, and/or chemical, and/or biological features, and vice versa.

The relativity of the context uniqueness of any one or another place in the world at or during a specific time is *relative to* another one or more places in the world at or during one or more specific times. The evaluative measure, quantitative or qualitative, of the relativity of one place in the world at or during a specific time to another one or more places in the world at or during a specific time is *scientifically-epistemologically judged* from and by means of the epistemologically-metaphysically commonly sensical modalities of activity-reactivity mentioned above. The spatiotemporal context of a place in the world currently is common sensibly *unique* and *particular* because of a *relatively* unique and, thus, *relatively* particular interplay of physical and biotic forces in judged comparison to any and every other commonly sensibly contextually unique place in the world at or during a specific time and a *relatively* unique and, thus, *relatively* particular prior interplay of physical and biotic forces.

However, these are *not* the physical and biotic forces of *of*, *from*, or *at*, or *in*, or *by* this common-sensibly contextually unique and, thus, common-sensibly contextually particular place at or during a specific time. Rather, the place *itself* and the specific time *itself*—which are, rather, *relatively* (i.e. *relativistically*, and thus *relatively*) a four-dimensional spatiotemporal epistemological metaphysical unity—exist at all only insofar as they *are*, in their very existing, emergent properties and, thus, commonly sensible (visually, tactilely, auditorily, gustatorily, olfactorily, vestibularly and kinesthetically) *as a place at or during a time* with relatively unique and, thus relatively particular physical, and/or chemical, and/or biological properties (i.e. commonly sensible, recognizable, and appreciable features). The place *as place* and the time *as time* emerge from *this* relatively unique interplay of physical and biotic forces. These emergent properties, or identically, these physical, and/or chemical, and/or biological features *emerge of*, *from*, and *by* physical and biotic forces interplaying. That physical and biotic forces interplay in a relatively particular way makes emerge *this place at or during this time* as well as the further emergent properties of *of*, *from*, *in*, or *by* this common sensibly unique place at or during a specific time. Relativistic spacetime, motion, and rest are—at least contemporary epistemological-metaphysical physicists and cosmologists hope, and are striving willfully to solve as a, or perhaps, as *the* fundamental scientific-epistemological problem—emergent from the mechanics of quantized fields interacting with each other or even non-interacting quantized fields which only, and scientifically-epistemologically absolutely necessarily, *self-enact*, *self-activate*, *self-mobilize*, and *self-actualize* into and as existing *self-interactively: actus primus* and, identically, *actus sui*. We can, however, only *epistemologically-metaphysically* sense, observe, conceptualize, experience, know, and be conscious of such mechanics of quantized fields with probabilistic uncertainty *that is itself*, scientifically-epistemologically necessarily, only *probabilistically uncertain* as to this scientific-epistemological *uncertainty* as uncertainty at all.

Epistemologically-metaphysically and, thus, scientifically-epistemologically, it is only subsequently *and* consequently to this or that *relatively* unique interplay of physical and biotic forces that can we can, with awareness or not, actively receive, synthesize, combine, and thereby conceptualize, experience, and be subjectively experientially conscious of the interplay of physical and biotic forces *at or of this place, at or during this time*. And—lest I, or, perhaps, we

mistakenly consider myself, or, perhaps, ourselves to be divine prophets or, worse, in-but-not-of-the-world gods with an adept hand at god-tricks from a situatedly de-situated nowhere/nowhen—I and we, too, exhaustively, are emergent properties—i.e. all human-beings *absolutely*, or human-being-like existences *absolutely*, whatever we or these are, if ever or anywhere any particular thing at all, that have, that do now, and that will exist in the world were, are, and will be, one or more existingly emergent properties. I quickly and purposefully pass by the irony I have drawn out as presently tangential but, nonetheless, an invaluable (i.e. not valuable or a value whatsoever) gift that calls me—if not us—to open myself (or, perhaps, ourselves) toward essential questions as *we all* can, and many of *us* do, along our individual and shared ways through the world, *regardless* of who—though not what—and where or when each of us was, is, or will be existing in the world. In any case, the epistemologically-metaphysically common sensibly unique emergent properties or, identically, the commonly sensible physical, and/or chemical, and/or biological features *that are this* place at or during *this* time (including interactive human beings existing past, present, and future) *emerge* from, of, and by physical and biotic forces. And perhaps *biotic* forces, too, are *biotic* at all as emergent from, of, and by and, thus, as emerging and disappearing properties, or features, of physical and chemical forces interplaying with physical and chemical forces, forcing and being forced in this way and that.

Beyond all, what is essential to notice is that Grantham, as do Bouma-Gregson and Georgakakos, senses and, thus, understands and, thus, pre-consciously and consciously conceives, and, thus, consciously and self-consciously (and perhaps unconsciously, though this is entirely a speculation) experiences that forces are actions, reactions, and thus interactions and that, identically, actions, reactions, and thus, interactions are forces. To act and to react is to force. To interact is to force and be forced. *What is, is force forcing and being forced in many emerging and disappearing, relatively unique modalities of action, reaction, and, thus, interaction and the modalities of activities, reactivities, and, thus, interactivities that are comprised of these actions, reactions, and interactions and what is, identically, is actions acting and being acted upon, reactions reacting and being reacted to, interactions interacting* such that interplays of forces emerge and disappear in relatively unique and, thus, relatively particular forays, and relays, and power plays, *et al.* of forces forcing and being forced. What is, is force is and, identically, what is, is activity-reactivity, and vice versa. Epistemologically metaphysically, to be, being, and all beings that have been, are, and will be, exhaustively and exclusively, respectively, exist and were existing-existences, are existing-existences, or will be existing-existences in and of the existing to come, if any.

I noted above that I asked one or two more questions on different themes before returning to questions of physical activities, biotic activities, the physical template, the total environment of the Eel River and its basin, and structuring, defining, and controlling activities. Recall from above that the ecology of the Eel River, as Grantham thinks about it, is “the full web of relationships that exist between...physical processes through [to] food web...dynamics.” As before, I am hard-pressed to understand Grantham as understanding anything except that the relationships of the web of relationships of the Eel River and its environment are interactions and the existingly emerging and existentially disappearing interactivities these interactions comprise. Recall that the relationships of “the full web of relationships that exist between physical processes through [to] food web dynamics” are

these...biotic relationships responding, or biotic communities responding to those physical dynamics and...in some cases affecting...those physical dynamics. But really

predominately responding to those physical dynamics as well as responding to biotic interactions with one another...it's a place where physical processes are really important for kind of defining...the environment for, for controlling the environment, and controlling what ultimately [are] the ecological, are the biotic interactions that, that occur there.⁷⁴⁵

As best as I can interpret what Grantham responded to my questions, I understand that he understands biotic relationships to be biotic interactions. Biotic relations and relationships are biotic actions, reactions, and, thus, interactions. Biotic dynamics—the dynamics of these relationships—are the dynamics of the active and reactive motions of biotic interactions. I have already written above that, as far as I am able to infer, physical dynamics are physical processes, and vice versa, and these are both physical activities, reactivities, and interactivities. The food web or webs of the Eel River, then, would be superveningly emergent properties of physical and biotic interactions. And, as I mentioned above, all such biotic activities, reactivities, and interactivities and the actions, reactions, and interactions that comprise them may be the existingly emerging, existingly enduring, and existentially disappearing properties, or features, of the interplay of physical interactions or, what is identical, physical forces. The food web dynamics of the biological organisms of the Eel River and its basin, which is to write, the total web of food and nutritional relations of the biological organisms of the Eel River and its basin, is a existingly emerging, existingly enduring, and existentially disappearing modality of interactions or, what is identical, forces.

I *did* ask Grantham what a food web is. “A food web,” he replied,

basically describes the pathways by which energy and nutrients are transmitted among organisms. So the base of the food web are organisms that rely upon the sun primarily...and photosynthesize and...generate matter that's consumed by other organisms, which are consumed by other organisms...So a food web basically describes those sort of pathways...by which energy and nutrients are...transferred among...organisms.⁷⁴⁶

I note, first, that Grantham may understand a food web to be a representation or model that one or another person makes and utilizes in order to describe, and/or to test, and/or to explain biotic trophic interactions within a scientifically-epistemologically defined system (recall that Grantham spoke of systems above). Or, distinctly, Grantham may understand that a food web *is* the web of past and current biotic trophic interactions of a biotic community that he or someone else *can*, but does not have to, represent or model for his or another's purposes and end-goals. The latter understanding, however, seems unlikely since Grantham speaks of a food web as *describing* the pathways by which energy and nutrients are transmitted among biotic organisms. When I asked whether or not he distinguishes between a food web and an ecological food web, he said no, “I guess I don't make a distinction.”⁷⁴⁷

As with Bouma-Gregson and Georgakakos, I also asked Grantham whether a river is energy or has energy. “Yeah, I mean...a river certainly has both kinetic and potential energy,” he responded.⁷⁴⁸ I then asked whether a river is matter or has matter. “A river is matter,” he replied.⁷⁴⁹ Then he answered again, differently: “A river has matter, is made of physical materials, elements.”⁷⁵⁰ Hoping for some clarification, I followed up, wondering “What is

energy? What do you understand energy to be when you're speaking of it?"⁷⁵¹ "Energy," he explained, is

kinetic and potential energy, so kinetic energy being the... movement of material actively moving. And then potential energy, the idea that we have...the capacity for that...energy to be translated into kinetic energy...So you have your [river or its water] behind the reservoir, right...River impounded. And that river is not moving, [but] it still has energy, but in the form of potential energy.⁷⁵²

There are *many* important questions waiting to be heard and responded to here. I notice, for example, that in a food web biotic organisms transmit and transfer energy and nutrients (i.e. matter) along pathways from one to another. The biotic organisms actively transmit, transfer, etc., but *are not* the energy or matter that they are actively transmitting, transferring, etc. Likewise, a river "river certainly has both kinetic and potential energy." Yet he understands that "A river is matter," but then conflates a *being* matter with a river "[having] matter, [being] made of physical materials, elements." *To have* and *to be*, or having and being, are not the same, epistemologically-metaphysically and, thus, scientifically-epistemologically or otherwise.

On both hearing and re-reading Grantham's responses about energy later, as with his other responses, I notice, at the least, a confluence of Bouma-Gregson's, Georgakakos', and Grantham's understandings of what ecology is; of what the environment is; of what the ecological food webs of the Eel River are; of what energy is; of what potential and kinetic energy are; of what processes, dynamics, relations, drivers, controls, etc., are; and of what patterns and structures are. I need not, I conclude, *for the present work*, at least, further explore Grantham's responses on energy, kinetic and potential energy, and why a river has (or distinctly, is) one or another of forms of energy in this spatiotemporality but not that one, and so on. Without further analyzing Grantham's responses about energy and matter, I judge, tentatively, that my understanding of Bouma-Gregson's and Georgakakos' understandings of energy, matter, and a river are adequate for me to understand, generally at least, Grantham's understanding of them.

5.6 Action and activity in "Letter on Humanism"

Rather than begin about Heidegger, I would like to begin with the questions to which Heidegger responds fully, partially, or, perhaps, not at all in the following excerpts. I will respond—here only briefly—to some of these questions. Then I will turn below to the secondary literature about Heidegger's writing. Opening his "Letter on Humanism," Heidegger writes (in translation):

We are still far from pondering the essence of action decisively enough. We view action only as causing an effect. But the essence of action is accomplishment. To accomplish means to unfold something into the fullness of its essence, to lead it forth into this fullness—*producere*. Therefore only what already is can really become accomplished.⁷⁵³

That we are still far from pondering the essence of action decisively enough, I agree—regardless of whether *we* is only *me* or some larger human family, group, or collective. I sense that I can never ponder the essence of action decisively enough. If I were able to ponder the essence of action decisively enough, it could follow that I could achieve the *finis* of this pondering, or

thinking, once I had pondered decisively *enough*. This achievement would be mine—mine in the sense of actualized me by means of my activities in service to the end-goal of achieving the *decisively enough* threshold of this pondering. In my actualization by achievement, I would thereby actively *accomplish* the *finis* of this thinking. In other words, by means of my achievement, I would actively accomplish the *completeness* and the *fulfillment* of thinking the essence of action decisively enough. This actualization by achievement of the accomplishment of the *finis*—that is, the *enough*—of thinking the essence of action decisively enough would be, in effect, the definition of such pondering. Having actively accomplished this defining, I could be prone to mistaking my actualization by achievement—the accomplishment of pondering the essence of action decisively enough—for knowing or, worse, for knowledge I possessed, whether metaphysical, epistemological-metaphysical, or otherwise. I could be prone, furthermore, to understanding my active achievement as *my own achieving*, my means of my willful activities, the definition of the limit, or *finis*, of the *enough* of pondering the essence of action decisively enough. Knowledge of the definition could follow.

Perhaps we view action as causing an effect. This is surely correct in many of not most epistemologically metaphysically governed cases, and is, then, epistemologically metaphysically true to the lawful opening-revealing and laying forth of the sense and sensibility of epistemological metaphysics. I do not agree that this is merely *our* view. Yes, an action effects. Epistemologically metaphysically, the action and effect—or what is identical, the reaction—are opposite, existentially simultaneous, equal, and thus scientifically-epistemologically causally indistinguishable. The effect acts oppositely, existentially simultaneously, equally, and scientifically-epistemologically causally indistinguishably on the action of and by which it is the effect. Yet, for example, is action actualizing action actively (whether as itself or another action) the same as action *causing* action (whether itself or not) to actualize (whether itself or not) or, distinctly perhaps, action *causing* a reaction? Heidegger does not respond to such questions in the letter. I would need to ask Heidegger what he understands *viewing* to be such that *we view x as* rather than, for example, *x is*. I would need to understand, at least, what Heidegger understands a *cause* to be, a *causa* to be, and *aitiā* (*αἰτία*) to be. Likewise, I would need to understand, at least, what Heidegger understands both *action* and *effect* to be. I would, at least again, need to understand what Heidegger understands *reaction* to be. In this letter, Heidegger does not respond to these questions.

The essence of action is not accomplishment. Action *of, for, from, or by action* alone (whether itself or of, for, from, or by another action) has nothing to do with accomplishment, and can have nothing to do with accomplishment. Action *of, for, from, or by action* can and does achieve—striving or successfully acquiring, winning, or attaining, for example, without necessarily completing, fulfilling, or moving towards such completion or fulfillment. Action of, for, from, or by action alone, however, never accomplishes any being—including anything or anyone—and never can, absolutely. Action of, for, from, or by action does not, and cannot, accomplish the world, much less the scientific-epistemological universe. Action of, for, from, or by action—whether a human-being's own action of any category (e.g. accidental, instinctual, instinctual purposeful, fully purposeful or intentional) or an action not by human-being—does not and cannot accomplish human-being, whether human-being, human-being-presencing in the world, or human-being-ex-sisting in the world. Action of, for, from, or by action alone does not and cannot accomplish any being, whether this being is being, being-presencing in the world, or being-existing in the world. Action of, for, from, or by action alone loses its way. Action of, for, from, or by action alone actively progresses endlessly without end. As such an actor much

judge, and judge *actively*—of, for, from, or by the actor itself—such progress as progress at all. Progress of action of, for, from, or by action alone, if it is progress, is and can only as a means to the goal of actualizing the next action, reaction, and, thus, interaction. Force of, for, from, or by force alone is never completes or fulfills and is never completed or fulfilled. Force has no end insofar as force is of, for, from, or by force forcing or being forced.

Being *gives—as a gift*—the possibility of, the faculty for, and capacity for action (here I write broadly of action of every category). Being, however, *is not* nor *is exhausted by* what action, activity, actualization, activation, or any other act or action, *are*—including the action of *willing*, i.e. the *gift* of the possibility of willing *in order to x*, even if *x* is first, essentially, fundamentally, and ultimately in order *to will*, that is, *in order to will to will*. To give is not and cannot be an action, an act, an activity, a reaction, a reactivity, an interaction, or an interactivity. To give is to give of and for the practice of giving and, therefore, for and towards the wellbeing and safe-keeping and loving-belonging of the what or the who to which the gift is given. Other than this, to give is nor for anyone or anything else—not even the giver; not even the giver's enjoyment over the possibility of the receiver's wonder, appreciation, or joy at the receipt of such a gift. Action, reaction, and interaction; activity, reactivity, and interactivity can come to their own completion and fulfillment only of and from, as guided and, thus, governed by such practice as giving. Likewise, action, reaction, and interaction; activity, reactivity, and interactivity serve in their genuine role, as means to an *end*—not merely an end-goal or an aim—only in relation to and guided always from, through, and thus by practice, such as giving, thinking, befriending, safe-keeping, or loving. Action, reaction, and interaction alone of, for, from, or by itself or another action, reaction, or interaction alone loses its way and can only, always, and everywhere constantly and without exception overcome activity, reactivity, and interactivity by means of actions, reactions, and interactions in and by means of endlessly, unendingly further, evermore effective actions, reactions, and interactions *without rest*.

What is accomplishing? What is *to accomplish*? To accomplish is to bring to or to come into the *end* (not to be conflated with end-goal or, simply, goal or aim or achievement) of that which accomplishes or is accomplished. Upon bringing to or coming into the end—the end to which this what or who belongs—the what or the who of which I write comes to its completion and, as completed, its fulfillment as that which it is. If I write of a being-ex-sisting in the world, then I write of the accomplishment, or completion, of this being's *existing-in-the-world*, and from this completion, I write of the fulfillment of this being's *existing-in-the-world* as a being-existing in the world. If I write of the completion and fulfillment of a being-existing in the world, I do not necessarily write of the being's being, or the being's presencing, or the being's essencing, or the being's becoming (in general, not just becoming-ex-sisting or be-coming-presencing), the being's beingness, etc. I sense here a nearness to but not a sameness as the thinking-way Aristotle journeyed so many years ago. *To accomplish* is and, thus, speaks its senses of and from, *ad- - compleō (complēre)*: *Towards* or *to* or *near* filling full, filling up, filling out, fulfilling.⁷⁵⁴ *Complēre* is, and thus speaks its senses of and from: *cum- -pleo*, or with fullness, with fulfilling, *com-pletion*.⁷⁵⁵

What to accomplish *means* I do not know. Does the word itself have a purpose, or an intent, or a will, for example, such that *it* means *x*? Or what does *Heidegger* mean for us to understand when he gives human voice to the senses the word *accomplish* speaks? I can only interpret his *meaning* to the best of my ability. I do not and cannot know definitively what *Heidegger* meant for his reader to understand. Nor can I know if *Heidegger* fully sensed and understood with accomplishing awareness what senses the words spoke into the sensibility of the

world. In thinking, Heidegger gives human voice to these words' senses, to be sure, but this does not entail the he, or I, fully sense them and, thus, understand them. However, like Heidegger, and like any and everyone else, I, too, can and do hear, and I, too, can and do attune and listen to the senses that *accomplish* speaks givingly into the world that I may hear sensitively and thus come to understand what *to accomplish* is and, thus, sense and understand the world more fully.

That to accomplish is *the unfolding* of a being (including a being-presencing and a being-existing) into the fullness of its essence, *the leading* forth into this fullness, I agree. Yes, to accomplish *can* be but is not necessarily to produce, and to produce *can* be but is not necessarily to accomplish. To produce can also be, but is not necessarily, an action or reaction or the activity-reactivity comprised by such actions-reactions. To produce, then, can be but is neither in essence nor exhausted by *active, reactive, or interactive* production and the productive activities-reactivities comprised of such active-reactive production. Heidegger, however, speaks of *producere* as an action. Yes, *producere* can speak senses of action and, thus, the action of producing. But *producere* is not necessary an action or an activity, essential or otherwise. Insofar as *producere* is entirely an action of, for, from, or by the action *producere* or another action, *producere* does not and cannot accomplish any being, including anything and anyone.

Heidegger writes that only what is can be accomplished and, thus, can become accomplished. Or, perhaps, could what is in its very being already be accomplished as the being that it is? Or, for example, perhaps what is a being-*existing* in the world is already accomplished *in and as* its being-*existing* in the world. Is what can be accomplished only that which already is? This is a question that Heidegger has responded to already: "Therefore only what already is can really be accomplished."⁷⁵⁶ Maybe, maybe not. I am not yet ready to respond fully.

In "Letter on Humanism," Heidegger writes (in translation):

Thinking does not become action only because some effect issues from it or because it is applied. Thinking acts insofar as it thinks. Such action is presumably the simplest and at the same time the highest, because it concerns the relation of Being to [human]. But all working or effecting lies in Being and is directed towards beings. Thinking, in contrast, lets itself be claimed by Being so that it can say the truth of Being. Thinking accomplishes this letting.⁷⁵⁷

Thinking acts insofar as it thinks. I disagree. Thinking, insofar as it *is* thinking, is not acting, action, or activity comprised of acts or actions; thinking is not reacting, reaction, or reactivity; thinking is not interacting, interaction, or interactivity. Thinking does not act. Thinking *can* but does not necessarily govern acts and actions actualized, i.e. acted with awareness, or intention, or purpose, or will, or consciousness, or some combination thereof. In governing and guiding action-reaction, however, thinking does *not* and *cannot* determine, make, define, constitute, manufacture, actively create, actively produce, actively cause, ground, ascertain, validate, etc., the action-reaction that it governs and, thus, guides. Thinking, insofar as it is thinking, *is not* and *cannot be* force or, therefore, forceful. The governing and guiding of thinking is thoughtful governing and guiding insofar as it is not and cannot be force or forceful. Thinking, then, is not and cannot be a means to any goal, end-goal, or aim. Thinking is not a technique or tool. Thinking, Heidegger seems to understand, is not, nor is thinking of, for, from, or by, *techne*, though it maybe lawfully sensed and understood to be *exhaustively* and *exclusively* technique.⁷⁵⁸ Thinking is not logical *if* and *insofar as* logic is given to sense and, thereof, sensed and,

therefrom, understood, perhaps in advance, to be technique and its corresponding tools and technologies (such as scientific-epistemological methods and their methodologies) for formulating, framing, and positing a problem or puzzle; or for achieving an outcome, a solution, a result, a product, a yield, a fact, *et al.*; or again for evidencing, proving, ascertaining, grounding, or validating such an outcome, solution, result, product, yield, fact, *et al.* Thinking, however, *can* but does not necessarily govern and guide such logical activities.

Thinking can, *perhaps*, come to govern even such acts or actions that are initially purposeful and probably conscious but not—or at least not fully—actualized i.e. acted with restful awareness, or intention, or will. Blinking one's eyes may be such an example. Raising one's voice angrily when upset might be another. Whether or not thinking can come to govern motions that are accidental and safe-keeping—e.g. catching oneself when one trips or flinching from a ball flying at one's face or quickly catching an egg as it roll off the countertop—I am not yet ready to respond. Whether or not such accidental and safe-keeping movements are *actions* or *acts at all* is an essential question. The question of why or why not they are or are not actions-reactions soon follows. Here, too, I am not ready to respond, but I am no longer in lawfully epistemologically metaphysically sensed and, therefrom, lawfully understood-in-advance agreement with the epistemological metaphysical understanding that *yes, of course these are actions, as everyone sees!* That this question is a question worthy of responding to at all has only very recently called my attention to it.

Thinking is not acting. Thinking is not action. Thinking is not nor does it become action. Thinking makes no effect. Thinking does not make, or constitute, or enact, or activate, or actualize, or actively produce, or actively create, etc., any being or action—including anyone and anything, or any action-reaction. Thinking, insofar as it is thinking, has no effect. Thinking actively achieves no effect. Thinking cannot and does not because thinking, or *to think*, is not active or an action, is not reactive or a reaction, is not interactive or an interaction. One can think about someone or something or some situation. Thinking, however, is not a means to an end-goal. Thinking is not a tool whose application is evaluated and thereby valuable in order to actualize-by-achievement *x*, whatever *x* is.

Thinking is not acting. Thinking is not action. Thinking is not, therefore, and cannot be the simplest or the highest act or action. An act or an action could be the simplest or the highest act or action *if* it is governed with, of, and from the full practical awareness and the essential letting be of thinking, and thus *if* it is governed—without condition or qualification—with, of, and from thinking *or* with, of, from, or together with some other practice, such as thanking, giving, loving, resting, safe-keeping, learning, or befriending.

Does thinking *merely* concern a *relation to Being*? This seems far too distant and removed, or even isolated and actively self-asserting. What *is* the *between* that this *relation to* must bridge, and is this relating across or through this *between* understood to be an activation, enactment, actualization, or other category of action or activity? Heidegger does not respond in this letter. I respond: Yes, any and every *action*—and the possibility of, faculty for, and capacity to act or react and, thus, to interact—is a gift-giving being-given with, from, and of that from which we are given to being-come (be-come) to existing in the world and to which we belong in our being-existing in the world. Any and every action, insofar as it is governed and guided fully, or perhaps partially, with, of, and from practice, is a humble, worldly *acknowledgement* and thanks-giving for the giving-gift to beings-existing in the world, including human, of the possibility of, the faculty for, and the capacity to act (generally written here to

include any category of action possible for beings-existing in the world, human or other-than-human).

Whether or not all working lies in being I am not yet ready to respond. All working, and thus all work, *is*. All working and works are possible with, of, and from being as their being *working*, *work*, or *works* at all. But whether work and all working *lie in* being I am not ready to respond. Whether or not all working is directed towards beings I am not yet ready to respond. What does Heidegger understand work to be? What is to work? What is an effect? What is to effect? Is to work to effect, or vice versa? Yes, like working and all works, all effecting and all effects *are* and may presence or may exist. But whether all effecting and all effects *lie in* being I am not ready to respond. The possibility of, the faculty for, and the capacity to effect and be effected *are* givingly being-given with, of, and from being to beings-existing in the world, including human.

Does thinking let itself be claimed by being *so that* it can say the truth of being? No, thinking does not and, insofar as it is thinking, thinking cannot. Thinking, insofar as it is thinking, is not and cannot be a means to anything or anyone whatsoever, *not even* a means to saying truth of being my means of letting itself be claimed by being. For human beings-existing in the world, thinking is imperfect but lawful, lawfully attuned, sensitive, opening and re-opening, restful, letting be and letting be again, vulnerable, and at times uncomfortable and frightful responding (and thus co-responding) to the essential questions that come to meet one—a human being-existing—along the way of sense and sensibility through the world to which this one belongs and fares existingly. Thinking, insofar as it is thinking at all, is lawful. Thinking, insofar as it is thinking at all, is *truthful*. Thinking, insofar as it is thinking, is not and is never estranged, alien or alienated, separate or separated, or distinct or distinguished from the lawful calling, gathering, belonging, safe-keeping, trusting, and guiding of truth such that thinking need to let itself be claimed or reclaimed by truth *in order to* say the truth of being—i.e. in order to say truth. Were this truthful, thinking *would be* a technique and, thus, a means to end-goals. Technique belongs to the domain of activity-reactivity and, thus, interactivity.

Yes, thinking, insofar as it is thinking at all, is *letting beings be*, including the thinker it, her, him, or themselves. Yes, thinking *is accomplishing*—insofar as it *is thinking*—letting what or who it thinks be as it is, without expectation, demand, positioning, framing or reframing, or other activity and force. Such accomplishing is not and cannot be *post hoc* thinking. Thinking *is* this letting. This is an essential difference. Thinking is not, and cannot be, a means to accomplish anything or anyone. Thinking, insofar as it is thinking, *is* being-accomplishing, being-fulfilling. being-completing. Thinking, insofar as it is thinking, is not the means to accomplish what is yet to be accomplished and now lacking accomplishment. The activity of achieving and thereby actualizing, insofar as it is governed and guided by a practice such as thinking, can be a means to accomplishing and, thus, to an accomplishment. But thinking is not achieving accomplishment. Thinking is accomplishing what is thought. Thinking is not *making* or *representing* or *constituting* or *positing* or *framing* or *rendering* or *arguing* or *convincing*, *et al*. These are modalities of actions-reactions and the activities-reactivities these action-reactions comprise. Thinking is, restfully, letting be what *comes of its own* to thought so that thinking *can receive responsibly*, think at all, and thus be what thinking is. Heidegger, I interpret, understood this even as he gave himself once and again, though never perfectly or perfectly consistently by anyone's judgement, but always trustingly and faithfully, to giving his voice lawfully and truthfully to that which called him to thinking—which called him forth to thinking as he fared his way existingly through the world. And Heidegger is not alone or unique to thinking or

thoughtful saying and writing. Augustine gave himself to thinking lawfully and sensitively. Aquinas gave himself to thinking lawfully and sensitively. Descartes gave himself to thinking lawfully and sensitively. Locke gave himself to thinking lawfully and sensitively. Newton gave himself to thinking lawfully sensitively. Hume gave himself to thinking lawfully and sensitively. Kant, Marx, and Nietzsche each gave themselves to thinking lawfully and sensitively. Einstein gave himself to thinking lawfully and sensitively. As have many others—women, men, and human-beings-existing otherwise—whether they are heard or unheard, known or unknown, for whatever reason, within our contemporary academies.

In “Letter on Humanism,” Heidegger notes that “[w]e measure deeds by the impressive and successful achievements of *praxis*. But the deed of thinking is neither theoretical nor practical, nor is it the conjunction of these two forms of behavior.”⁷⁵⁹ The editor of *Basic Writings* notes that in 1845 Marx wrote that

[t]he question whether objective truth can be attributed to human thinking is not a question of theory but is a practical question. Man must prove the truth, *i.e.*, the actuality [also translated reality] and power, the this-sidedness [*Diesseitigkeit*] of his thinking, in practice. The dispute over the actuality [also translated reality] or non-actuality [also translated non-reality] of thinking which is isolated from practice is a purely scholastic question.⁷⁶⁰

Marx understands *practice* as not only distinct, but as the opposite of thinking. Thinking, or theorizing, is the *that-sidedness* of human activity and practice is the *this-sidedness* of human activity; in other words, practice is the real actuality of human activity or, what is the same, the actual reality of human activity. For example, Marx writes that “all mysteries which lead theory to mysticism find their rational solution in human practice and in the comprehension of this practice.”⁷⁶¹ Practice is the real sensuous actuality or the actual sensuous reality of human activity: “human sensuous activity, practice;” “the reality and power, the this-sidedness [*Diesseitigkeit*] of his thinking, in practice;” and later, “he [Feuerbach] does not conceive sensuousness as practical, human-sensuous activity.”⁷⁶² Thinking, or theory, isolated (or, similarly, one could write *alienated*) from practice is *purely* scholastic; theory alienated from practice is *purely* theoretical. It has not power or sensuous reality; it has no effectivity; it is not actualizable in the sensuous world of practical activity.

Marx understands thinking to be theorizing, and vice versa. Theory, therefore, is opposite practice, and vice versa. Humans must prove the truth of their thinking (*i.e.* of their theorizing). *How* do humans prove the truth of their thinking? *How*? This is a technical question. It is not only a fundamental, but an essential epistemological metaphysical and, thereof, scientific-epistemological question. A *how?* question is the proposition of a *problem*. *How* do humans prove the truth of their thinking? This is a problem to be solved. *This* particular problem is of the essence of epistemological metaphysics.

How *do* humans prove the truth of their theorizing (*i.e.* thinking)? We must do so by means of a technique: a test. Humans prove the truth of their thinking by means of a test. What is the test? The test by means of which we prove the truth of our thinking is by *applying* our theory in practice. *How* do we apply our theory in practice? We apply it in practice by attempting to *actualize* it. This actualization is an activation of the theory in application. The truth of a theory that we successfully actualize in application is validly methodologically *practically* validated as truly corresponding to objective truth. As a test, however, one must not

only judge the *effect* or *outcome* of the test, one must evaluate whether the test *itself* is valid *as* a test. *How* do humans evaluate and validly validate or invalidate this test? Humans do so by means of a technique. A validly validated methodology is a technique for validly conducting the test so that both the testing and the test's effects, or results, will be validated. To evaluate the validity of the test requires a validly validated methodology. *How* are the effects, or results, of the validly methodologically validated test judged? Humans must judge the effects of the validly methodologically validated test by means of evaluating the effects of the test. This evaluation is a *measurement* of the effectivity of the actualization of the truth of one's theorizing (i.e. thinking) by means of its application in practice. What is its application in practice? Theorizing (i.e. thinking) is a *tool* or *technique* that humans actualize in application, i.e. in sensuous objective activity, or practice, *in order to* actualize-by-achieving some end-goal or aim. The test evaluates, or measures, the effectivity of this tool when it is actualized in application as a means to actualize-by-achievement some end-goal. The test, in other words, evaluates the effective utility—or what is the same, the practical utility—of the theory, or the thinking.

The truth of a human's theorizing (i.e. thinking) is truth at all only insofar as it has a positive power. This power is the evaluation, or the assigned value of the effectivity of the truth of a human's theorizing (i.e. thinking) when this truth of thinking is actualized in practical application, i.e. in actual reality, as a means to actualize-by-achieving some goal. If the truth of a human's thinking is evaluated to have no actual effectivity, the thinking has no real or actual power. If the truth of the thinking's effectivity is null; its power is null. Thinking that has no effectivity, has no power. Thinking, or theory, that has no power is of no value—it is valueless. Furthermore, the truth of a theory (or thinking) that has no real or actual power is not true and, thus, is not truth. The truth of thinking, or theory, that does not *effectively* and *actually* correspond to objective truth in practice—that is, to real or actual sensuous activity—when tested and evaluated is null, or not true. That which is not true is not truth. Truth that has no real or actual power is not truth. Truth that cannot be effectively actualized in application is not truth.

The power, or value, of the effectivity of the truth of a human's theorizing (i.e. thinking) indicates the *accuracy* of the subjective theory to the objective truth—i.e. to actually real (or really actual) sensuous activity; or what is the same, to practical activity, whether human or otherwise. A theory that is validly methodologically evaluated to be actually effective is correct. A theory that is validly methodologically evaluated to be actually ineffective is incorrect. In other words, a theory that is validly methodologically evaluated really effective is true. And a theory that is validly methodologically evaluated to be really ineffective is false. True and false indicate the power or powerlessness, that is, the positivity or nullity of the effectivity of the truth of a theory (i.e. of thinking) when actualized practically as a means to actualize-by-achieving some end-goal. Testing and evaluating the truth value of our theorizing, i.e. of our thinking over against the objective truth of objective, sensuous activity *is* one of human-being-subjects' practices, i.e. one of human-being-subjects' actual, real, objective sensuous activities. We validly methodologically test and validly methodologically evaluate the truth value of our very subjectivity upon over against actual, real, objectively sensuous activity. When a human-being-subject tests and evaluates the truth value, that is, the power of one's (her own or another's theorizing (i.e. thinking), she is testing and evaluating the validly methodological validity and, thereby, the truth value and, thus, the power, or the effective utility, of ourselves—that is, of our subjectivity.

What, however, does Marx understand practice to be? Practice is *praxis*, and vice versa: “All social life is essentially practical [*praktisch*];” “The coincidence of the changing of

circumstances and of human activity or self-change can be conceived and rationally understood only as revolutionary practice [*Praxis*];” “he [Feuerbach] does not conceive sensuousness as practical [*praktische*], human-sensuous activity” [as Feuerbach *should* so conceive of sensuousness because sensuousness *is* practical, human-sensuous activity]; and importantly, “human sensuous activity, [i.e.] practice [*Praxis*].”⁷⁶³ *Praxis* is actual and, thus, real “human sensuous activity.” Real, actual human sensuous activity is, likewise, practice. *Revolutionary praxis* is practical-critical activity.⁷⁶⁴ Or, vice versa, revolutionary activity is active-critical *praxis* (i.e. practice).⁷⁶⁵ *Praxis* is a modality of activity—human objective, sensuous activity informed by the validated power of the truth of thinking—correct, or true, theory. *Praxis* is practical activity and, as practical activity, *praxis* is opposite *theoretical* activity insofar as the latter is isolated from practical activity and thus without effective actualization in application. Theorizing is theoretical activity. Thinking is a means of making theories: “All mysteries which lead theory to mysticism find their rational solution in human practice;” and “Man must prove the truth, *i.e.*, the reality and power, the this-sidedness of his thinking, in practice.”⁷⁶⁶ In this sense, thinking is theorizing. Theorizing is theoretical activity. Thinking, as a means for making theories, is theoretical activity. A theory is a system of thoughts that is a tool, a tool whose evaluated effectivity determines both its truth value and its utility value, and thus its power. In other words as theoretical activity, thinking must be validly methodologically validated against actuality by means of testing and the evaluation of its effectivity and, thus, the measure of its power and, thus again, its value—that is, its practical utility as a means for posing and actualizing by achieving goals.

Now I return “Letter on Humanism.” What does Heidegger understand thinking to be? Heidegger understands thinking to be “neither theoretical nor practical, nor...the conjunction of these two forms of behavior.”⁷⁶⁷ Thinking is not theoretical, *i.e.* thinking is not theorizing. Thinking is not human theoretical activity. Likewise, Heidegger understands that thinking is not *praxis*, or practice. Thinking is not human practical activity. What does Heidegger understand thinking to be? Heidegger understands thinking to be a deed: “the deed of thinking;” “[t]hus thinking is a deed.”⁷⁶⁸ Yet Heidegger has already responded to this question elsewhere. What does Heidegger understand thinking to be? “Thinking does not become action...Thinking acts insofar as it thinks. Such action [*i.e.* thinking] is presumably the simplest and at the same time the highest...”⁷⁶⁹ Heidegger understands that thinking *is* acting. Thinking *is* action. Thinking *is* activity. Thinking, insofar as it *is* thinking (at all), acts. If thinking is acting, and thus action, and if thinking is a deed, then it would seem that the doing of a deed is the acting of an action. A deed is an act and this act’s action. The doing of thinking is acting and this act’s action.

What, however, does Heidegger understand *praxis*, or practice, to be? In the letter, at least, he does not respond to this question directly. But a reader can plausibly infer that he understands practice, or *praxis*, to be the same as that which Marx understands *praxis* to be: “We measure deeds by the impressive and successful achievements of *praxis*.”⁷⁷⁰ Similarly, seemingly considering deeds, he writes that “[t]he actuality of the effect is valued according to its utility.”⁷⁷¹ In other words, the actuality of the effect of a deed is valued according to the degree of impressiveness and success we evaluate the deed to have achieved, *i.e.* the degree of impressiveness and success we evaluate the deed to effect. *Praxis*, Heidegger would seem to understand in the letter, is a modality of activity. *Praxis* is acting and acting’s actions. As action, *praxis* effects. *Praxis*, therefore, is effective and the power of this effectivity can be measured “by the impressive and successful achievements” of the *practical* activities of humans. We measure deeds, Heidegger writes, by the effects—that is, the achievements—of *praxis*. We

only understand deeds to be deeds, Heidegger seems to understand, insofar as we can measure their effectivity, and thus evaluate their power and their value: “We measure deeds by the impressive and successful achievements of *praxis*.” Yet Heidegger understands thinking to be a deed. And the doing of a deed is the acting of an act. A deed is the active doing of the deed; an act is the acting of the act. A deed is an act: “Thinking acts insofar as it thinks.” A deed—the deed which is of a doing—is the act of an acting.

Heidegger understands, however, that “the deed of thinking is neither theoretical nor practical, nor is it the conjunction of these two forms of behavior.”⁷⁷² Heidegger gives voice to the question: “[I]n what relation does the thinking of Being stand to theoretical and practical behavior?”⁷⁷³ He responds:

[The thinking of Being] exceeds all contemplation because it cares for the light in which a seeing, as *theoria*, can first live and move. Thinking attends to the clearing of Being in that it puts its saying of Being into language as the home of ek-sistence. Thus thinking is a deed. But a deed that also surpasses all *praxis*. Thinking towers above action and production, not through the grandeur of its achievements and not as a consequence of its effect, but through the humbleness of its inconsequential accomplishment.⁷⁷⁴

Heidegger has told the reader of the letter what thinking is: To think is to act. Likewise, to think is to do (a deed). Thinking is acting, and thinking is doing a deed. I have inferred that Heidegger understands, therefore, doing a deed to be acting an act. To do is to act. To do (a deed) is a modality of action and the activity such actions comprise. To do is a modality of activity. Yet Heidegger could understand the reverse of this: Perhaps he understands that to act is to do, and thus to act is a modality of doing (a deed). As far as I am able, there are further questions to which Heidegger would need to respond for the reader before the latter could understand his own understanding of that of which he writes: action and doing. In light of this impossibility, I will infer that Heidegger understands to do to be to act, and not vice versa. Heidegger could indicate the importance his understanding at the beginning of the letter: “Thinking acts insofar as it thinks.” Thinking, Heidegger seems to understand, is a modality of activity that surpasses or towers above both the modality of activity and its deeds (or actions) that *praxis* is as well as the modality of activity and its deeds (or actions) that scientific-epistemological *theorizing* is. This modality of activity, thinking and the “[letting] itself be claimed by Being so that it can say the truth of Being,” a letting that “[t]hinking accomplishes,” is so distinct from the modalities of activity that are *praxis* and *theorizing* that we cannot even *begin* to evaluate thinking as we evaluate the effectivity and, thereby, the power of the actions (or deeds) of *praxis* and scientific-epistemological theorizing. Thus, Heidegger voices the questions: “Whence does thinking take its measure? What law governs its deed?”⁷⁷⁵ Even so, Heidegger has still written “[t]hinking acts insofar as it thinks.” If this is what thinking is, then thinking, practicing (*praxis*), and scientific-epistemological theorizing share an essential communion, a communion from and of which these three modalities can differ at all as what they are: Each *is* acting, each *is* acting’s actions, and each *is* the activity its particular type of actions comprise.

In the letter, Heidegger does emphasize that this modality of activity, i.e. thinking, is not the same as the modality of theoretical activity, or theory, nor the same as the modality of *practical* activity, or *praxis*. Unlike other modalities of activity, thinking is *not* measured by its effects, i.e. by “the impressive and successful achievements” of thinking.⁷⁷⁶ Thinking is a doing,

and doing is a modality of activity. Thinking, that is, is an acting that “surpasses all *praxis*” and “towers above action and production, not through the grandeur of its achievement and not as a consequence of its effect.”⁷⁷⁷ Here—“towers above action and production”—Heidegger seems to write of *action* as the particular actions that comprise the general modality of activity that *praxis* is. He is trying to sense and, then, write the difference between the modality of activity that is *praxis* and the modality of activity that is *thinking*. Thinking, in other words, towers above *praxis* (i.e. “[practical] action and production”).

I understand: All action effects. All acting effects. All activity effects. In other words, all action makes effects; all acting makes effects; all activity makes effects. Insofar as a result is an effect, or vice versa, all action makes results. All acting makes results. All activity makes results. Insofar as one speaks of action, acting, or activity, one must also speak of reaction, reacting, and reactivity. All action both *is* a reaction and activates a *reaction*; all acting both *is* a reacting to another acting and activates a reacting; all activity both *is* a reactivity to another activity and *activates* a reactivity. Epistemologically metaphysically and, thereof, scientifically-epistemologically, the sense and sensibility of the world and, thereof, the lawful understanding of the world are more specific: All action both *is* an opposite, existentially simultaneous, and equal reaction and activates an opposite, existentially simultaneous, and equal reaction. Epistemologically metaphysically, it is absolutely the same for acting and for activity as it is for action. Lawfully, epistemological metaphysical sense and sensibility openingly reveals all action *A* to necessarily have an opposite, existentially simultaneous, equal, and thus epistemologically metaphysically (and, thereof, scientifically-epistemologically) causally indistinguishable reaction *B*. This reaction *B* is the action *B*—the opposite, existentially simultaneous, and equal action *B* whose acting oppositely, existentially simultaneously, equally, and thus epistemologically metaphysically (and, thereof, scientifically-epistemologically) causally indistinguishably activates and actualizes its reaction, action *A*. Epistemologically-metaphysically, it is absolutely the same for acting-reacting and activity-reactivity as it is for action-reaction.

I understand: Action that is *of, for, from, or by itself* or *of, for, from, or by* another action is not and cannot accomplish being or any being, whatsoever, absolutely, including the accomplishing of anything or anyone. The essence of action is *not* and *cannot be* accomplishing or accomplishment. Questions come before Heidegger on his way through the sense and sensibility of the world. These questions call him forth to thinking. Heidegger responds lawfully and faithfully with great sensitivity and responsibility. Heidegger, in thinkingly responding to the questions before him, is faring the way such questions open before him. In thinkingly responding to these question, Heidegger fares the way of giving his human voice to language, and thus to words’ speaking their senses and sensibilities into the world that we, human-beings-existing in the world, may sense and speak. Heidegger, in thinking lawfully and faithfully in responsibility to the questions that call him forth, is learning—once and again—to give his human voice to words’ speaking of senses of which he is so sensitively aware. Again, these are the senses *words* speak givingly into the sense and sensibility of the word. Heidegger is faring a way along which he comes to meet the words that speak these senses. Yet he does not, and cannot, meet all the words whose speaking he senses nor can he, or does he, respond with accomplishing awareness to the questions that call him toward these senses, sensibilities, and their understandings.

In the letter, as well as elsewhere in the relatively little that I have read of Heidegger’s writing, Heidegger does not respond to two essential questions. Undeniably, he acutely senses their call. He is faring the way to which he is gathered and belongs—*his* way. He is faring

toward these questions, responding as he goes as best as he is able. Yet, at least when he wrote the letter, he had not yet come to sense at least three questions with full accomplishing awareness. He does not, then, respond to the questions with an accomplishingly fulfilled—that is, an accomplishing (though not achieving) awareness. Marx, too, faithfully and trustfully fared the way opened before him by the essential questions that called him forth. Yet, despite sensing what Marx did not come to sense along his way, Heidegger did not come into the fullness of a meeting with several words to whose senses he was so attuned, nor did he give voice to the questions that called him forth into the fullness of these words' senses and sensibilities of the world, and thereof, the understanding the give to human-beings-existing in the world. What are these questions? I shall come to them.

In “Letter on Humanism,” there are confusions and even contradictions in what Heidegger writes, and thus what Heidegger responds. For example, thinking acts insofar as it thinks. If, and only insofar as thinking is acting, and thus a modality of action and the activity such actions comprise, then thinking *necessarily* effects. Thinking, one could write, makes effects. If and only insofar as thinking is acting, and if and only insofar as thinking, therefore, is a modality of activity, then thinking *necessarily* effects, or thinking necessarily makes effects. Here one may hear, if one listens, an essential closeness to what *poieîn* (ποιεῖν) is and, therefrom and thereof, the senses *poieîn* givingly speaks into the sensibility of the world. (I shall return to this later in the chapter.)

What does thinking effect? What effects does thinking make? In the letter, Heidegger does respond to these questions. As I noted above, Heidegger understands and, thus, writes: “But the essence of action is accomplishment.”⁷⁷⁸ What is *to accomplish*? “To accomplish,” he tells the reader, “means to unfold something into the fullness of its essence.”⁷⁷⁹ For Heidegger, *to accomplish* is a word that has meaning. Whether he understands this meaning to belong to the word or to belong to the human speaker that gives human voice to the word's senses is unclear here. Leaving this aside, what do the actions of the modality of activity that thinking is accomplish? “[A]ll working or effecting lies in Being and is directed toward beings,” he writes, but “[t]hinking, in contrast, lets itself be claimed by Being so that it can say the truth of Being. Thinking accomplishes this letting.”⁷⁸⁰ Thinking, which is acting insofar as it thinks, accomplishes letting itself be claimed by being [“Being”] “so that it can say the truth of Being.” Thinking, note, *already is* prior to *actively letting itself* be claimed by being. Thinking, then, before it *remembers* to actively let itself be claimed by being, is acting *of, for, from, and by* thinking alone or the thinker alone—that is, *of, for, from, and by* the action alone that thinking is and thus the actor that the thinker is. “Thinking,” he writes elsewhere,

is neither theoretical nor practical. It comes to pass before this distinction. Such thinking is, insofar as it is, recollection of Being and nothing else. Belonging to Being, because thrown by Being into the preservation of its truth and claimed for such preservation, it [thinking] thinks Being. Such thinking has no result. It has no effect. It satisfies the essence in that it is.⁷⁸¹

Heidegger understands that thinking comes to pass before the distinction of theoretical activity and practical activity and, thus, is neither theoretical activity nor practical activity. *Thinking, insofar as it is at all, whatsoever*, is the recollecting of Being and nothing else. Here we come upon a dissonance and contradiction. Thinking, Heidegger also understands, actively lets itself be claimed by being. Thinking, then, is thinking—that is, thinking is necessarily acting *before* it

recollects being and *before* it actively lets itself be claimed by being. Here, in the dissonance and contradictory sensing and understanding of responding to the question of what thinking is, the reader can sense the difficulty of faring a way of essential questions as Heidegger does with imperfect but thirsty, hungry faith, trust, and lawfulness.

The questions' call which Heidegger senses draw him into their corresponding understandings of the world; they draw him beyond many (but not all, by any stretch of the imagination) of the lawful, epistemological-metaphysical senses and sensibilities that are given to and that openingly reveal the epistemological metaphysical sense and sensibility of the world. The question, in other words, and the sensible speaking of their words, open a path before him and call him forth. He decides, once and again, to move, or go, forward into their call, their sense, their sensibilities, and the understandings that correspond to them. He moves, then, faithfully, trusting, and lawfully, with and in the governing guidance of these questions, their words, and the senses they give to him beyond the world epistemologically metaphysically being openingly revealed. Yet Heidegger does not and cannot *know* what awaits him in meeting until he comes into and accomplishes his part of this meeting, the meeting in fulfilled awareness of the questions that call him forth, faringly. There are at least three questions that call Heidegger forth but which, as far as I can tell, he does not quite come into a meeting with them in or with fulfilling awareness—at least in the thinking recorded in the “Letter on Humanism.” In the letter, then, Heidegger does not respond to these questions simply and straightforwardly. The questions are essential: *What is action? What is effect? And What is practice, or praxis?*

For this reason, I suspect, Heidegger writes, for example: (i) “we are still far from pondering the essence of action decisively enough;” (ii) “we view action only as causing an effect;” (iii) “the essence of action is accomplishment;” (iv) “thinking accomplishes the relation of Being to the essence of [humans];” (v) “it [thinking] does not make or cause the relation [but rather] [b]rings this relation to Being solely as something handed over to it from Being;” (vi) “[t]hinking acts insofar as it thinks;” (vii) “[s]uch action [i.e. thinking] is presumably the simplest and at the same time the highest [action and, thus, the activity comprised of this modality of actions];” (viii) “[t]hey [Plato and Aristotle] take thinking itself to be a *technē*, a process of reflection in service to doing and making[, but] here reflection is already seen from the perspective of *praxis* and *poiēsis*;” (ix) “thinking, when taken for itself, is not ‘practical;” (x) “[s]uch characterization [of the action that thinking is as *theoria*, or theoretical activity] is a reactive attempt to rescue thinking and preserve its autonomy over against acting and doing;” (xi) “such thinking [the thinking that ponders the truth of Being, which *is what thinking is*] is neither theoretical nor practical [but rather] comes to pass before this distinction;” (xii) [s]uch thinking is, insofar as it is, recollection of Being and nothing else;” (xiii) “[thinking], [b]elonging to Being, because it is thrown by Being into the preservation of its [Being’s] truth and claimed for such preservation, it [thinking] thinks Being;” (xiv) “such thinking [i.e. thinking essentially, i.e. what thinking is] has no result;” (xv) “it [i.e. thinking essentially, i.e. what thinking is] has not effect;” (xvi) “it [i.e. thinking essentially, i.e. what thinking is] satisfies its essence in that it is;” (xvii) “[t]hinking builds [upon the house of Being];” (xviii) “[t]hinking conducts [historical ek-sistence, that is, *humanitas* of *homo humanus*, into the realm of the upsurge of healing];” (ixx) “[i]t [the thinking of Being, i.e. thinking as what it is insofar as it is thinking] exceeds all contemplation because it cares for the light in which a seeing, as *theoria*, can first live and move;” (xx) “[t]hinking attends to the clearing of Being in that it [thinking] puts Being into language as the home of ek-sistence;” (xxi) “[t]hus thinking is a deed;” (xxii) “[thinking is] a deed that also surpasses all *praxis*;” (xxiii) “[t]hinking towers above action and production, not

through the grandeur of its achievement and not as a consequence of its effect, but through the humbleness of its inconsequential accomplishment;” (xxiv) “[f]or thinking in its saying merely brings the unspoken word of Being to language;” (xxv) “[w]e measure deeds by the impressive and successful achievement of *praxis* [but] the deed of thinking is neither theoretical nor practical, nor is it the conjunction of these two forms of behavior;” (xxvi) “[t]hrough its simple essence, the thinking of Being [which is what thinking is] makes itself unrecognizable to us;” (xxvii) “[w]hence does thinking take its measure?;” and (xxviii) [w]hat law governs its [thinking’s] deed?”⁷⁸²

In Heidegger’s understanding as he recorded in the letter, there is a recurring dissonance in and a disagreement between what he writes of thinking and of what thinking is. *If* Heidegger sensed and, thereof, understood such dissonances and disagreements epistemologically metaphysically and, thus, *if* Heidegger understood such dissonances and disagreements *as problems to be solved* by some *technical* means, *then* these dissonances and disagreements would be epistemological-metaphysical and, thereof, scientific-epistemological problems. Some of these problems would surpass problematic ambiguity and would be epistemologically-metaphysically and, thereof, scientifically-epistemologically contradictory. For example, see (iii), (iv), (xx), (xxi), and (xxii) above. However, even if Heidegger were to sense and, perhaps, understand these dissonances and disagreements strictly epistemologically metaphysically, they would still not be epistemological-metaphysical problems, errors, or incorrectness *by* Heidegger alone nor would they be indicative of Heidegger’s epistemological-metaphysical negligence or oversight. Were these dissonances and disagreements epistemological-metaphysical problems, Heidegger would be, as he is, involved *with* these problems, but he would not be their author, positioner, framer, enframer, maker, constitutor or co-constitutor, constructor, inventor, etc. Heidegger, I suspect, insofar as he too sensed these dissonances and disagreements to some degree, would not have understood them to be epistemological-metaphysical problems. And, I agree: They are not.

In many but by no means all of his understandings, corresponding as these do to what Heidegger senses, Heidegger has been called to move trustingly, faithfully, and lawfully beyond—that is, as governed lawfully from *what* is beyond—epistemological metaphysical common sense and sensibility. He has been called to move trustingly, faithfully, and lawfully beyond the understandings that belong lawfully and correspondingly to epistemological metaphysical sense and sensibility in and of the world. His movement along the way opened before him and the corresponding changes in what Heidegger may sense and understand of the world are *not Heidegger’s* achievement. This movement and these changes are neither action or reaction, active or passive. They are not, nor are they of, from, for, or by active-reactive or active-passive motion. Neither this movement nor these changes are effects. This motion and these changes are not effective *whatsoever*. They are not even so much as *ineffective*—rather, they have nothing essentially to do with effectivity, ineffectivity, or effectivity’s evaluative measure *whatsoever*. Insofar as power is the evaluating measure of the effectivity of an action-reaction and the activity-reactivity such actions-reactions comprise, this motion and these changes are *powerless*.

Heidegger, as a human-being-existing in the world, is *necessarily* gathered into, or enfolded into and by the calling of the questions and the senses and sensibilities these questions open before him as he moves thinkingly into them. But this gathering enfolding is not achievement. Much less is it *Heidegger’s* achievement. He does not move by means of willfully positing problems, definitions, frames, or perspectives and then willfully, actively moving

himself to actualize the solutions to such problems by achievement. The questions which Heidegger senses and responds to are not *problems* at all. Heidegger *does* sense *this*. And, to be sure, the motion and changes of which I write are not accomplished fully. Heidegger does not, and cannot, at will or otherwise, leave behind, much less reject or dismiss, fix or solve, the lawful giving and opening-revealing sense and sensibility of epistemological metaphysics. He can only let it be and learn to sense it more fully, more accomplishingly, more thoughtfully. The dissonances and disagreements the reader readily finds in the letter mark the sensuousities, the steep grades, the challenges, the confusions, the discomforts not only of not knowing the way ahead, but even of the disappearing of any ground for thinking whatsoever. These difficulties are of and come with faring openingly, and thus lawfully, trusting, faithfully, and *thoughtfully*—which can never be blindly, dogmatically, or insensitively—in response to the call of essential questions. *This* is what Heidegger did, a doing that was not *acting*, but *practicing*. This is what Heidegger did—and he did it very imperfectly, without doubt, but returned nonetheless to move along, once and again, the way the questions' call was opening-revealing before him. *This* faring, this doing, is not, and cannot be, *acting*, *action*, or the *activity* such actions comprise. *This* motion is not, and cannot be, active-reactive motion or active-passive motion.

A deed is not necessarily an action. A deed *can* be active. A deed *can* be done actively. But a deed is not necessarily active; a deed is not necessarily done actively. Acting and acting's actions do not, and cannot, exhaust what doing and doing's deeds are. One who does does not necessarily do actively or reactively. Doing and doing's deeds can also be *practical*. Doing can be, and perhaps is in essence, *practicing*. A deed can be, and perhaps is in essence, a *practice*. Doing can be, and perhaps is in essence, *praxis*.

What questions, then, does Heidegger sense and respond to as best as he is able, but to which he does not—at least in the letter—come into the accomplishing of the meeting with and in fulfilling awareness of these questions? What questions does Heidegger sense and respond, as best as he is able, without coming—at least in the letter—into a fulfilled meeting with these questions in and with fulfilling awareness and fulfilling sensitivity? I have organized these questions in groups. These questions are *not* and *cannot be* my own and do *not* belong to me as a product of and, thereby, as evidencing some mystical ingenuity or divinity of which I have possession. The questions are: (i) *What is action? What is to act? What is activity?* (ii) *What is to effect? What is an effect?* (iii) *What is practice? What is to practice? What is praxis?* (iv) *Is praxis action, or vice versa? Is to practice to act, or vice versa? Is practice action, or vice versa?* (v) *What is doing? What is to do? Is doing acting, or vice versa? Is a deed an action, or vice versa?* (vi) *What law governs thinking? What law governs acting and its actions and activity? What law governs practicing and its praxis? What law governs doing and its deeds?* (vii) *What is law?* (viii) Heidegger, especially, could voice the question: *Is human-being thrown into existing at all? Is throwing an action or the activity comprised of such actions?* Throwing, as I understand it, is *forceful*. Throwing, as I understand it, is action.

Heidegger came to senses and understanding that Marx did not come to along his way of thinking in response to essential questions. Nonetheless, *both* responded trustingly, faithfully, and lawfully in thinking the questions that called them forth in and through the epistemological metaphysical sense and sensibility of the world. These senses and sensibilities are given lawfully epistemologically metaphysically to the world, and as *we* are given and gathered lawfully into epistemological metaphysical sense and sensibility; *we* are carried into the through the world, likewise, by the understanding that belongs to this sense and sensibility. I write *we*,

for I include myself, at least, along with Marx and Heidegger as given to, gathered to, and belonging to epistemological metaphysics—given to, gather to, and belonging to epistemological metaphysics at least as and from where and when we began along our paths, faring these as we do. One need not be exceptionally sensitive to faithfully, trustingly, and lawfully listen and heed essential questions and the senses and sensibilities these call us toward. One need not be a great thinking to think and, thinkingly, move faithfully, trustingly, lawfully, and thus practically into the opening of sense and sensibility and their understandings that essential questions call one towards.

What if *prâxis*, or practicing, and thus practice, was not only essential to, but was what the giving-gift of *existing-in-the-world* given to human-being-existing in the world, and to all beings-existing-in-the-world, was? What if *prâxis*, or practice, and thus practicing, not only *was* not, but had nothing essentially or necessarily to do with action, acting, activity, or a modality of activity? What if the very possibility of acting and its actions, as well as the many different faculties and capacities for sensing these possibilities for acting and, then, *acting*, were giving-gifts *to* and *for* beings-existing-in-the-world *for* our existing? What if *existing-in-the-world* was a giving-gift, and thus a being coming-to-exist in the world was *itself* a gift-being-given? *To give* is not an acting or reacting, an action or reaction, or modality of activity or reactivity. *To give is to practice*. What if practice, insofar as it practices, is lawful. What if practice, insofar it practices at all, lawfully governs and limits acting, acting's actions, and the innumerable diverse modalities of activity? What if motion and moving not were no in essence, exhaustively, exclusively, and absolutely, active-reactive motion, active-passive motion? What is *what* motion *is* is not in essence, or primordially, or ultimately, or absolutely, or necessarily *active*, *reactive*, or *interactive*? What if the *ex-sisting* of active-reactive motion, *as* what active-reactive motion is, was possible as a giving-gift of, from, and governed and limited by *what* motion *is*? What if active-reactive, or active-passive, motion was given and is-being-given *movingly* to *ex-sisting* as what it is? What would *this givingly bestowing* motion be? What if active-reactive, active-passive motion was a modality of motion, but neither *what* motion is nor exhaustive of all motion? These are questions to which Heidegger did not come to meet with accomplishing fulfilling awareness and, then, respond to of and from such fully sensitive awareness, *even as* he attuned himself with uncanny sensitivity to the questions ahead of him, listened to them attentively, and lawfully, faithfully, and trustingly heeded these questions as they called him forth in thinking. Heidegger *did* famously respond to the question of the *meaning* of human-being-existing in the world, in *Being and Time* and, again and again, throughout his life of thinking. Metaphysical and, in particular, metaphysical epistemological understandings of what *theōriā*, *poiēsis*, and *prâxis* are were inextricable from his life of responding to the questions before him—prior to the publication of *Being and Time*, in *Being and Time* itself, and beyond into his later years. Even so, as best as I can tell, the understanding that *prâssein* and, thereof, *prâxis*, and that *poieîn* and, thereof, *poiēsis* were both distinct modalities of activity guided his thinking throughout his life. In later studies—such as in the “Letter on Humanism”—both the senses to which he brought thinkingly to sensitive awareness and, thus, his understandings did change. He came to understand that, yes, *prâxis* and *poiēsis* (or *active prōdūcere*) were important to human-being-existing in the world. These two modalities of activity, however, were at best of lesser importance than what was essential to human-being-existing in the world and, thus, to *what* human-being-existing in the world *is*: the modality of actions, and thus the modality of activity these actions comprise, that thinking is.

Differently from pondering the essence of action decisively enough—which Heidegger recognized that “we [including him, I assume] are still far from”—what the essence of action is (i.e. what action is) and what the essence of practice is (i.e. what practice is) are *questions* that call *us*—questions to which *we* belong and which we do not, and cannot close, decide, fix, solve, dispose of, reject, or answer definitively and conclusively by achieving or accomplishing one or another *decisively enough*.

5.7 Action and activity in select secondary literature about Heidegger

For his chapter in *A Companion to Phenomenology and Existentialism*, Craig Delancey sets himself the goal of

show[ing] how the notion of being-in-the-world is not only a break with modern views of the subject that solves epistemological problems, but by offering an alternative to the subject/object division it can solve, or more often escape, some of the central problems of the philosophy of action.⁷⁸³

Delancey achieves this goal—“this done through the attempt”—by looking for “something more fundamental which underlies both [“purposeful consciousness (in this context, subjectivity)” and “a deterministic world of objects and their causal interactions (objectivity)”] and makes them possible.”⁷⁸⁴ In achieving this goal, Delancey lays the “grounds” on which “kinds of activity might be possible which are neither a *sui generis* feature of an isolated subject, nor solely a product of external and purposeless laws.”⁷⁸⁵

In order to identify “underlying common presuppositions” across a spectrum of “seemingly incompatible views” in what would generally be considered analytic philosophical theories of human action, Delancey provides examples of three different events, as follows:

- (1) After Jones trips on a crack in the sidewalk, she falls down.
- (2) Jones blinks.
- (3) Jones announces her plan to balance her checkbook, adds up the total value of the checks she has written, and writes down this sum.⁷⁸⁶

For any theory of action, he explains, the first and basic task is “to distinguish between mere events (events of type 1) and behaviors (events of types 2 and 3). What does Delancey understand an event to be? He does not ask what an event is, but a reader can infer from what he does write. For example, to describe the event (3), he writes that, apparently, “only humans, or at most humans and other complex animals, are capable of such actions.”⁷⁸⁷ Events such as (3) are actions, and actions of this type are described as intentions or intentional states.⁷⁸⁸ For example, “Jones balanced her checkbook because she *desires* to know the remaining balance, or because she *fears* that she may make an overdraft.”⁷⁸⁹ The analysis of intentional and other mental states—such as belief, knowledge, desire, fear, among others—is “distinct from the kind of analysis a mature predictive science like physics offers of more simple events,” such as events of type (1). One superficially familiar with physics, classical or quantum, understands that physicists research *actions*, *reactions*, and, thus, *interactions*. Again, Delancey seems to understand an event to be an action. Event of the types exemplified by (1), (2), and (3) are three distinct types, or modalities, of acting and, thus, of action.

Further along, Delancey notes that “the difficulty of distinguishing behavior from action can be illustrated by consideration of a kind of situation that is an important part of the discussion of action in the tradition of existential phenomenology, although it is largely ignored or denied in the analytic tradition.” What does he understand behavior to be? He does not ask this question. A reader, however, can infer what he understands behavior to be from what he does write. Behavior is, he explains, distinct from mere events such as (1).⁷⁹⁰ Events (2) and (3) are behaviors. Event (2) is exemplary a kind of behavior “seen across the animal kingdom.” Event (3) seems, at least, “to be a special kind of behavior, unique in the terrestrial sphere to humans: an *action*.” I have inferred that Delancey understands events to be actions. If events are actions, and (2) and (3) are events, then behavior is general category of actions and the activities these actions comprise. Delancey confirms this explicitly for (3). So, behavior is action. But, if I set my inference aside, what about behavior (2)? “Common sense,” the author explains, “seems to find that something separates the automatic or limited behaviors of many other kinds of animals, or some human automatic behaviors [e.g. action (1) or behavior (2)], from certain complex behaviors of which humans alone appear to be capable.”⁷⁹¹ He gives several examples of automatic or limited behaviors of animals and humans, as follows: “A spider builds a web, a fly moves toward the light, and a human blinks—these are behavior, they have purposes, but they appear of limited flexibility.”⁷⁹² In contrast to these behaviors, actions might be “behaviors that fulfill a plan, or are motivated by conscious and complex cognitive states, or are guided by explicit rational rules.”⁷⁹³

Two epistemological-metaphysical and, thereof, scientific-epistemological problems are evident: How do action theorists scientifically-epistemologically distinguish actions of the type exemplified in (1) from complex, consciously purposeful actions of the type exemplified in (3)? Likewise: How do action theorists scientifically-epistemologically distinguish distinct modalities of action as exemplified in (1) and (3) from the purposeful but seemingly automatic, perhaps partially or fully unconscious behaviors of the type exemplified in (2)? The two scientific-epistemological problems of action theory indicate the two categories of problems Delancey finds to underlie common presuppositions across a range of incompatible understandings and theories in the philosophy of action. As he says, “[a] commitment to a sufficient scientific naturalism appears to render notions of purpose superfluous,” on one hand, while on the other, “[a] commitment to distinguishing action from behavior (by way of being caused or explained by one or more of a range of candidates for uniquely human mental states) faces substantial difficulties, including that most candidates for such states are inconsistent with the actual practice of expertise.”⁷⁹⁴ Here we learn that Delancey understands *practice* to be *action*, or *practical* action. The practice of expertise is comprised precisely by the complex actions of an human expert in their field—a behavior that the expert is so well versed in that aspects of it—particularly the technical aspects—come to appear automatic, like a spider building a web, a fly moving toward the light, or a human blinking. Practice is a modality of actions and, thus, of acting. Very well, but does *Delancey* understand such behaviors as exemplified by event (2) to be actions? I am unable to confirm whether he does or not.

Here Delancey turns to Heidegger’s *Being and Time* as “providing the most extensive and radical attempt in recent philosophy to find an alternative to the division we inherit between a causal and objective external world and a purposeful and subjective inner world.”⁷⁹⁵ Heidegger’s “existential phenomenology” provides a possible and likely solution not only to “classical problems of epistemology,” but to the two commonly underlying epistemological-metaphysical and, thereof, scientific-epistemological problems of action as understood in the

philosophy of action. Delancey explains how, for Heidegger, “Dasein...is fundamentally *being-in-the-world*” such that “Dasein cannot be separated from the world, and the world cannot be separated from Dasein...”⁷⁹⁶ For any and every particular Dasein, “world is the system of purposes that determines the actual and potential interactions this particular Dasein can have with things or other Dasein, and also the actual or potential interactions this Dasein can understand.”⁷⁹⁷ Likewise, “[w]orld in the sense of being-in-the-world is not external, but includes essentially the interaction of myself with things, and I am essentially defined by these interactions, as are the things with which I interact.”⁷⁹⁸ World is “revealed first and most often through the ways in which we [all Dasein, plural] interact with them [i.e. with other beings, including other Dasein]” and, as such, “world is the *horizon* of possibilities for Dasein.”⁷⁹⁹ Dasein “projects itself onto its possibilities.”⁸⁰⁰

That “Dasein is confronted with possibilities” and that “it is the very nature of Dasein to be aware of these possibilities in some sense, and to realize some and reject others,” does not entail that this is “solely a way of choosing options.”⁸⁰¹ Rather, this is “the actual constitution of Dasein: [Delancey quotes Heidegger] ‘the projection is the way I *am* the possibility.’”⁸⁰² World is the horizon of possibilities for Dasein. Dasein *is* a constitution, i.e. Dasein is both constituted and is the constitution constituting of itself. *To constitute is to act*; constituting is an activity that *makes* that which is being constituted. World is revealed first and most often through the ways Dasein interacts, both with itself constituting itself (an interaction) and with other beings-existing in the world (interactions). The horizon of possibilities that is the world is revealed first and most often through the ways Dasein interacts with these possibilities. Written differently, Dasein both is the possibility of Dasein and is Dasein making Dasein a possible possibility. Dasein, then, *is* revealed first and most often *and* reveals itself first and most often through Dasein’s interactions, i.e. through (by means of) activities-reactivities. Dasein “cannot, as it were, sit still, but must interact.”⁸⁰³ Dasein “is thrown [by Dasein itself, of itself, for itself] into the world from its past, into its future, and this *makes* it possible for Dasein to have comportments” (italics added).⁸⁰⁴ Dasein’s projection of itself onto the possibility of Dasein and, thereof and thereby, onto the possibilities of the world as these possibilities, “*makes possible understanding, and this includes also activity*” (italics on *makes* added).⁸⁰⁵ Here Delancey cites Heidegger, who writes in *Basic Problems of Phenomenology*, as quoted by Delancey: “‘Understanding as the Dasein’s self-projection is the Dasein’s fundamental mode of *happening*. As we may also say, it is the authentic meaning of action.’”⁸⁰⁶ Dasein not only *has* activity, Dasein *is* activity. Dasein’s projection of Dasein upon its possibilities, including the possibility of Dasein being Dasein, “*actually makes* it [Dasein] what it is” (italics added).⁸⁰⁷

What does Delancey understand action and the activity these actions comprise to be? And why does Delancey (and Heidegger, at least at the time he wrote the works from which Delancey quotes) understand human-being-existing in the world *to be* our activities, and thus to be activity, and, thus, to be the authentic meaning of action? These are *not* rhetorical questions—far from it.

In his eighth endnote, Delancey cites Hubert Dreyfus, explaining that he follows Dreyfus “in using ‘activity’ as a neutral term to avoid confusion with the formal notion of action” of the philosophy of action.⁸⁰⁸ “[T]he term [‘activity’],” he continues, “includes behaviors” and can “also refer to events described in alternative ways where the distinction between behaviors and mere events may not arise.”⁸⁰⁹ Though I had not read the book by Dreyfus that Delancey cites, I decided to quickly read the passages in this book to which Delancey draws his reader’s attention. In this passage, Dreyfus writes:

Notice that in trying to explain Heidegger, I have had to speak of *activity* rather than *action*, since Heidegger may well hold that the subject/object account of *action*, which is self-evident to common sense, does require that the movements that constitute action be performed intentionally. Heidegger, however, is trying not to explicate our commonsense concept of action but to make a place for a sort of *comportment*, as he calls it, that has been overlooked both by common sense and a foriori by the philosophical tradition...Heidegger...wants to work out an account of everyday, nondeliberate, ongoing coping. In letting such comportment show itself as it is in itself, Heidegger has to free himself not only from the tradition but from our commonsense focus on deliberate action...Heidegger wants to show that we are not normally thematically conscious of our ongoing everyday activity...⁸¹⁰

Dreyfus understands everyday, nondeliberate, ongoing coping and the corresponding modes of comporting oneself to be “our ongoing everyday activity.” *To cope* is to be active in activities—not necessary *actions* in any deliberative, thematically conscious manner, but active in activities none- and nevertheless. Likewise, *to comport* oneself appropriately and even non-deliberately towards and into such activities is also *to act* in the world towards and into the activities of the world, even if *to comport* oneself is not *to act* in any deliberative, thematically conscious manner. Indeed, Dreyfus, like Heidegger when writing *Being and Time*, understands that “[t]he bare objects of pure disinterested perception are not basic things we can subsequently use, but the debris of our everyday practical world left over when we inhibit action.”⁸¹¹ Objects, as object, are the reaction, or result, of our act of inhibiting our *practical* acting. The practices of our everyday practical world are *our* practices, and these practices include both our everyday, nondeliberate, ongoing activities and our purposive, deliberate, thematically conscious actions. Dreyfus understands that a practice is either an action or an activity. To practice, then, is to act, whether in a deliberative, thematically conscious way or in a nondeliberative, not thematically conscious way (i.e. to cope). To be a human-being-existing in the world is to practice, and to practice it to act: “there are only skills and practices,” and skills are the techniques corresponding, principally and foremost, to the *how* of our activities and then, *perhaps* but never necessarily, to the *why*.⁸¹²

Dreyfus’ understanding that nondeliberative, not thematically conscious everyday practices (e.g. coping, comporting) are activities (but not deliberative, thematically conscious actions) seems to have been consistent throughout his career. In the introduction he wrote with Mark Wrathall for *A Companion to Heidegger*, the authors explain that “being-in-the-world means that we always find ourselves in the world in a particular way—we have a ‘there,’ that is, a meaningfully structured situation in which to act and exist—and we are always disposed to things in a particular way, they always matter to us somehow or other.”⁸¹³ Our disposedness, in turn, is revealed to us “in the way our moods govern and structure our comportment by disposing us differentially to things in the world.”⁸¹⁴ In other words, our disposedness—the result of our being disposed—is “an ‘attunement’” to things in the world.⁸¹⁵ This attunement, however, “necessarily goes with an understanding of what things are.”⁸¹⁶ Like Delancey, Dreyfus and Wrathall seem to concur with Heidegger at the time he wrote *Being and Time* that “Dasein’s understanding of the world as a kind of “‘projecting onto possibilities.’” As Delancey explained, the projecting onto possibilities is an existential activity, and this activity *constitutes* Dasein. Constituting is acting, whether with deliberateness and thematical consciousness or not.

Dreyfus and Wrathall help their reader understand, in turn, what understanding, that is, what “a projective existential understanding of the world” is, as follows:

To see what Heidegger has in mind with the term “understanding,” one needs to focus primarily on practical contexts and practical involvements with things in an organized and meaningful world. I am in the world understandingly when I am doing something purposively, for example, making an omelet in my kitchen. In doing so, I “let” the things in my kitchen be “involved with” each other—the eggs are involved with the mixing bowl, which is involved with the wire whisk and the frying pan and the spatula. As I heat the frying pan in order to melt the butter in order to fry up the omelet in order to feed my children, I am ultimately acting for the sake of some way of being a human being—for the sake of being a father. All these connections between activities and entities and ways of being are constitutive of the understanding of the world I possess. In the process of acting on the basis of that understanding, in turn, I allow things and activities to show up as the things and activities that they are...In acting in the world, then, I understand how things relate to each other...”⁸¹⁷

First a reader can note that *to do* is understood to be *to act*: “when I am doing something purposively, for example, making an omelet,” which is an activity, e.g. “I am ultimately acting for the sake of...”. Doing is a modality of acting. But Dreyfus and Wrathall do not ask what *to* is. They are helping us understand what being disposed, being attuned, and understanding are. Our disposedness is an attunement, and our attunement necessarily goes with an understanding of what things in the world are. The understanding of Dasein is Dasein projecting Dasein on possibilities, including the possibility of Dasein as a way of being-existing-in-the-world. Dreyfus and Wrathall emphasize that to understand what understanding is, one must focus on *practices*—that is, on the practical contexts and practical involvements of oneself and others in the world. All of these practices and their innumerable and shifting relations with each other and with other beings are *activities* and *interactivities*, i.e. relations with one another as one and the other *act*. Dasein’s practices are both the activities both of projecting Dasein itself on possibilities, including the possibility of Dasein as a way of being existingly in the world and the activities on the basis of which understanding (i.e. the projecting onto possibilities in the world) Dasein allows things and activities to show up in the world as the things and activities that they are. To practice is to act. Practice is action or acting, whether acting deliberately and thematically consciously or just coping and comporting ourselves in an everyday, nondeliberative, not thematically conscious manner. Dasein *is* at all insofar as Dasein acts and actively activates and actualizes itself and its very possibility by means of its ongoing activity.

This is the essential epistemological metaphysical problem I have come before in prior chapters. A Dasein is its *actus primus* and the *actus sui* of itself, for itself, from itself, by itself. As its *actus primus*, Dasein is the act of projecting itself both *as* and *onto* the very possibility of being itself at all and, effectively thereby, understanding itself and, effectively thereby, actively disposing and attuning itself to the world. As the *actus sui* of itself, Dasein is of, from, and for itself and oppositely, existentially simultaneously, equally, and thus epistemologically-metaphysically causally indistinguishably by itself, upon over against itself, continually actualizing itself actively, that is, continually projecting both itself and the very possibility of being Dasein itself at all forward into the future from out of the past onto possibilities of itself as a Dasein in the world at all. Dasein as *actus sui* of itself, Dasein is that upon which upon which

Dasein acts and Dasein is perpetually standing reserve for functional deployment into the activity of projecting itself onto possibilities, including the possibility which Dasein is. The apparent pleonasm is necessary. Whether or not this is what Heidegger understood when writing *Being and Time*, and whether or not this is what Heidegger intended his readers to come to understand when reading *Being and Time*, I do not know. This is, however, what Dreyfus and Wrathall understand, it seems, and they indicate that their understanding is attuned to Heidegger's.

In a later essay, Dreyfus' understandings have not shifted, at least as far as I can tell. He writes that "[b]eing a world-discloser is, indeed, what is essential about Dasein but, since Dasein's openness or transcendence arises from the finite stand it takes on itself through its activity in the world—that is, its essence is its existence—it cannot suffer the loss of its ability-to-be without total annihilation."⁸¹⁸ The epistemological metaphysical problem I mentioned above is found here, too. Dreyfus understands Dasein's essencing to supervene on ("Dasein's openness or transcendence arises from") its existing, and Dasein's very existing both is and is by *Dasein's* own act, i.e. the standing it takes on itself through—i.e. by means of—its activity in the world. Insofar as Dasein is, Dasein is existing, and insofar as Dasein exists, Dasein exists both *as* and oppositely, existentially simultaneously, and equally as *a result of* its activity in the world. Dasein's very existing is, then, a reacting. Dasein is the effect of its own effecting—i.e. is the effect of its activity in the world. Its essence is its existence, and existing is the activities of different modalities of acting, whether acting deliberately and thematically consciously or acting non-deliberately and not thematically consciously.

While Mark Wrathall both appreciates Dreyfus' interpretation of Heidegger's understandings—particularly Heidegger's understandings during the period of writing *Being and Time*—and understands Dreyfus' own understandings, he does not share Dreyfus' understandings without important qualifications. Wrathall develops one area where his understandings differ from Dreyfus' in "Heidegger on Human Understanding."⁸¹⁹ In this essay, Wrathall summarizes the pragmatic interpretations of Heidegger's understanding of understanding and interpretation. He considers Dreyfus' interpretation influential among the pragmatists accounts. Dreyfus understands three modes of understanding, the second supervening upon the first, and the third upon the second. These are, first, "primordial understanding," i.e. "unreflective, everyday projective activity" (recall Dreyfus distinguishes deliberative, thematically conscious action from unreflective, everyday projective activity); second, "interpretation," or "laying out the as-structure;" and third, assertion.⁸²⁰ Each of these three levels of understanding is a level of activity, and the second and third levels are the type of activity that some philosophers working in the philosophy of action maintain are distinguishable *as* actions in light of the complex mental states that motivate them (as Delancey discussed). Rather than the pragmatist hierarchical (i.e. vertical) interpretation of Heidegger's understanding and, thereof, the pragmatists' own understanding *of* what understanding *is*, Wrathall interprets Heidegger's understanding of understanding horizontally. Wrathall understands *what* understanding *is* from his interpretation of Heidegger. Wrathall understands that understanding *is* a function of world disclosure. In other words, understanding is a means by which human beings existing in the world achieve—not accomplish—world disclosure. Each type of understanding-compartment "is a concretization of a common structure" and is horizontal in that "the different types of understanding need not be derived from each other—insofar as they are types of understanding, they are all on the same level with each other."⁸²¹ One type of understanding is only *relatively* primordial—that is, the primordially of one or another type of

understanding is judged (by a Dasein, presumably) relative to its “centrality to the primary ontological function of world disclosure” (of this same Dasein).⁸²²

Interpreting Heidegger’s discussion of understanding and, thereby, informing his own, Wrathall notes that “the formal structure of understanding in general” functions as a means in and for world disclosure. “The *function* of a thing,” Wrathall writes, “is the operation it performs, the part or role it plays in achieving an overall end or purpose.”⁸²³ “The structure,” he continues, “is the way constituent features of a whole are organized so as to perform the function.” Wrathall understands understanding in general—i.e. all types of understanding—to be a structure that functions. In other words, understanding not only *operates*, but *is* its operating as a means to world disclosure. A function is not, and cannot be, an end in itself. Understanding *is* a function operating in order to, or as Wrathall writes “so as to” achieve an overall end or purpose. Such an end, however, is and can only be an end-goal. Wrathall does not ask what an end is. An end is in itself, not achieved by means. The organized parts, or structure, that are organized in order to operate functionally as a means to world disclosure—in other words, understanding—is a projection onto possibilities, and vice versa. The function the understanding performs is “disclosing the world as a setting for meaningful action.”⁸²⁴ Here, intentionally or unintentionally, Wrathall situates himself in the camp of the philosophy of action that considers action to be action at all only insofar as it is deliberative, purposeful, and conscious, and thus an effect of, that is, *effected by* the prior *activities* that complex mental states are. Each of these mental states could be a *type* of understandings in Wrathall’s horizontal understanding of what understanding is.

Wrathall, then, like Dreyfus, distinguishes between action and activity, and though Wrathall does not explicitly indicate this, a reader can only make sense of Wrathall’s understanding of what understanding is *if* the reader assumes, in good faith, Wrathall so distinguishes. For example, Wrathall writes that “vertical accounts [i.e. pragmatist interpretations of Heidegger’s understanding of understanding and interpretation] are mistaken in even treating understanding as a *type* of act at all.”⁸²⁵ He continues immediately:

All human actions (as distinct from mere behaviors or merely spatio-temporal events) involve understanding—that is, seeing in terms of possibilities. All human compartments...are understanding-compartments. Interpretation, by contrast, is an act—an act in which one appropriates the understanding and develops it through a commitment to particular significations disclosed in the understanding.⁸²⁶

Interpretation is *deliberative, purposeful, and conscious*. Only therefore does Wrathall understands interpretation to be an *action*. However, because interpretation *is* deliberative, purposeful, and conscious, it is *not* an activity. A Dasein interprets, or acts, from out of its achievement of world disclosure by means of a functional understanding activity. A Dasein interpreting is a Dasein acting *deliberatively, purposefully, and consciously*. A Dasein interpreting is a Dasein *actively* “developing and appropriating possibilities through a commitment to a particular course of action [distinguished from activity]” and, therefore, “some form of interpretation will be pervasive in all particular instances of worldly action [distinguished from activity].” What, however, is the structuring, functioning, operating, and projecting that understanding is if it is not action?

As Wrathall writes, “[a]ny actio we perform involves a commitment to developing a particular way of projecting onto possibilities, which amounts to an ‘interpretation’ of ourselves

in the world. The world-disclosive function of interpretation is to involve us in developing, refining, and articulating the possibilities projected by the understanding.”⁸²⁷ The action that interpreting is, we learn, is *also* a function operating as a means to disclose the world. Without recognizing it, Wrathall brings *action* within the realm of *activity*, and vice versa, even after he has attempted in the essay to distinguish these as regards the functional operating as a means to world disclosure that understanding is and, distinctly, the deliberative, purposeful, and conscious action that interpreting is. What, however, is the *projecting onto possibilities*? What is this *projecting*? Here Wrathall, in informing his own understanding of what this *projecting* is, Wrathall quotes Heidegger. “The [functioning] structure [that understanding is] consists in projecting onto possibilities.”⁸²⁸ “‘Projection,’” Wrathall writes, quoting Heidegger, “unlike pure perception, does not terminate on an object, but ‘unveils without making what is unveiled as such into an object of contemplation’ (GA 24: 398).”⁸²⁹ Wrathall continues quoting Heidegger: “‘What is *most proper* to this activity and occurrence,’ that is, to projection, ‘is what comes to expression linguistically in the prefix “pro-”, namely that in projecting, this occurrence of projection *carries* the projecting one *out and away from itself* in a certain way’ (GA 29/30: 527).”⁸³⁰ Projecting, Heidegger understands, is an activity. Wrathall does not indicate that he understands projecting in any other way.

What, however, is the occurrence of which Heidegger writes? It is, it seems, an instance of the projecting—in other words, a Dasein-specific, spatiotemporally-specific point of the ongoing activity that is this particular Dasein’s projecting onto possibilities. The occurrence is a spatiotemporal slice of a specific Dasein’s ongoing activity that projecting onto possibilities is. What, however, are the “mere behaviors or merely spatio-temporal events” from which Wrathall distinguished deliberate, purposeful, and conscious action *as* action?⁸³¹ Like the understanding—i.e. like the *projecting of projecting onto possibilities* that both Dasein is and is the means by which Dasein makes possible, or actualizes the possibility of, its very own possibility for existing in the world—mere behaviors and merely spatio-temporal events *are* activities. One can recall Delancey, for example, and his examples of (i) a mere event and (ii) a mere behavior, but one need not do so. Concerning mere behaviors, one can consult biology—an introductory college-level biology textbook, for example, or a textbook on behavioral biology.⁸³² What one will find is that mere behavior is actions, reactions, and interactions that are purposeful but mechanistically automatic—i.e. automatic action, reaction, and, thus, interaction. In all cases, mere behaviors are epistemologically-metaphysically understood and, thereof, scientifically-epistemologically explained as chains of actions-reactions, activities-reactivities, and thus interactions and the interactivities different modalities of interactions comprise. Concerning mere spatio-temporal events, one can ask what contemporary physicists research. Contemporary physicist research precisely the mere events that are the behaviors of the fundamental particles of the universe—which is to write, all existing absolutely, of the cosmos. And what are these behavioral events? They are actions, reactions, and interactions, regardless of whether one is researching the macroscopic levels of the universe where classical mechanics and relativity explain these activities-reactivities or one is researching the microscopic levels of the universe where quantum mechanics explain these activities-reactivities and upon which all other levels of existing supervene emergently and complexly—including human-beings-existing in the world. If Wrathall does not respond to further questions (questions that are the same or similar to those I noted above with regard to Heidegger’s “Letter on Humanism”), then human-being-existing’s understanding actively-reactively and, thereby, complexly and dynamically (dynamic in the sense of classical physics) emerges from what

behavioral biologists and, more fundamentally, physicists research and explain. Whether or not Wrathall or—as Wrathall interprets him, at least—Heidegger would be in agreement is impossible to infer from Wrathall’s essay. However, this is understanding of understanding—as *projecting onto possibilities* that, in turn, makes human-being-existing’s actions (different from mere activities) possible—is an epistemological-metaphysical understanding of what understanding is in essence and whence it comes. Understanding is complexly and dynamically emergent, human-specific, nondeliberative, non-reflective, not thematically conscious activity that is distinguishable both from human deliberative, reflective, self-referential, thematically conscious action and from mere mechanistically automatic behavior and from mere spatio-temporal events (whether the action-reaction of a macroscopic classical two-body system or a microscopic quantum excitation of an interaction field whose position is only probabilistically known).

Another important differentiating qualification of Wrathall’s understandings from those of Dreyfus is what the former understands practicing to be, and thus what he understands a practice to be. Dreyfus understands coping to be nondeliberative, non-reflective, not thematically conscious practicing. Coping is background practicing. *This* modality of practicing is “skillful activity” yet nondeliberative, non-reflective, and not thematically conscious activity.⁸³³ Another modality of practicing, of course, is afforded by the former. As Dreyfus understands, this is the modality of practical action (distinct from activity), i.e. of deliberative, purposeful, conscious action which is *made* possible by, or whose possibility is effected (made out) by, or again, as Dreyfus and Wrathall write, which is afforded by coping activities.⁸³⁴ In recent years, however, it seems that Wrathall has come to a distinct understanding of what practice is. In a personal communication, I asked Wrathall what he understood practice to be. “I offered my best account of a practice in the introduction to *Background Practices*,” he responded.⁸³⁵

In the introduction to *Background Practices*, Wrathall notes his understanding of the distinction between skills and practices. “Skills,” he writes, “enable us to participate in a practice fluidly.”⁸³⁶ Elsewhere, citing Dreyfus, Wrathall elaborated further what a skill is: “a skill is a bodily set, given concreteness in a particular worldly setting, and only by means of such a set do we gain access to the ‘thickness’ of existence.”⁸³⁷ And what is a bodily set? To respond, Wrathall cites Dreyfus: a bodily set is “ ‘an actualization of a particular habit or skill...a skill which, indeed, [one] cannot entertain apart from its actualization in a given activity of anticipating;’ ” a skill, then, “ ‘cannot be entertained apart from some particular activation.’ ”⁸³⁸ For the moment I will pass over the apparent circularity.

A practice, however, “is not reducible to a skill.”⁸³⁹ A practice is “the standing condition of the possibility of acting skillfully in a domain...a practice is a complex structure that sustains action.”⁸⁴⁰ What is this complex structure that a practice is? “This structure,” he writes

is a particular way of organizing the world and agents into settings within which normatively articulated purposive activities can be pursued coherently. The structure (a) is embodied in skillful dispositions to act, (b) is incorporated concretely into the equipmental contexts of the surrounding world, and (c) involves an element of social recognition.⁸⁴¹

He immediately clarifies: “A practice...is not an action nor reducible to a set of actions” but “an ongoing practice necessarily gives rise to lots of particular actions.”⁸⁴² The practice, then, “is not

found in those actions [to which it gives rise], but in the skills, objectifications, and shared meanings that support and give structure to those actions.”⁸⁴³ Wrathall elaborates further on what “a particular way of organizing the world and agents into settings withing which normatively articulated purposive activities can be pursued coherently” is:

To say that a practice has a normative order or that it is normatively articulated means simply that there are better or worse ways to engage in the practice, and the actions that belong to a practice can be done well or badly, properly or improperly. Being subject to the normative order of a practice is a criterion by which we can tell if an action belongs to a practice.⁸⁴⁴

Furthermore, “practices are purposive because there is an end or goal in view when one engages in the practice...The full rich character of most practices comes from the way that they support the pursuit of multiple aims.”⁸⁴⁵ Yet practices do not cease or collapse once a goal is achieved; rather, they “persist beyond any particular successful performance of the actions that belong to the practice.”⁸⁴⁶ This, again, is because “the practice itself is the structure in virtue of which certain actions will ‘belong to’ or ‘express’ or ‘instantiate’ the practice.”⁸⁴⁷ An action, then, “expresses the practice well when it furthers the ends or purposes of the practice while drawing on the skills and equipment that embody the practice.”⁸⁴⁸ Practices are “ingrained into bodies in the form of skillful dispositions to act and discriminatory capacities” that “persist independently of our current involvements and [give] us standing possibilities for action.”⁸⁴⁹ This skillful disposedness “is an important way in which practices bring intelligibility to the world,” for one’s “ability to understand what would otherwise be a chaotic whirl of events depends on having skills for discriminating meaningful features and responding appropriately to what happens around” one.

Finally, practices “are social in the sense that they are typically learned from, or learnable by, others” and “inauguration into practices is an essential part of coming to belong to a broader community.”⁸⁵⁰ Practices are “socially constituted,” “must in principle be accessible to and communicable to everyone,” and, on being inaugurated into one or more practices, “we acquire a shared sense of appropriateness—of not just what constitutes a proper or improper performance within a practice, but also what constitutes a good and worthwhile life.”⁸⁵¹ “In some sense,” then, “all practices form a kind of background to actions, withdrawing from consideration as we are engaged in the action.”⁸⁵² As the background for possibilities for acting and their actions, “what becomes salient are the affordances,” or possibilities for action, “of a current situation;” in other words, “the practice itself becomes transparent in favor of the entities and tasks that are most pressing at the moment.”⁸⁵³ Distinguishing his understanding of practices in general from Dreyfus’ understanding of background practices, Wrathall notes that “[o]rdinary practices make a limited domain of entities and actions intelligible to us” while “[Dreyfus’ understanding of] background practices make the world in general intelligible to us.”⁸⁵⁴ I am not sure that Wrathall’s distinguishing achieves (not accomplishes, for we understand ourselves to be considering *activities* and *actions*) the distinguishment that he understands it to achieve. If I am to, perhaps, understand Wrathall more fully, I first need to understand what he understands the difference between practice and human-being-existing’s understanding to be. Unfortunately, he has not responded to this question in any published literature with which, at least, I am familiar. But I can work with what he has published.

I recall, as discussed above, that Wrathall distinguishes his understanding of human-being-existing's understanding from that of Dreyfus. Dreyfus understands that the most primordial and fundamental level of human understanding is nondeliberative, unreflective, everyday projective activity; in other words, the most primordial and fundamental level of understanding—i.e. what human understanding *is* in essence—is skillful coping which, in turn, either is or is made possible by background practices.⁸⁵⁵ Wrathall's understands that human-being-existing's understanding is the structure *that is* both a human-being-existing's projection onto possibilities as *itself* a possibility of what-to-be projected by its own projecting (a projecting that *itself* must be a possibility already projected and onto which human-being-existing has projected itself onto) and a human-being-existing's projecting onto possibilities before it *as already* this *particular* human-being-existing choosing who—not what—to be and how to be a human-being-existing in the world.⁸⁵⁶ And, as I noted, Wrathall understands that projecting is “activity” and that any given project, or act of this activity, is an “occurrence” of this activity.⁸⁵⁷ For Dreyfus, primordial and essential understanding is background practices, and background practices are “nondeliberative, unreflective, everyday projective activit[ies].” What, however, is the difference between what Wrathall understands human-being-existing's understanding to be and what he understands practice to be?

I can begin to respond by responding first to this further question: As Wrathall understands, what belongs to what: a practice to a skill, or a skill to a practice? Wrathall understands both practices and skills to be practices and skills *of* human-beings-existing, *for* human-beings-existing, *from* human-beings-existing, and *by* human-beings-existing. In this sense, existing practices and skills of the world are human-beings-existing's practices and skills. Wrathall writes that a practice is not reducible to a skill. A skill enables us to participate in a practice fluidly. It would seem that a skill belongs to a practice and, in this belonging, a skill is both of and for the practice and develops further within the practice by practicing. Yet a practice is “ingrained into bodies in the form of skillful dispositions to act and discriminatory capacities.” And this skill or—what Wrathall seems to understand to be the same—this skillful disposedness “is an important way in which practices bring intelligibility to the world,” for one's “ability to understand what would otherwise be a chaotic whirl of events depends on having skills for discriminating meaningful features and responding appropriately to what happens around” one. A skill is an important *way in which* practices bring intelligibility to the world and a practice is *a particular way of* organizing the world and agents into settings within which normatively articulated purposive activities can be pursued coherently. A skill is a way practice brings intelligibility to the world. This skill is the skill of human-beings-existing. Human-beings-existing, then, bring intelligibility to the world. When epistemologically metaphysically sensed and, thus, understood, this is very close to human-beings-existing making the world intelligible for human-beings-existing or, what is the same, effecting the intelligibility of the world for human-beings-existing. And this, in turn, is very close to human-beings-existing being human-being-subjects either acting on an object world or utilizing the world standing by as means to posit and actualize by achievement end-goals. Vice versa, a practice is *a particular way of* organizing the world and agents into settings within which normatively articulated purposive activities can be pursued coherently. What is the difference, then, between what Wrathall understands “organizing the world and agents into settings with which normatively articulated purposive activities can be pursued [i.e. actualized] coherently” and “bring[ing] intelligibility to the world” so that the world is not merely “a chaotic whirl of events”? Again, epistemologically metaphysically sensed, this seems very close to human-beings-existing making the world *the*

world at all, in the first place, and thereby actualizing the world as the world. A reader may sense a persisting ambiguity between what Wrathall understands a skill and a practice to be.

Wrathall understands a practice to be ingrained into bodies *in the form of* skillful dispositions to act and discriminatory capacities. Can a practice of human-beings-existing exist without the bodies of human-beings-existing? No, given Wrathall's understanding of what practice is, it would seem not. Yet the practice *must* be prior to the ingraining into any one or another particular human body in the form of skillful dispositions. Wrathall is clear about this: practices "persist beyond any particular successful performance of the actions that belong to the practice" because "the practice itself is the structure in virtue of which certain actions will 'belong to' or 'express' or 'instantiate' the practice." Yet a reader is nevertheless before a conundrum. Where or from who or what does a practice originate and thus begin to exist *if* skills, or skillful dispositions, belong to this practice? Practices are socially constituted, Wrathall tells the reader, and, as such, are "typically learned from, or learnable by, others." This only emphasizes the call of the question, however. It does not respond to it: Where or from who or what does a practice originate and thus begin to exist *if* skills, or skillful dispositions, belong to and are developed in the domain of *this* practice? Wrathall does not respond to this question. Again, the distinction between what Wrathall understands a skill and a practice to be remains ambiguous.

What is a skill? Wrathall responds that "a skill is a bodily set, given concreteness in a particular worldly setting, and only by means of such a set do we gain access to the 'thickness' of existence." And a bodily set, he understands, as I have noted, is "an actualization of a particular habit or skill...a skill which, indeed, [one] cannot entertain apart from its actualization in a given activity of anticipating" and which, to be clear, "cannot be entertained apart from some particular activation." Again, not the ambiguity between what Wrathall understands practice to be and skill to be: only by means of the bodily set in a worldly setting that is a skill *do we gain access to the thickness of existence*. A skill, however, is both itself an activity *and* the effect of an two acts, that of activation and that of actualization. Whose acts activate and actualize the skill in order for us (human-beings-existing) to gain access to the thickness of existing? Wrathall's answer seems to be that *we act, we activate and actualize a skill as a means to gain access to the thickness of existence*. But these two acts are *our acts*. Whether or not they are *actions* or mere purposeful but nondeliberative, unreflective, not thematically conscious activities is not clear in what Wrathall understands. These two actions (or activities, as may be) seem to be *themselves* necessarily *skillful*. These two actions (or activities, as they may be) are *purposeful* and we activate the skill and actualize the skill as a means to—that is, as a technique to—actualize our goal by achieving our goal. What is our goal? Our goal is gaining—or rather, I may write plausibly, based on what I understand of Wrathall's understanding—*making* access to the thickness of existence, including the thicknesses of our own individual and collective existences. What, then, is the thickness of existence and what are the thicknesses of our individual and collective existences? Are these distinct from our actions (or activities, as it may be) and, thus, our making?

The question before us is: What is the difference between what Wrathall understands human-being-existing's understanding to be and what he understands practice to be? Wrathall understands the understanding of human-being-existing to be the structure that is the projecting onto possibilities. Projecting onto possibilities—or what the structure is that, in turn, understanding is—is the functioning function that is the operation it performs in achieving an overall end or purpose. This functional operating in order to achieve an end-goal that projecting

onto possibilities is, as Wrathall understands, quoting Heidegger, activity and that any given project, or act of this activity, is an occurrence” of this activity. This activity that understanding is, is indistinguishable—as far as I can discern, perhaps mistakenly—from practice and skillful dispositioning. This activity that understanding is functions as a means in and for world disclosure, where world disclosure is the end-goal. Understanding functions, or operates, then, by actively organizing the constituent features of a whole so as to perform the function, and this function, or operation, which is the activity that understanding is, is actively a means to actualize by achievement the end-goal, which is world disclosure—or in other words, which is the thickness of existence and of our individual and collective existences; or in other words again, which is the intelligibility of the world and of our being-existing in the world. The circularities are *not* what is most important, though *why* there are circularities is an essential question—essential because I find similar circularities of lawful epistemological-metaphysical sense, sensibility, and, thus, understanding among other scholars and researchers whose work I have studied. However, that Wrathall understands, at least, human-being-existing, understanding, practicing, and skillful dispositioning to be in essence, primordially, ultimately, and exhaustively *activity* is what is most important. Deliberate, purposeful, reflexive, and thematically conscious actions are necessarily included, as these are—in their very possibility, much less their actualization—*necessarily* effected by human-beings-existing’s activities, especially the dual, opposite, existentially simultaneous, and equal activities of our projecting onto possibilities and our being projected on possibilities actively by human-being-existing (i.e. us) as a possibility at all—a possibility we must activate and actualize by achievement is we are to be human-beings-existing in *the world*, as Wrathall understands it, at all.

What is activity? What is action? What is acting? And, what is practice in light of what Wrathall responds to these questions? I have not been able to locate his responses.

Other Heidegger scholars, too, have considered action and activity in some regard or another. From an essay written by Bret W. Davis, I first learned that parts of Heidegger’s work recording his thinking into the essence of action after “Letter on Humanism” have been published.⁸⁵⁸ Davis’ essay has been influential for my own responding to questions that come before me. However, as of yet, I have not read many of the works by Heidegger that Davis studies and from which he quotes in this essay.⁸⁵⁹ I have been able to gather an understanding of what Heidegger wrote from Davis’ quotations and interpretations. However, again, I have not read many of the works from which Davis quotes. It is not, therefore, my place to interpret here the full arc of what Heidegger has written in any of these works or across all of them and, thus, the full arc of what Heidegger understood. Despite this, through reading his essay, I can try to interpret what Davis understands acting, action, and activity to be and, ever so tentatively, what Heidegger, too, may have understood.

Davis asks, “what exactly does Heidegger mean by ‘will’?” Davis interprets Heidegger to mean by “will”

a ‘commanding’ [that] is ‘the fundamental attunement of one’s being superior’ to others (N3 152). ‘To will is to will-to-be-master’ (QT 77). In willing one mounts beyond oneself so as to increase the territory under one’s command; will is, in short, ‘being-master-out-beyond-oneself [Über-sich-hinaus-Herrsein]’ (N1 63).⁸⁶⁰

If this is what Heidegger meant, as Davis writes, when Heidegger gave his voice to the word *will*, perhaps I can begin to understand why Heidegger would mean this when he spoke the word.

Davis offers sufficient indication. Davis quotes Heidegger, who wrote “ ‘in general the will itself is what is evil.’ ”⁸⁶¹ Why would Heidegger understand this? Davis gives some indications. “The will,” Davis writes, “is fully unleashed as the technological *will to will*.” He then returns to interpreting Heidegger, writing

Heidegger understands technology as the manner in which the world shows itself when it is calibrated by the will to will...Technology, for Heidegger, is a way of revealing things, or rather, a way of not letting them properly be revealed as *things (Dinge)* with their own integrity...In the technological worldview, all beings are reduced to mere *standing-reserve (Bestand)*, that is, to material and energy resources standing at the beck and call of...the will to will...⁸⁶²

Davis further interprets what Heidegger explains, writing that what Heidegger

means by *Ge-stell* as the gathering (*Ge-*) of a willful setting or positing (*Stellen*) that is the culmination of the history of the ancient producing (*Herstellen*) and modern representing (*Vorstellen*) of beings in the contemporary ordering (*Bestellen*), exposing (*Ausstellen*), and displacing or distorting (*Verstellen*) of them in the denuding world of technology.

Davis’ reader can begin to sense, through Davis, why Heidegger might have written, for example, “ ‘in general the will itself is what is evil.’ ” Yet I disagree. Will is not evil. No particular will of a human-being-ex-sisting in the world is evil in that it is a will, nor is any human-being-ex-sisting evil that wills.

Will is not “a ‘commanding’ [that] is ‘the fundamental attunement of one’s being superior’ to others.” To will is not “to will-to-be-master.” A being, including a human-being-ex-sisting in the world, that wills does not necessary or essentially mount beyond itself so as to increase the territory under its command. To will is not necessarily nor essentially “ ‘being-master-out-beyond-oneself.’ ” Heidegger was mistaken. Why he was mistaken is readily understandable. We are given to ex-sisting in the world given and openingly revealed of, from, and through epistemological metaphysical sense and sensibility, and we are given to ex-sistingly be carried into and through the world by lawful epistemological metaphysical understanding. We belong lawfully to the world into which we are givingly gifted as beings-coming to humanly be-existing in the world. We belong in advance as we are given to the world. Belonging, however, is where we begin in the world. Belonging, however, does not imprison. Belonging, insofar as it is belonging at all, is not and cannot be force, force forcing, or force being forced. Belonging is the home from which we begin faring our ways through the world. We belong to the world lawfully epistemologically metaphysically openingly revealed in sense and sensibility. The law of this world is will willing itself to will autonomously and (self-) sovereignly—that is, without limit, without condition, without qualification except that which it wills itself to will in order to will autonomously and (self-)sovereignly. Lawfully epistemologically metaphysically sensed, and therefrom, lawfully epistemologically metaphysically understood common sensibly, autonomy and (self-) sovereignty are freedom—*our freedom, my freedom, your freedom*. What freedom is, however, is a question—not *my* question, or anybody else’s—that calls us.

Will that wills will to will endlessly without end; will that wills will to will autonomously and (self-) sovereignly is not good. *Perhaps* what such a will wills is evil—though a will is itself

not evil. For a will that willfully wills to will endless without end in order to overcome itself in order to will ever more effectively so as to, eventually, will autonomously and sovereignly (including necessarily *self*-sovereignly)—what we are given to understand as *freedom*, the *free* will—is not, and cannot be good, much less a good will. Such a will is the grounding-ground of itself. Such a will is the *actus primus* and the *actus sui* of itself. Such a will, the grounding-ground of itself, the *actus primus* and—oppositely, existentially simultaneously, equally, and *identically* the *actus sui* of itself, is its own impossibility and, thus its own contradicting-contradiction. Such a will can only endlessly without end willfully overcome itself in order to will to will autonomously and sovereignly—without limit, without condition, without qualification *except* that which will wills itself to will in order to will more effectively and, thus, more powerfully. Such a will *must necessarily* constantly overcome itself willfully if it is to will to will further, more effectively, more powerfully. Otherwise, a will that wills to will autonomously and sovereignly exhausts itself and returns to nothing. A will to will wills to constantly overcome being-nothing. A will that wills itself, a will that wills to will autonomously and sovereignly, cannot and does not rest. All rest is only relative to active, willful movement. *Perhaps* what such a will wills is evil—though the will itself is not evil. In any case, a will that wills to will autonomously and sovereignly in order to will with absolute effectivity can do no good. A will that wills in this way is terrifying. Such a will as this is *lost* and *homeless*. Such a will is scared and, perhaps, hurt. Such a will needs openness, kindness, friendship, and love without expectation, conditions, rejection, being exiled, demands or commands. Such a will as this does not, and perhaps cannot, remember the essential being-belonging to which it lawfully belongs as what it is—a gift givingly and loving given to some beings, for their use and well-being, as these selected beings are themselves given to come to be one or another such being with the faculty and capacity to will, including human beings-existing in the world.

Will is not essentially, necessarily, or exhaustively evil. Will does not necessarily, essentially, originally, or—I trust—ultimately will will to will endlessly without end in order to will ever more autonomously and sovereignly (including necessarily *self*-sovereignly). Heidegger was frightened of the will to will, and I do understand why. I, too, have lived with fear of *tékhnē* in service to the will to will that lawfully gives and opening reveals world in its sense and sensibility and in which world we are belonging and givingly-given to come to exist. His fear, however, clouded his ability to be, to *listen* to the question that called him, and to come to sense thinkingly and, perhaps, understand with fuller being-aware the fuller accomplishing responses that were awaiting his meeting. Fear does this with all of us—with all of us human-beings-existing in the world. When we are fearing, we cannot think. When and while we fear, we can interrogate, we can analyze, we can evaluate and examine, we can reckon, we can reason, we can problem solve and fix, we can argue, we can convince, and we can fight, or we can flee. When we fear we can act and react, too. But when we fear we cannot think, and we cannot rest-beingly.

What is to will? To will is to become sensibly aware of a goal—including a goal one formulates and posits by oneself and for oneself, where this one may be individual or collective—and to activate oneself into willfully active motion towards and in order to actualize the goal by achieving the goal, whether partially or entirely.

What is a good will? A good will is a will that is *both* governed lawfully *and* serves dutifully that which is giving law to openingly-revealing give the world to existing, that which is giving law to opening-reveal the senses and sensibilities and, thereof, the understandings of the

world, and that which is-giving beings to come to exist in the world lawfully sensibly revealed, including human-being-existing in the world. A good will is a will that is *both* governed lawfully in, with, and by practice and which lawfully, dutifully serves the end of practicing—a practicing, insofar as it is practicing, is lawful and good. A good will is a will that is both governed lawfully in, with, and by and which lawfully, dutifully serves the end that being-good and well-being *is*, for these two are the same. A good will is not, and cannot be, a will that wills to will, much less a will that wills to will autonomously and sovereignly (including necessarily self-sovereignly). A good will is a will that is used actively but *lawfully* governed—that is, a will that is practically governed, limited, conditioned, and qualified in service to being-good and well-being. I return below to the question, *What is practice?* We practice, however, and can practice, only when we let our will rest in our belonging, under our care and concern, with our love of what it is, and as our own and, thus, when we let will simply but lawfully be with or within us while we practice and, thus, move practically, even if we, too, are resting openly in stillness and quiet.

Will and the faculty and capacity to will—that is, to use will *lawfully* and, thereof, *wisely*—is a *gift*. Will is a gift we are *given* that we *learn* of being-good, being-well, and corresponding openingly, trustingly, faithfully, and lawfully with that which gives us to the world, and that we may thankfully do this while we are being-existing humanly in the world. Will is not inherently, originally, essentially, necessarily, or—I trust—ultimately will willing to will, nor much less, will willing to will autonomously and sovereignly with unlimited, unconditioned, and unqualified willful effectivity, i.e. will power.

Davis writes of “[t]wisting free of the [d]omain of the [w]ill.”⁸⁶³ We do not need to actively twist free of the will or the domain of the will. This is not freedom, nor will it bring freedom or provide us with freedom. This is us understanding that we must autonomously, sovereignly, and willfully-actively escape, avoid, flee, and punish the will, including our own individual and collective wills. We do not need to, nor should we “turn away from the will.”⁸⁶⁴ Such forceful reaction can only embolden that which we will to rid ourselves of or that which we will and actively and, thus, forcefully ignore, ostracize, banish, or exclude. In actively willing to turn away from the will, we willfully and forcefully close ourselves off from what most needs our attention, our kindness, our friendship, and love, and orienting guidance.

Davis writes of “the problem of the will.”⁸⁶⁵ Will is not a problem. A will is not a problem. A human-being-existing that wills is not a problem. What a will does as a means to will itself willfully to will in order to will autonomously and sovereignly in order to will more willfully, more effectively, more powerfully, and so on endlessly, without limit, condition, or qualification, can be hurtful, distressing, painful, confusing, terrifying, destructive, damaging, and so on. But the will *itself* is not the problem. Davis writes of what we must do *in order to* twist free of the will. This *in order to* indicates that Davis writes of activity-reactivity. Activity-reactivity is and can only be a means to end-goals—in this case, a technical means to willfully free ourselves of “the problem of the will” and “the domain of the will.” This is only, and can only be, a reaction-action and reactive-active. There is no good, nor healing, nor well-being that will come of such activity-reactivity. No freedom will be given to us, nor will meet freedom along our ways, much less will we actualize freedom by means of willfully achieving freedom for ourselves, of ourselves, from ourselves, and by ourselves, as if we were the autonomous and sovereign grounding-ground. We do not need to, nor should we “willfully renounce willing.” We do not need to, nor should we willfully activate “a rejection of willing” in order to actualize by achieving our freedom from the will in the future.

Davis quotes Heidegger as writing “ ‘Perhaps we come to know what non-willing is only once we have reached it.’ ”⁸⁶⁶ We do not need to reach it. We are not distant from it. We are not isolated from it, much less exiled from it. It is truthful that we do not remember what will is. But we sense—even as we will to will autonomously and sovereignly, if we so will—its being-lost and its being-homeless. We already can understand what letting will rest is—lawfully, kindly, lovingly, and thus openingly and vulnerably letting will rest in belonging as the gift that it is. We need not achieve this understanding and the senses to which this understanding corresponds, though we may need to journey once again to come into its meeting. This movement, the movement of faring practically, of faring lawfully, of good faring, and of faring in well-being, is not, and cannot be, active-reactive motion, active-passive motion, or effective motion (all of which are the same).

The motion of which I write is essential and gives the possibility of the gift of *active-reactive* motion, or what is the same, *active-passive* motion. The motion of which I write is the end of itself, as what it is, as it is. It is not a means or a technique, as all active-reactive motion—including willfully active motion and mobilization—is and can only be. There is, then, nothing we need to actualize. There is nothing we need to activate. There is nothing we need to enact. There is nothing we need to achieve. We *do* need to accomplish letting the will rest. Unlike activation, enactments, actualizations, acts, actions, and activities—including willful activities—such accomplishing is not, and cannot be forceful or forced. Such accomplishing *cannot* be willed, thus the will is a gift that, if governed with lawful opening kindness and love and, thus, goodness—however imperfect—can help us be-well in our existing as we fare lawfully in the world. We do not need to, nor should we, strive to extricate ourselves into a region of pure non-willing and, by these means, actively and autonomously free ourselves, for ourselves, of ourselves, by ourselves, and also by these means, actively solve the problem that we are given to understand will to be. We need to remain with and open to the will, and our wills, as the gifts that they are—gifts that we have been given, likewise, the responsibility to kindly, gently, lovingly, wisely, with good and for well-being, and lawful govern as we are lawfully governed by that which gives us to existing in the world. In so doing, along the way of such practice, we, too, we remember what to rest-beingly is. Only along this way will remember our own belonging, and in this belonging, open our homes to welcome the will as what it is—a useful means to good action, action guided and governed from, of, and always welcomingly belonging to and with practice. Practice is lawful.

What, then, does Davis understand action, and the activity such actions comprise, to be? Davis asks, “what would human ‘activity’ be like if it were radically otherwise than willing?”⁸⁶⁷ When we move will lawfully letting will rest, we are not active-reactive or, therefore, interactive. This movement includes letting ourselves rest as we let our will rest. Such rest is not, and cannot be relative. Only active-reactive motion and active-reactive rest is relative, and when such activity-reactivity is relative, it is only relative to other active-reactive motions. The will is gift for activating ourselves or others in order to achieve goals. The will is itself a primordial activation—but that is *all* it is. As such, it is a gift, a gift that we are given—with trust and faith and openness, in love—the law responsibility of governing wisely as an aid during our existing that we may learn and relearn well-being and being-good, that we may listen to essential questions, and responsibly respond in the practical motion of thinking along the ways of sense and sensibility such questions openingly reveal before us.

Why does Davis put scare quotation marks around the word “activity”? I sense, but cannot know without asking him—which I have not done—that he does so because he is aware

of the calling of questions before him that open to meet him and can openingly reveal a way towards the meeting of as yet unmet senses, sensibilities, and, thereof, understandings of the world. With responding to such questions with ever more openingly accomplishing awareness, the senses and sensibilities and, thereof, the understandings of the world to whose meeting the questions lawfully lead Davis, Davis will too come to meet the words which speak these senses and sensibilities into the world that *we* may come to sense them and understand the possibilities we are given as we fare existingly through the world. Davis senses already that he does not speak of activity. But he has yet to come to be the word or words which speak the senses he is coming to meet and understand.

From what I can only gather through Davis' interpretation of the records Heidegger left of his way of thinking, Heidegger, too, moved towards the questions that called him to think the essence of action, acting, and activity; and thus, reaction, reacting, and reactivity; interaction, interacting, and interactivity; and passion, being passive, and passivity. Heidegger had come to sense that action and passion belong together, that activity and passivity belong together. They do. Heidegger may have come to sense that the proper and lawful domain of the will—the domain to which the will properly belongs—is action, reaction, interaction, and passion, and, therefore, activity, reactivity, interactivity, and passivity. It is. Yet whether or not Heidegger sensed this, and whether or not had come to meeting the understanding of such senses, I cannot tell. Davis, quoting Heidegger, writes: “Heidegger clearly states that ‘*Gelassenheit* lies...outside the distinction between activity and passivity...because it does not belong to the domain of the will.’”⁸⁶⁸ What Heidegger writes is ambiguous—though this is not a problem. Yes, being-letting be is not of nor does it belong to the domain of activity and passivity. Activity-reactivity, activity-passivity, however, is the domain *to which* the will lawfully and properly belongs. Thus, yes, being-letting be is not of, from, or in the domain of the will. The will belongs to the domain of action, acting, and activity, *not vice versa*. The will is a gift, the gift of a technique for lawfully activating, actively mobilizing and moving, and thereby actualizing goals. The will is no more, and no less. Activity, reactivity, and passivity and their corresponding motion do not, and cannot, belong to the domain of the will. The will belongs, lawfully, to the domain of activity, reactivity, and passivity and their corresponding motion. When we are given to lawfully to sense and, thereof, to understand with full or partial awareness that action, acting, activity, reaction, reacting, reactivity, interaction, interacting, interactivity, passion, being passionate, and passivity belong to the domain and rule of the will—a will that is given to understand itself to be the *actus primus* and *actus sui* of itself, a will that is given to understand itself to be the grounding-ground of active existing and, thus, of itself—when we are given to sense this, and, thereof, to understand this, we are given to the call—perhaps a strong call, but never forceful—of essential questions gently, kindly, and lovingly opening ways of being-existingly in the world to us that we had not sensed and, thereof, understood before. I have yet to find where Heidegger records his thinkingly responding in coming to meet, face to face, so to speak, the question: What is action? What is activity? What is to act? What is reaction? what is reactivity? What is to react? What is passion? What is being passive? What is passivity? Even had he come with accomplishingly coming-into-fulfilledness awareness of the questions—and he very well did, as I cannot know—such thinkingly responding is a way and cannot actualize an answer by willfully achieving a “decisively enough.”

As I gather and interpret what Davis writes, and through Davis' interpretation, some of what Heidegger has written, I sense that the former understands, and that the latter understood, that what they are and were sensing and coming to meet in understanding was not more activity-

reactivity, activity-passivity, or the active-reactive motion which corresponds to the domain of action-reaction, activity-reactivity. For example, Davis writes (both of his own thinking and understanding and, I believe, intermingling his interpretation of Heidegger's recorded thinking):

...we are to engage in attentive waiting upon the open-region (*die Gegnet*) which surrounds our limited horizons of perception and intelligibility and lets them be in the first place. The resolute openness of this "waiting upon"... [the] authentic thinking as *Gelassenheit* and waiting involves a courageous and mindful "surmising" (*Vermuten*) that enables a "coming-into-nearness to the far" (*CPC 75, 97*)...such thinking as attentive waiting that surmises would neither predetermine nor demand the full disclosure—the unbounded unconcealment—of that upon which it waits. Rather, *Gelassenheit* as attentive waiting is a thoughtful remembrance, a restrained comportment, an indwelling forbearance which steadfastly stays with being (beyng) as the open-region or "abiding expanse" that requires our thoughtful participation for the appropriating events of its clearings of truth (*CPC 76, 79*).⁸⁶⁹

What Davis writes, and what he either quotes or cites Heidegger as writing, is not written about action-reaction, activity-reactivity, interactivity, or passivity. Davis senses this with already acute awareness, even if he does not yet respond to the questions directly, *What is action? What is acting? What is activity? What is passivity?* Heidegger, too, undoubtedly sensed with exceptional sensitivity the call of such questions opening a way of thinking before him. He undoubtedly sensed with more and more awareness, listened to, and heeded the senses being spoken by words yet to be met or met with again along the unforeseeable opening of his path, words yet to be discovered or rediscovered in their offering themselves to us, words to be listened to in a fuller sensing and, thereof, understandings of these words' speaking senses *givingly* that he could sense and, thereof, understand what is given with accomplishing-fulfilling awareness. Heidegger did listen, heed lawfully, faithfully, and trustingly, and move thinkingly and sensitively, though far from perfectly. Such lawful, faithful, trusting sensing and moving, however, requires no expertise or experience. It does not require or need action, acting, or activity. It is not, nor does it require necessarily, much less demand forcefully, *tékhnē, ars, or cræft*. Yet it never makes, and cannot make (*poieîn*), *tékhnē, ars, or cræft themselves* into a problem to be solved, nor does it reject, exile, turn away from, or otherwise abandon these gifts. For human-being-existing, it does require faring existingly though the world. It does require rest and being-letting be. It does require opening to questions as these call us but do not, and cannot, force us to or, what is the same insofar as it is *active* or *reactive*, *make (poieîn)* us listen, much less heed and think or otherwise practice. It is given to all human-beings-existing in the world.

While Davis affords his reader an attentive interpretation and, thereof, understanding of Heidegger, turning to the work of Richard Capobianco can further elucidate the senses of what Heidegger thinkingly comes to understand and shares with a reader in his writing. As Capobianco notes, the ancient Greek thinkers to whom Heidegger attuned himself so keenly understood "[p]oiein [to be] a making manifest as a 'bringing forth' (*Hervorbringen*) in accordance with the primordial bringing forth that is *physis*..."⁸⁷⁰ *Poieîn*, that is, spoke to these thinkers of *phúsis* (also, *physis*), and "*physis* is [and was] the 'measure' (*Maß*), Heidegger insists, and not the subjective designs and dictates of the human subject..."⁸⁷¹ Capobianco continues, lucidly: "It is along with, in accordance with, *physis* that the sculptor 'brings forth' the 'look of the god' from the block of marble...[a]ll 'art...is in 'the highest sense' this kind of 'bringing

forth' in accordance with the arising-emerging that is...*phúsis*."⁸⁷² As Capobianco reminds his reader, quoting Heidegger, "[t]he *technites* is one whose activity 'is guided by a comprehension whose name is *techne*,' yet this word does not simply mean 'a doing and making;' rather, *techne* is fundamentally 'a form of knowing.'" This form of know *how* is knowing *how* to bring forth the work of art in accordance with—that is, lawfully governed of and from, and only in this way, and never forcefully, by *phúsis*, including especially the *phúsis* of the beings-existing the *technites* takes up and works, simultaneously, both with and on—even if only as the *technites*' glimpse senses and comes to meet the being- or beings-existing that, of their own, gleam before and toward her, gathering her to them and she, them to her.⁸⁷³ This is not an en-counter. This is a meeting that gathers both the *technites* and the being- or beings-existing she senses into the openness between them, where and when together they come to reside of a time.

Capobianco studied at great length what Heidegger understood and of what he wrote when he wrote of *clearing*, or *opening*, or *open-region*. Of the scholars of Heidegger's work I have read, he affords the most sensitive reading of the senses to which Heidegger gives voice. Over the years, Capobianco as reminder his readers that "[w]e humans, along with all things, are granted by the clearing and sojourn with the clearing." Quoting Heidegger, he writes: "To put an even finer point [on the matter of the identity of clearing and human being existing in the world]," Heidegger writes that " 'the human being is not the clearing itself, is not the whole clearing, is not identical with the whole clearing as such.'"⁸⁷⁴ Over his years of thinking, Heidegger comes to sense, and therefrom, to understand that the clearing he writes of is not simply that cleared up by means of the light that shines ontically, that is, by light existing in the world giving warmth and illuminating being-existing in the world. Capobianco summarizes this succinctly. Referring to Heidegger's life-time path of thinking, he notes that "the story reads *from* 'the lighting' *to* 'the clearing.'"⁸⁷⁵ In a quote he selects, Capobianco helps the reader come to sense that which Heidegger senses. As quoted by Capobianco, Heidegger writes

'There is clearing also in darkness. Clearing has nothing to do with light [*Licht*] but comes from 'light' [*leicht*]. Light [*Licht*] has to do with perception. One can still bump into something in the dark. This does not require light, but a clearing. Light—bright; clearing [*Lichtung*] comes from light [*leicht*]...' ⁸⁷⁶

Heidegger does not, however, reject, ignore, exile, or seek to fix the ontic, metaphysical understanding of *light* as this could be conflated with *clearing*.⁸⁷⁷ Rather, he indicates that "the exceptional Greek visible 'light'"—in which we exist and are able to sense the unfolding of *phúsis*—is "granted by another kind of light that is much more difficult to see (and for this reason comparatively 'invisible,' which Athena, like the owl is able to see)."⁸⁷⁸ This granting-lighting is the clearing "through which everything comes to be gathered into what it is."⁸⁷⁹ This is a distinct sense and understanding from that of Aristotle and, following Aristotle, Aquinas, who—as Capobianco explains—"maintained that the activity of the human intellect was like a 'light' that shines upon things and renders them (actually) 'viewable,' that is, (actually) intelligible; this 'natural light' was created by the Divine or Uncreated Light but distinct from it and autonomous in its operation."⁸⁸⁰ Once a reader senses, through his interpretations of Heidegger, what Capobianco himself understands the clearing to be, as well as considering his sensitive interpretations of Heidegger's own understandings of light, darkness, and the clearing, the reader may, too, come to hear the questions of *what* activity, lighting, and human-being-existing—given as we are to understand ourselves lawfully as a human-being-subject—*are*.

What is action? What is *to act*? What is activity? What is practice? What is *to practice*? These are the questions that I come before, as openingly as I am able—though far from perfectly, if such perfection were to exist. To begin to respond, I must come to greater awareness of what I understand myself and other human-beings-existing in the world to be. This I can only do along the way of responding to the question, here only in the *most* preliminary way, as a beginning: *What is human-being-subject*? And, *What is human-being-existing*? These questions will lead me before the former questions once again.

5.8 What is human-being-existing? Is human-being-existing exhaustively human-being-subject, i.e. subjects?

Human-being-subject is what I have been lawfully epistemologically metaphysically given to sense and, thus, to understand in advance. Human-being-subject is what I have long understood human-beings-existing in the world to be, exhaustively and absolutely. I have long understood myself in advance to be and, along the way, I have meet human-being-subject. This meeting is a *meeting*. It is *not* an encounter. I do not *encounter* or *counter* human-being-subject, *even if* human-being-subject understands itself to encounter or even if human-being-subject *does*, effectively, counter us. I shall say *what* human-being-subject is. The *only* way to do this is to *befriend* human-being-subject—that is, to be a friend to human-being-subject as it is, letting human-being-subject be what it is. This is a commitment to human-being-subject, and thus to human-beings-existing in epistemological metaphysical sense, sensibility, and understanding. As a commitment of the highest kind—human friendship—I shall hold human-being-subject with gentle yet attentive regard and respectful care, as I am able, and thus undoubtedly imperfectly. I shall not encounter or counter human-being-subject, though I shall—as I must—befriend, that is, be human-being-subject’s friend throughout. Being a friend does not require reciprocation, however gratifying and fulfilling reciprocation typically is. A friend, ultimately, does not ask for or even expect reciprocation. I shall be human-being-subject’s friend *lovingly* and *attentively*, letting human-being-subject *be* what human-being-subject *is*. For I am befriending myself as I am given to the world’s sensibility and its understandings in advance of human-being-existing. I do not, and I shall not, *will*, seek, or otherwise hope, attempt, try, or demand change, i.e. that human-being-subject change. Much less do I, or shall I, conquer or convince human-being-subject in order to change or fix human-being-subject, thereby achieving a solution to what I do not like in accord with my will and my will’s end-goals. I need not act or will at all, forcing human-being-subject thereby, even if only to react passively or defensively to me, he, or she in my activity. I let human-being-subject *be* and be human-being-subject’s friend. Only thus may I remain with, and be humanly committed to, what I *am* in essence, to human-beings’-existing mutual humanity as the human-beings that *we are*, in and of human-being, perhaps *for* human-being (at least in the highest of human moments), but *never* by human-being upon over against itself. This is *not* a valuation of, an evaluation of, an examination of, a validation or invalidation of, verification or lack of verification of, research on, or an investigation into—whether scientific-epistemological or otherwise—human-being-subject.

Yet, to meet human-being-subject and to befriend human-being-subject, unconditionally and exceptionlessly, is still not to respond faithfully to the question: What is human-being-subject? I can *only* respond to this question if I am, and remain, a friend. Friends do not epistemologically metaphysically, and thereby scientifically-epistemologically, research their friends, for they love their friends—not as subjects, or as objects, but as human-being-friends.

Of course the friend may ask the other a question. A friend is, before essential questions, honest—gently and forgivingly honest, if only imperfectly—with the other.

Lastly, a reminder: I am always beginning to respond to the question: *What is human-being-subject?* My response is *always only* a preparation and, thereby, preliminary. I think along the way of faithfully responding. I am always beginning faithfully, with yet more robust faith. I do not posit answers, much less solutions—as if this were called for at all. It is not.

5.9 Epistemological-metaphysical human-being; that is, human-being-subject

As subjects, I will and subsequently labor endlessly to value, evaluate, validate, and thereby correctly verify the object as, indeed, a true object. Each individual, collective, or relational object established as scientific-epistemological knowledge and its corresponding objective truth, validated as such, fills a gap in the totality of objectivity. Thus, I labor endlessly in accumulative progression to fill such gaps—gaps in knowledge, as is commonly said. Truth, as the subject understands-in-advance, is the truth of the objective in its objectivity. The truth of the objective, in the totality of its objectivity, is objective truth. Objective truth is epistemological truth, and vice versa. Epistemological truth is truth insofar as it is validly methodologically validated, or validly judged, efficiently causally by a subject. Epistemologically metaphysically, truth is to be validly true over against falsity, and to be true is to be correct. As subjects, I understand in advance scientific truth to be epistemologically logical truth, or the objective truth. The subject valued and evaluated, orders and corrects, validates, and, effectively thereby, verifies the object as an epistemologically-scientifically true object at all: the truth, as objective, is the epistemologically correct-being of the object re-presented both as and upon epistemological verification.

Scientific truth is epistemological truth. Scientific-epistemological truth is objective truth scientifically-epistemologically—that is, validly methodologically validated by an *already* validly validated methodology—valuated and evaluated, corrected, validated, and thereby verified by, of, from, and upon over against the subject. The subject is necessarily subjectively willing, activating, and mobilizing itself in order to value, evaluate, correct, validate, and thereby verify the truth of objects and, accumulatively progressively, the totality of objectivity. Epistemological truth is, exclusively and exhaustively, epistemological correctness or incorrectness—that is, whether something is true or false. Epistemological truth entails necessarily in advance of being validly methodologically validated as truth at all an - scientifically-epistemologically validated explanation of how, or by what means, I validly methodologically established knowledge of this validated and thereby verified correctness (truth) or incorrectness (falsity)—and then, if I am authentically scientifically-epistemologically scrupulous, a scientifically-epistemologically validated explanation of how I know that I know how I validly methodologically established knowledge of this validated and thereby verified correctness or incorrectness would be epistemologically required.⁸⁸¹

In what I am commonly given to understand to be its practical aspects, *science-epistemology* is the myriad of procedures, methods, technologies, and techniques; the willfully posited and re-positing rules for governing the formulation and testing of scientific-epistemological hypotheses (i.e., of posited scientific-epistemological problems) and of scientific-epistemological theories (i.e. solutions to or explanations of scientific-epistemological problems); the evaluating, framing, examining, measuring, comparing, triangulating, testing, analyzing, and setting up to try, to validly methodologically judge, or in other words, putting up

to trial by scientific-epistemological evidence of these hypotheses and theories; and the scientifically-epistemologically evaluated, corrected, and validated scientific-epistemological solutions and explanations that, by means of research, scientists-epistemologists produce. I understand that human-being-subjects (i) either scientifically-epistemologically confirm or fail to confirm the scientific-epistemological hypothesis or to solve the scientific-epistemological problem human-being-subjects posited; or, I, subject, understand that human-being-subjects either (ii) fail to falsify or falsify the scientific-epistemological hypothesis or problem human-being-subjects posited. Yet—even when human-being-subjects put to test and put to trial a scientific-epistemological hypothesis or theory, and, by means of the evidence human-being-subjects produce, the problem or theory is either confirmed or eludes falsification, and thus stands in validity as corrected and efficiently causally verified scientific-epistemological fact, or *factum*—this scientific-epistemological fact is, and can only ever be, mere scientific-epistemological theory, however well human-being-subjects materially ground and empirically confirm it, fail to falsify it, or (as is commonly understood) practically apply and utilized it.

Scientific-epistemological theory and confirmed or unfalsified scientific-epistemological explanation—regardless of how successfully productive and efficiently effective such a theory or an explanation is in its formulation, framing, and applied deployments—is born of and remains only and exhaustively of the *most* profound, all-encompassing fundamental human doubt and distrust. This essential doubt and distrust are given to human-being-subject to understand in advance. This essential doubt and distrust is the most profound doubt and distrust of being, of love and belonging, of law, of human being, of human-being-ex-sisting in the world, of world, and of all beings, their coming to presence in the world, and—for some, though not for all—their coming to stand up and out presencingly in the world upon the grounding-ways of the world's sensibility.

Epistemologically metaphysically, all *essentia* is exhaustively, universally and eternally, *existentia*.⁸⁸² What and who is, is so far as this what or who exists and, as existing, is being-made-to-stand out, or ex-sist, upon over against the grounding-ground, efficiently causally by the grounding-ground. Epistemologically metaphysically, upon what or who is a being made to stand out upon over against? Upon the human-being-subject, the grounding-ground. Being and all beings are at all insofar as being and beings validly methodologically exist—that is, insofar as being and beings are made to ex-sist by means of a validly methodologically validated act of judgement, or *causa efficiens*. That which may come to validly and thus truly exist is what and who human-being-subject *first* validly methodologically, or efficiently causally, perceives and conceives. *Percipiō* (*percipere*) speaks to us of *per-* *-capiō*.⁸⁸³ *Per-* *-capiō*, in turn, tells us of acts of capture, seizure, grasping, possessing, taking, taking hold of, laying hold of. *Per-*: by, by means of; *-capiō*: capture, seizure, grasping, taking into possession, taking hold of, laying hold of. *Concipiō* (*concipere*) speaks to us of *cum-* *-capiō*.⁸⁸⁴ *Cum-* *-capiō*, like *percipiō*, tells us of acts of capture, seizure, grasping, possessing, taking, taking hold of, laying hold of: *cum-*: with, by means of. *Percipiō* and *concipiō* are acts, and as acts, they are forceful and causally effective. *By means of* tells us that these—to *perceive*, to *conceive*—are means to actualize and thereby achieve end-goals.

What and who validly methodologically exists, and only thereby is, is what or who human-being-subject cogitates: *me cogito ergo sum, cogito eam est ergo est* (*I cogitate myself therefore I am, I cogitate it therefore it is*). *Cum-* *-agitō* forces, or what is the same, efficiently causes that which exists or could exist, or that which is or could be—whether, for example, in possibility, potentiality, or actuality.⁸⁸⁵ *Cum-* *-agitō* forces, or what is the same, efficiently

causes, i.e. makes being stand-out, or makes being stand-out and up upon over against human-being-subject. Validly methodologically validated, *cum- -agitō* epistemologically metaphysically exists in the active, transitive sense of efficiently causally ex-sisting and making ex-sist. As with objects, human-being-subject must also validly methodologically secure itself in objectivity as validly methodologically validated and, efficiently causally thereby, valid human-being-subject in its subjectivity, validated and thereby correctly verified as existing, and only thereby, as epistemologically metaphysically being at all. Having been validly methodologically, and thus effectively, posited by means of cogitation, human-being-subject can perceive, conceive, and cognize all that which human-being-subject has validly methodologically made-to-ex-sist and, thereby, truly exists—including human-being-subject itself and all other beings validly objectively existed.

Human-being-subject begins and ends in the most profound doubt. It is this understood-in-advance doubt and distrust that grows powerfully without limit or end in the subjective/objective void left in the wake of modern, that is, epistemological skepticism and modern, postmodern, and contemporary epistemological critique.⁸⁸⁶ In the void of epistemology, all possibility and all potentiality or actuality of the essential, unconditional and exceptionless belonging in advance of human-being, of human-being's being sent into the world upon a way of sense; of the welcoming gathering of human being in its coming to presence in world as *the* world; of human-being being gathered unconditionally and exceptionlessly into the careful shelter of place in the revealing-opening that is world—all that is and can be, at all, whatsoever, in possibility, potentiality, and actuality, is only insofar as human-being-subject validly methodologically sets it up in its valid being-existing, as correct representation upon the grounding-ground of human-being-subject. What is, can, and could be, whatsoever, universally and eternally, is insofar as it is epistemologically posited, valued and evaluated, and validated as the objectivity of the objective by, over against, and upon human-being-subject. Human-being-subject does not exempt God or any gods. Human-being-subject, and thereof, all human-beings-subjects, are likewise not excepted: Human-being-subject is both the objective (or goal) and the object of its own efficiently caused epistemological metaphysical positing, valuating and evaluating, correcting, validating, and efficiently causally thereby, verification of itself, for itself, efficiently causally by itself upon over against itself.

5.10 Human-being-subject: The activity-reactivity of subjectively being-ex-sisting and objectively being-ex-sisted

When I write of efficiently causative activity, I write of the sum of efficiently causative actions. Action is efficient causation. Activity is the process and summation of efficiently causal actions and—oppositely, simultaneously, equally, and absolutely indistinguishably—their reactive, interactive, or intra-active effects.

When I write herein of human-being-subject, or of human-being the subject-grounding-ground, or of the subject-founding-foundation, or of one or more human-beings-subjects, I write, of course, of *me cogito sum*. Most familiarly, and most infamously today, I write of *me cogito ergo sum*. The *ergo*—commonly written, as understood, following *cogito* and preceding *sum* (*me cogito ergo sum*)—is superfluous. There is no temporal or spatial pause, no “therefore” (*ergo*), no possible distance *whatsoever*—existential, logical, epistemological, or otherwise—between (i) the human-being-subject grounding itself as itself the ground of subjectivity and the totality of objectivity—that is, the grounding-ground of all that validly methodologically exists

and therefore is or can be—and (ii) human-being-subject efficiently grounding itself as the ground for itself, and positing itself up upon itself over against itself as itself existing and therefore as having been self-methodologically validly validated and correctly self-verified into and, thereby, as ex-sisting. There can be no distance whatsoever between the efficiently causative subjecting-grounding and the efficiently causal, or objectifying, subjected-ground. These are oppositely, simultaneously, and equally *identical*. The human-being-subject—which is the subjectively grounding-objective ground—is *itself* the grounding-ground of itself, of experience, and of human-being-subject' self-consciousness, whether individual, collective, or both. The human-being-subject, the subject-grounding-ground, is both the *me* of *me cogito sum* and, identically, the *cogito sum* of *me cogito sum*. Only as both—oppositely, simultaneously, equally, and identically—the *me* and the *cogito sum* is human-being-subject effectively *me sum*: I am myself (efficiently causally by myself). *Me cogito* (*I cogitate myself*) is a means to actualize by achievement—oppositely, simultaneously, equally, and identically—*me sum* (*I am myself*), and vice versa.

Here I may begin to sense the lawfully contradicting-contradiction of epistemological metaphysics: If *me cogito* is a means to actualize by achievement *me sum*, then *me cogito* must necessarily epistemologically metaphysically exist, and thereby be, *prior to me sum*. Epistemologically metaphysically, *me sum* is—oppositely, simultaneously, equally, and identically—the means to actualize by achievement, and thereby, make ex-sist *me cogito*. *Me sum*, therefore, must necessarily epistemologically metaphysically exist, and thereby be, *prior to me cogito*. *Me cogito* and *me sum* are, however—insofar as they are to epistemologically metaphysically ex-sist and, thereby, be at all—*simultaneous, equal, and identical*. Neither one nor the other is or can be prior or posterior to the other, which is itself. Both *me cogito* and *me sum* are acts—opposite, simultaneous, equal, and both identical and efficiently causally identifying acts. Both are—oppositely, simultaneously, equally, and identically—the efficient cause of the other *and* the other, and vice versa. Here I begin to sense that human-being-subject *is* the epistemological metaphysical contradicting-contradiction—a lawful contradicting-contradiction, to be sure, and thus an *essentially* epistemological metaphysical contradicting-contradiction.

Human-being-subject exists at all, and can only exist, insofar as human-being-subject is absolutely, originally, and in essence validly methodologically efficiently causally self-made to exist out of the profound, near total skeptical distrust which the human-being-subject (i.e., the subject-grounding-ground) *is*. From this skeptical, fearful distrust comes the epistemological metaphysical existential necessity that the subject-grounding-ground validly, efficiently causatively create itself and, simultaneously and endlessly unendingly, validly will to effectively overcome itself in order to validly, efficiently causally ground itself anew ex-sistingly. Human-being-subject, or human-being-the-grounding-ground, is, as it must be, the validly methodologically efficient creator (or, in other words, the efficient cause), the valuator and evaluator, the validator, and the verifier of being and all beings insofar as being or any one or another being can exist or exists at all—regardless, for example, of whether in possibility, potentiality, or actuality. Epistemologically metaphysically, a being-existing-in-the-world—regardless of whether, for example, in possibility, potentiality, or actuality—exists and can only exist insofar as this being is validly methodologically efficiently caused and, thereby, made to ex-sist. That is, epistemologically metaphysically, and thus scientifically-epistemologically, a being-ex-sisting ex-sists at all only as being the effect or, what is the same, the product, the

construction, the yield, the created creature, *et al.*—validly methodologically efficiently caused and thereby validated by human-being-subject into and, thereby, as ex-sisting at all.

Epistemologically metaphysically, *to be* is *to exist*, and *to exist* is to be the product, the made result, or—what is the same—the efficiently caused effect of human-being-subject’s activity. To be, therefore, including human-being-subject existing in the world, is to be made to stand forth validly, to be forced to stand out up upon with valor, to be posited-standing up out upon valuably. Epistemologically metaphysically, to be, including human-being-subject, the grounding-ground, is not and cannot be coming to presence oneself or being-presencing oneself. Epistemologically metaphysically, to come to presence at all in the world is to be made or otherwise efficiently caused to stand up and out presencingly upon the existing ground. To be made or otherwise efficiently caused to stand up and out presencingly upon the existing ground is to be created, or otherwise efficiently caused, by this making. Epistemologically metaphysically, to be created, whether most primordially as possibility or potentiality (prior to any possible realization, or actualization, as actuality) is to be originally and in essence epistemologically posited, or that which is forcefully made to stand forth from, by, and upon over against the subjective grounding-ground, whether as epistemological metaphysical possibility, potentiality, or actually being-ex-sisting. Thus, epistemologically metaphysically, to be at all is to have been validly methodologically posited as present, valued, evaluated, validated, and actively thereby, verified as a *being-correct* and, efficiently causally thereby, truly existing at all.

Epistemologically metaphysically, to make ex-sist and to be made to ex-sist—i.e. to be ex-sisted—are, respectively, to efficiently cause to exist, and thereby to be, and to be the efficient effect of such a cause. To be made to stand-presencing out upon over against is *to exist*, or more tellingly, *to ex-sist*. Epistemologically metaphysically, *to be*, at all, is *to be validly methodologically*, and thus efficiently causally, ex-sisted.

Epistemologically metaphysically, *to essence*, much less to have an essence or to be an essence, is to epistemologically metaphysically exist. What or who is, ex-sists. What or who ex-sists validly methodologically ex-sists as validly methodologically validated, and efficiently causally thereby, ex-sisted as an effect whose means is the antecedent efficient cause or causes. To be an epistemological metaphysical existing, or a validly methodologically validated existence, is to exist and thus to only be at all, whatsoever, of, by, and upon over against human-being-subject. Human-being-subject, in turn, is itself only insofar as human-being-subject validly methodologically is—oppositely, simultaneously, equally, and identically—the maker (the producer, the creator, the constitutor, the constructor, or otherwise the efficient cause, *et al.*), the making (the causing-effecting, the producing, the creating, *et al.*), and the being-made (the effect, the being-produced i.e. the product, the being-created i.e. the creature, *et al.*) that is efficiently being self-caused, or self-made, or self-forced to stand out up upon over against itself as the valid grounding-ground. The human-being-subject, as validly methodologically validated grounding-ground, autonomously and self-sovereignly efficiently causally secures itself of, by, and upon over against itself. Human-being-subject, insofar as human-being-subject is and is to be at all, must necessarily subjectively objectify itself and overcome itself, willfully, constantly, incessantly, and endlessly without end.

5.11 A preliminary response: Causing ex-sisting and being caused to ex-sist (being-ex-sisted)

Again: Epistemologically metaphysically, *to be* at all, whatsoever, is *to exist* validly methodologically correctly and, thereby, truly. That which ex-sist truly is that which is made to ex-sist by valid methodological validation, or validly methodologically validated judgement, and thereby judged to *ex-sist* as ex-sisting at all, truly. Such judgement is an act, and as an act, the *causa efficiens* of ex-sisting. Likewise, epistemologically metaphysically, such judgements efficiently cause any and all particular beings-ex-sisting in order that these ex-sist truly at all.

What is *causa efficiens*? What is efficient cause? *Cause*, and thus *to cause*, speaks of and from the Latin *causa*.⁸⁸⁷ *Causa* is that which makes one move; that which motivates or mobilizes one; that which puts one in motion or movement; that which makes, produces, creates, or otherwise effects something or someone else, moving and thereby making this something or someone act or do.⁸⁸⁸ *Causa*, as it speaks in these senses, is an *action*. As an action, *causa* is *forceful*: the exercise of force by one upon or against another that activates and thereby actualizes, for example, the movement, motion, or mobilization of this other or changes the movement, motion, or mobilization of this other. This exercise of force that makes move, motivates, mobilizes, etc., may be, but is not necessarily, in order to actualize by achievement an end-goal, for example.

Yet *causa* is also, relatedly, a legal or judicial process, a legal or judicial case, or legal or judicial trial.⁸⁸⁹ Thus, *causa* speaks these senses, too, of and from what it is. In a *causa*, one is put through legal or judicial proceedings, framed by or posited and examined in a legal or judicial case that is to be legally or judicially tried by means of legally or judicially putting on trial or taking to trial. *Causa* in these senses, too, is the activity comprised of the actions of *putting one through proceedings, framing one by and examining one in* a case to be tried by means of *putting one on trial* in order to be judged.

Causa is legal or judicial *action* or *activity* comprised of such actions. As legal or judicial action or the activity comprised of such actions, *causa* is necessarily both efficient and effective.⁸⁹⁰ *Causa*, I can write, is necessarily both *efficiently effective* and *effectively efficient*. Both *effective* and *efficient* are and, thus, speak unanimously of and from *ex-facio* (*ex-facere*).⁸⁹¹ *Ex-* says *out of, from out of, by, by means of*.⁸⁹² *Facio* (*facere*) says *to make, to produce, to create, to construct, to frame, to render, etc.*; as well as *to cause to be, to cause to make, to cause to produce, to cause to create, to cause to construct, to cause to frame, to cause to render, to cause to exist, etc.*⁸⁹³ *Ex-facere* is and, thus, speaks of and from, that which is efficiently caused *out of*—that is, *by means of*—making, producing, creating, constructing, framing, rendering, forging, or otherwise efficiently causing to be or to exist. Each of these actions, or the activities comprised of such actions—making, producing, creating, constructing, framing, *et al.*—is a means to a willed end-goal: making *something* or *someone*, producing *something* or *someone*, etc. As a means, each of these actions itself must be willfully posited and actualized-by-achievement as a means functioning in service to the end-goal of the maker's, producer's, creator's, *et al.*'s will. In other words, for human-beings-ex-sisting, these means are *themselves* willed and willfully actualized as means in order to, in turn, actualize-by-achievement the willed end-goal. The maker, producer, creator, *et al.*, actualizes-by-achievement each of these means to the willed end-goal itself by making *making move; putting, pushing, or pulling* into motion thereby *motivating* or *mobilizing* who or what the *maker, et al.*, wills to functional as means. The end-goal, in other words, is the *maker, et al.*, achieves making who or what they will

to function as means *actualize* as the means willed—a means, of course, to the other, original willed end-goal I mentioned above. I can begin to sense that, for *ex- -facere* and therefore, necessarily, for *causa*, each and every end-goal is willfully posited and willfully actualized-by-achievement. Likewise, this end-goal is only, and can only be, effectively ex-sisted as actually ex-sisting at all by a means or prior, willfully posited and actualized by achievement means which the *maker, et al.*, in turn, had to previously willfully actualize-by-achievement as means. I note, too, that *the maker, the creator, et al.*, must first either be efficiently and effectively made to move, or mobilized, whether by another or by means of willful self-activation and willful, efficiently effective self-mobilization thereby. *Causa*, in all of its senses, is *effective* or that which *effects* and is, thereby, *effective*. *Causa*, in all of its senses, is *efficient* or that which makes one or forces one to be efficient.

I have written that *causa* is necessarily effective and efficient. *Causa* is, and thus speakingly gives to the world's sensibility the senses of (i) that which makes one move; that which motivates or mobilizes one; that which puts one in motion or movement; that which makes, produces, creates, or otherwise effects something or someone else, moving and thereby making this something or someone act or do; and (ii) legal or judicial *action* or *activity* comprised of such actions. *Causa* is *action* or the *activity* comprised of such actions, including especially *legal* or *judicial* action. *Causa* is, then, and speaks—even if only in a whisper—its senses into the world of and from *cūdō* (*cūdere*). What is *cūdō* (*cūdere*), and what senses does this word speak, bringing these senses to the sensibility of the world? *Cūdō* (*cūdere*) is, and thus speaks senses of and from: *to strike, to beat, to pound, to knock, to hit, to stamp* (such as a coin is stamped out of metal), *to forge; to make by beating, pounding, hammering*.⁸⁹⁴ *Cūdō* (*cūdere*) is *to act*. *Cūdō* (*cūdere*) is *to force*. *Causa* is, and thus speaks senses of and from, *acting, action, and activity*. *Causa* is, and speaks senses of and from, *force forcing* and—oppositely, simultaneously, equally, and indistinguishably—*force being forcefully forced*.

There is an essential closeness between what *cūdō* (*cūdere*) and *agō* (*agere*) are and, thus, the senses these words speak and, in speaking, give to the sensibility of the world. Likewise, there is an essential closeness between what *faciō* (*facere*) is and what *cūdō* (*cūdere*) and *agō* (*agere*) are: force forcing and force being forced; the forceful exercise of force by one upon or against another that activates and thereby actualizes, for example, the movement, motion, or mobilization of this other; the forceful self-activation and self-actualization of force forcing and, effectively or efficiently thereby: making move, motivating, mobilizing; making stand up, making stand out, making stand up upon; putting on, putting out, putting up upon; positioning, positing, or composing validly, with valor and, effectively and efficiently thereby, powerfully and thus valuably.

What, however, are *legal* and *judicial* and what senses do these speak? *Legal* (*lēgālis*) is that which is proper to or belongs to *lex*.⁸⁹⁵ Contemporarily, *lex* is commonsensically translated into English as *law*, but such translation silences, forgets, and, in so doing, conflates the senses that *lex* speaks with those of the speaking of *law*—*even if* such translation is perfectly commonly sensible from out of the lawful understanding in advance to which I am given. Such translations silence senses words give us that I may come to sense with greater fullness the fathomless sensibility of the world. What is the difference?⁸⁹⁶ *Lex* is, and thus speaks senses of, choosing and selecting, gathering, collecting, bringing together and beholding. *Lex* belongs to, and thus speaks senses of and from *legō* (*legere*). *Legere* and the ancient Greek *lēgō* (λέγω) (*lēgein* [λέγειν]) are of the same and speak the same senses into the world's sensibility. *Law*, however, speaks distinctly. *Law* is, and thus speaks the senses of, lying, setting down, placing, laying

something down and fixing it or ordering it as a stratum, a layer.⁸⁹⁷ To avoid this confusion and the subsequent silencing of senses in the immediately following paragraphs, I shall speak of *lex* as *lex*, not law.

A *causa lēgālis*, then, is the proceedings and the trying that are proper to or that belong to *lex*. As belonging to *lex*, such legal proceedings and legal trying, as *legal*, are of, from, and by *lex*. Yet *how* are they of, from, and by *lex*? This is a technical question. Legal proceedings and legal trying, or putting on legal trial, are of, from, and by *lex* by means of what *causa* is: *to strike, to beat, to pound, to knock, to hit, to stamp* (such as a coin is stamped out of metal), *to forge; to make by beating, pounding, hammering*. The legal proceedings and legal putting on trial in order to legally try are the means by which *lex judges* the one who is put through such proceedings and put on trial. *Lex judges* by means of *causa: striking, beating, pounding, knocking, hitting, to stamping* (such as a coin is stamped out of metal), *forging; making by beating, pounding, hammering*.

What is *to judge*? *Judge* and *judicial* both speak their senses of and from what is the same: *iūs- -dīcere*.⁸⁹⁸ *Justice*, likewise, speaks its senses of and from *iūs*.⁸⁹⁹ This is why—in contemporary English, for example—I commonsensically speak of judges as justices, and vice versa, without any further thought. The judges of the United States' Supreme Court are the Supreme Court's justices, for example, and vice versa. *Dīcō (dicere)* is *to say, to speak*, and thus the word *dicere* speaks these senses.⁹⁰⁰ *Iūs* is *right, rule, the binding of lex or the binding to lex*.⁹⁰¹ Speaking to the Romans and their cultural heirs (full or partial), the word *iūs* brought these senses to the world's sensibility, speaking them forth that the Romans might sense them and take them up, giving these senses human voicing. For the Romans and their cultural heirs (full or partial), *iūs- -dīcere* is, then, *to speak or say rightly, to speak or say the rule, to lay down the binding of lex, to lay down the binding to lex*.⁹⁰² The Romans and their cultural heirs (full or partial) were given to understand that *iūs- -dīcere* was *regere*, and vice versa identically: *to rule was to speak the rule (rēgula); to rule was to lay down, by speaking rightly, the binding of lex or rule; to rule was to lay down, by saying the rule, the binding to lex; to rule was to regulate my means of laying down the rule, by means of binding to lex*.⁹⁰³ The Romans were given, as are we, to understanding in advance of *lex* and *rēgula* as identical in what these are as well as, therefrom and thereof, the senses these words bring to the sensibility of the world that I might sense. *Iūs- -dīcere* was to say and speak *cor-rectly*, and, efficiently causally thereby, to speak the rule, to say rightly, to lay down the binding to *lex*, to lay down the binding of *lex*. *Iūs- -dīcere* was, therefore, the act by which the one judged was put up in order to and thereby rightly and straightly to bound to *lex* and thereby—i.e. by these active means—*ruled*.

I have already responded, however, to a technical questions without listening first this problem itself: *How* is *lex* or, what is the same, *regula* laid down *cor-rectly* (*cum- -rēctus*, or *rightly*), efficiently, and effectively by and as *iūs- -dīcere*?⁹⁰⁴ *Lex*, or what is the same, *rēgula* is laid down bindingly and *cor-rectly* (or *rightly*), efficiently, and effectively by means of a *causa: iūs- -dīcere*. That is, *lex*, or what is the same, *rēgula* is laid down bindingly and *cor-rectly* (or *rightly*), efficiently, and effectively by means of: *striking, beating, pounding, knocking, hitting, to stamping* (such as a coin is stamped out of metal), *forging; making by beating, pounding, hammering* into a straight line, into right order, and by these means, *straightening* unto the rightness of the rule, *rēgula* or, what was understood in advance to be the same, *lex*. It is thus, by and as these efficient and effective means, that *causa* correctly imposes the *iūs- -dīcere* upon and against what or who is put through legal or judicial proceedings or, what is the same, upon and against what or who is put to legal or judicial trial in order to legally or judicially try them—

that is, in order to *judge* them correctly, efficiently, and effectively. Only efficiently and effectively thereby—that is, only *correctly* (or *rightly*)—is the rule of justice *enacted* and *enforced*. For the Romans, as they were given to understand in advance, the rule of justice was the rule of *lex*, and vice versa identically. *Lex* was *lex* only insofar as *lex* ruled and could be utilized to rule validly. Justice was justice only insofar as it ruled and could be utilized to rule validly. *Lex, iūs, iūdicō (iūdicāre), iūstitia, regere, rēgula, rēctus*: these words' spoke little or no sensible difference to the Roman's that these latter might sense and thus speak such differences commonly, in sensible communion. Given lawfully to the world's sensibility, that is, given to the ways of sense openingly revealed epistemologically metaphysically, these words speak little or no sensible difference to us, either—they are all hues of the same, having to do with the same, speaking sensibly of the same with the inconvenience of formal—that is, *merely* formal—differences in their rather useless details. For the Romans and their cultural heirs, and thus for us, each of these (*lex, iūs, iūdicō, iūstitia, regere, rēgula, rēctus*) was and—simultaneously, equally, and identically—was by means of: *causa*. A *causa* is, before all else, a *causa efficiens: cūdō (cūdere)*. All other types of *causa* are the effects of a *causa efficiens*. *Causa efficiens*, in other words, is the *causa prima* of all causation. *To act* is *to efficiently cause*, and vice versa identically: *cūdō (cūdere)* and *agō (agere)*. It would be metaphysically sensible, for example, that the *causa prima* is the willfully willing *actus purus*, and vice versa identically.

In any case, there is little coincidence or accident when I contemporarily and commonsensically speak in English of: *a just cause; a lawful cause; the cause of justice; a righteous cause; being right or righteous; a lawful act; a righteous act; trial by [means of] law; lawful judgement; right judgement; correct judgement; the rule of law; making laws and law makers; enacting and enforcing the laws or the rules; an act of law; a lawful action; effective regulation; efficient regulation; enacting or enforcing regulation; a regulatory act; the effectivity or efficiency of law*, or—what I am given to understand in advance to be the same—*the effectivity or efficiency of rule, or regulation, or policy*. And so on. I, too, am given to the metaphysical understanding in advance and—carried in this understanding in advance along the ways of sense opening and gathering us to them in the world from and as the speaking of words—I, in turn, give these senses common human voice in my own speaking, saying, writing and, perhaps, even thinking.

5.12 A preliminary response: Metaphysical-epistemological ex-sisting

Now I may respond anew to the question: Epistemologically metaphysically, what am I given to understand *to exist* to be? Epistemologically metaphysically, and thus lawfully, *to exist* is the effect of an act: *to validly methodologically validate*, that is, *to validly methodologically judge*. *To validly methodologically validate*, or what is the same, *to validly methodologically judge*, is a *causa* whose efficient effect is a *being-ex-sisting*—a being-ex-sisting validly and, thereby, truly. In other words, *to judge*, or *to cause*, efficiently effects a being-existing, making it ex-sist as a being-ex-sisting at all. *To validly methodologically judge* is an act of creation, of making ex-sist, where that which ex-sists is an effect of the act of creation, i.e. of making ex-sist. *To effect* speaks of and from *efficiō (efficere)*: *to make, to create, to produce, to manufacture, to construct, to make come to pass, to form, to execute, to render, to yield*. *Efficiō (efficere)*, in turn, speaks of *ex- faciō (facere)*, where *ex-* says *out of* and *facere* speaks of, for example, *to make, create, construct, fashion, frame, build*.⁹⁰⁵ Epistemologically metaphysically, human-being is human-being-subject, and human-being-subject is only insofar as it validly

methodologically efficiently causally (self-) ex-sists as both the first efficient cause of its ex-sisting at all and—oppositely, simultaneously, equally, and identically—the efficient effect of itself, efficiently causally by itself, for itself, upon over against itself.

What is *to exist*? What is *existence*? What do these words say to us, telling us—however quietly or, rather, unattended today—of what I think, speak, and write when I think, speak, or write them? *To exist* is not merely *to stand*. *To exist* is *to stand out* or *up into*, *to set out*, or *to place out*; or, *to exist* is *to be made to stand out*, *to be caused to stand out*, *to be set out*, *to be placed out*: *ex- -sistere*.⁹⁰⁶ *Ex- -sistere*: What or who ex-sists can only come to ex-sist at all up, out, and upon an *already* ex-sisting ground. In epistemological metaphysics, to be is, exhaustively and absolutely (universally and eternally), to ex-sist. In epistemological metaphysics, to presence is, exhaustively and absolutely, to ex-sist. Hence there very highest—the one *supreme*—end-goal (or objective) for human-being-subject is to validly methodologically validate (the act of judgement) and, efficiently causally thereby, secure and verify the ground-ex-sisting as ground *at all* upon which all beings-ex-sisting, insofar as they are to ex-sist at all, can be validly methodologically made, or posited, ex-sistingly in the world. As a being-ex-sisting, human-being-subject, insofar as human-being-subject is to validly methodologically enact and validate its own ex-sisting at all, whatsoever, as truly ex-sisting, necessarily requires an already ex-sisting ground upon which to stand up and out over against if human-being-subject is to ex-sist at all, in the first place and subsequently, and efficiently causally thereby, to epistemologically metaphysically be. This epistemological metaphysical ground is and must necessarily be objective, standing up and out against the feet—so to speak—of the human-being-subject-ex-sisting and all other epistemological metaphysical subjects. Epistemologically metaphysically, however, the objective can be the objective at all only by means of a validly methodologically validated act of judgement—that is, by means of the validly methodologically validation as object ex-sisting truly and thus at all, whatsoever—efficiently causally by and out upon over against the subject. If the human-being-subject is to ex-sist at all, it must necessarily ex-sist up out upon and against the epistemologically metaphysically validly methodologically validated objective ground as ground at all—ground made to ex-sist objectively efficiently causally by and out upon over against the subject-ex-sisting. The human-being-subject ex-sists and, thereby, is at all only insofar as it is—oppositely, simultaneously, equally, and identically—the objectively ex-sisting ground of ex-sisting itself and, efficiently causally thereby, necessarily and absolutely, the effect of the human-being-subject efficiently causally grounding this ground as ground at all as validly methodologically validated and, thereby, true ex-sisting. And so on. The human-being-subject is necessarily the grounding-ground of ex-sisting and, thus, all being. The relentless, unending, epistemologically metaphysically contradictory pleonasm are necessary.

I need notice that—at least epistemologically metaphysically—*to exist* speaks of *to efficiently cause* or *to be efficient caused*, as follows: *to efficiently make one move up, out, or into and thereby standing out, up, and upon*; *to be efficiently made to move up, out, or into and thereby standing out, up, and upon*; *to efficiently cause one to move, to efficiently put one in motion thereby making them stand out, up, and upon*. I hear three senses to which *to exist* calls my attention. In the first sense, one brings oneself to exist; or, what is the same, one forces oneself to exist and thereby to be; one efficiently causes oneself to exist and, thereby, efficiently causes oneself to be; or, what is the same again, one efficiently creates oneself and, thereby, efficiently create one's being-existing. Upon so doing, one efficiently causes oneself to stand out and up into the opening-clearing that holds the world, ex-sisting there as what or who this cause-

being-effect is. In the second sense, one is forced to, or efficiently caused to, or efficiently created as, stand(ing) out into the opening-clearing that holds the world, being-ex-sisting there as the efficient effect; or, what is the same, as the created creature; or, what is the same, as the produced product that this being-effect is. Thirdly, one efficiently causes another to exist as the being-effect standing out upon against the ex-sisting ground; or, what is the same, one efficiently creates another, causing the another to ex-sist, i.e. to be an ex-sisting creature; or again, one may efficiently make ex-sist, making another by means of making the other stand out into the opening-clearing that holds the world, forcing it to ex-sist *there* or *here*, *now* or *then*, and, efficiently causally thereby, into being-ex-sisting as what or who this efficient being-effect is at all.

The first sense mentioned of *to exist* speaks of efficient *causa sui*. The second sense speaks of efficiently being caused, i.e. of being-the-efficient-effect; it speaks of efficiently being created, where the existing creature is the efficient effect of the cause; it tells of efficient making, of being made to exist or of being produced. The third sense speaks of efficiently causing another to exist, and thereby to be; it speaks of being the efficient cause that creates another being-existing; or of making another being exist; or of producing another being-ex-sisting. This third sense could include being the uncaused efficient *causa prima*, the unmoved *primum movens*. For human-being-subject, the third sense is that of efficient *causa prima* and, therefore, of the *primum movens*. Epistemologically metaphysically, the first, second, and the third senses speak of—oppositely, simultaneously, equally, and identically—what human-being-subject is.

Human-being-subject, as the subject-grounding-ground, is necessarily and without exception both *efficient causa sui* and *efficient causa prima*. The second sense is proper to objects and the totality of objectivity. Objects and the totality of objectivity are efficiently caused to be; they are efficiently created, made, produced. They exist insofar as human-being-subject efficiently values, evaluates, validates, and thereby correctly verifies them as being-objects, or as being-ex-sisted efficiently causally by and out upon over against human-being-subject. Objects and the totality of objectivity exist insofar, and only insofar, as they are efficiently forced to stand up and out re-presentedly as validly methodologically valued, evaluated, validated, and thereby correctly verified objects, epistemo-logically ordered into objectivity as being-objects. Epistemologically metaphysically: To be, therefore, is (i) to exist or (ii) to be originally and in essence of, from, and efficiently causally by being made to ex-sist.

To exist and to be existed are each a *poiesis* (ποίησις; *poiēsis*)—an effect, a product, a creature or creation, a construct, a constitution, *et al.*—by means of *poiéō* (ποιέω, of ποιεῖν [*poieîn*]). To be human-being-subject, or what is the same, to be the subject-grounding-ground, and to be any object in the totality of objectivity, is to be lawfully, or epistemologically metaphysically, opened, oriented, gathered, and carried forth through the world's sensibility in the understanding in advance of the essential disposition of *poiēsis*: *technē* (τέχνη; *tékhnē*), or technique.

Poiéō (ποιέω, of ποιεῖν [*poieîn*]) is the same as, and thus speaks the same senses as, *to efficiently cause*, and vice versa. I shall return to this.

Epistemologically metaphysically, *to exist* is not and cannot be, be of, be from, or be by *praxis* (πρᾶξις; *práxis*). Nor can ex-sisting be of or from the sending, gathering, and orienting of human-being in the world belonging in essence to *praxis*: *phrónesis* (φρόνησις; *phrónēsis*). Epistemologically metaphysically, *to exist* and ex-sisting are not of or from *to practice*. Unlike *praxis* and *to practice*, *poiesis* and, thus, *to epistemologically metaphysically ex-sist* are not and cannot be ends in themselves. Epistemologically metaphysically, *to ex-sist* is not and cannot be

sufficient or enough, much less abundance, plenty, wellbeing, flourishing, or genuinely humanly fulfilling or completing. Epistemologically metaphysically, a being-ex-sisting is an effect, a means, and thus is not, and cannot be, much less can arrive at or accomplish *eudaimōn* (εὐδαιμόνων) or have *eudaimoniā* (εὐδαιμονία): well-being, welfare, human flourishing, good fortune, prosperity, blessings of good genius.⁹⁰⁷ Epistemologically metaphysically, at least, *poiesis*, and thus to ex-sist, are always in service to, in order to, a means of or for, a function of or for, or valued for the willful positing and willful actualizing by achieving an end-*goal*. Epistemologically-metaphysically or otherwise, *poiesis* is always in service to, in order to, a means of or for, a function of or for, or valued for willfully positing a goal and efficiently self-motivating and self-mobilizing; moving another; or efficiently being moved in order to actualize-by-achievement the goal, be it a product, a construction, a creature, a constitution, a framing, a rendition, or otherwise a being-efficient-effect. *Poieîn* speaks the same senses as *to act, react, interact*, or *intra-act*; *poieîn* is *to efficiently cause*.

Epistemologically metaphysically, at least, *to exist* is itself endless—without end or an end. To ex-sist is not and cannot itself be a beginning or an end in itself. Epistemologically metaphysically, at least, *to ex-sist* is not, is not of, and is not from *to practice*; to ex-sist is neither *praxis* nor of or from *praxis*. Human-being-subject, the grounding-ground—and, as I will see later, relativistic metaphysical “human-being-subject” or “human-being-subjects”—understands in advance that to be and thus to humanly be is to validly methodologically be made to humanly ex-sist. Epistemologically metaphysically, to be a human-being-subject is to efficiently cause oneself to ex-sist and to be—oppositely, simultaneously, equally, and identically—the efficient effect of this cause (the subject-grounding-ground). Also, to be is to be efficiently caused and, thereby, validly methodologically exist as an existing-efficient-effect and only thereby as a being-efficient-effect (an object in the totality of objectivity). Human-being-subject’s valid methodological ex-sisting is by *poieîn*. Human-being-subject’s ex-sisting is the *actus purus* that efficiently causes, at will, as will wills, the *actus primus*, that is, the *causa prima*.⁹⁰⁸

5.13 A preliminary response: What human-being is *not*

I must remind myself as I respond in thinking: My responding is only always preliminary as beginning, once and again, upon a way being opened and lit before us by the call and claim of essential questions. It is a way of faith and trust, in faith and trust.

To be is not necessarily, if at all, to be beingness or a beingness. The question *What?* does not necessarily ask about whatness or whoness. Essence is not necessarily, if at all, the whatness or the whoness that unchangingly defines subjectivity, objectivity, a subject, an object, human-being, a human-being, a thing, or any other being. To be is not necessarily to be an essence, a quiddity, or to have an essence or a quiddity insofar as being or a being are is metaphysically understood-in-advance to be whatness or its whatness, again respectively.⁹⁰⁹ Whatness or beingness may not be what to be is, being is, or a being is at all. Whatness, beingness, or existence may not be what ex-sisting, that is, what *being, a being, or being-ex-sisting in the world* are at all. Human-being is not human-beingness. To be is not necessarily to be a beingness, much less a being-existing. To be is. This is, is is-ing. A being is is-ing as the be-ing that it is. There is no necessary or pre-determined -ness here, no necessary or pre-determined stasis (stasis the strict sense of *inactive*, not *actively* moving, not *actively* moved, not mobilizable *by action, actively made* to stand still, etc.). Human-being given to the world *fares* along the paths of sense and sensibility lawfully being revealed in the world and, thus, opening

before and gathering human-being in the world to them in essential, lawful, and familiar belonging and common sensibility.

To humanly be is not to be human beingness, a human beingness or any corresponding -ness or static (as *inactive*, *actively unmoving*, etc.) sense of a human essence or having a human essence upon which properties and relations come and go, generate and degenerate, form and dissolve. Human-being is neither exhausted by nor exclusively spatial or temporal existence as spatiotemporal extension, substantive or otherwise. Nor, however, is human-being the relativistic metaphysical *reaction*—opposite and equal, and thus of the same—to human-being-existing revealed and thus given as metaphysical human-beingness: for example, human-being as the unlimited plurality of meanings of “human-being” without any essencing, or faring, what human-being itself is other than the meanings human-beings, individually or collectively, assign the term “human-beings.” Human-being is neither the determined nor freely willful arranging and ordering of multiplicities or the universally and eternally unchanging efficiently causal changing of becoming. Human-being is not the ordering, arranging, and synthetic compositioning of parts into their naturally determined, actualized heteronomous wholes. Nor is human-being a freely willed and autonomous, self-sovereign self-constituting, self-creating, self-producing, or self-making; nor, again, is human-being a co-constituting, co-creating, co-producing, or co-making of whole assemblages functionally assigned the name tag “human-being.” Human-being is not efficient *causa sui*, absolutely actual occasions efficiently-effectively valuing eternal objects (and thus themselves) up or down to produce their efficient effects, the actual occasions themselves, their actual events, and their actual nexuses.⁹¹⁰ Human-being is neither purely actual nor efficiently causally real. Human-being is not metaphysically exhausted by dynamics or statics, much less epistemological metaphysical relating-relations, i.e. purely contingent and universally-eternally unchangingly changing absolutely particular historical relating. Human being is not merely a logical possibility, potentiality, or actuality, whether metaphysically epistemological, relativistic, or otherwise. Human being is not necessarily a potential or power, nor is it (or, at least, nor is it exhaustively) to be actual, especially if actuality is understood-in-advance as what and who is validly methodologically validated, or activated and efficiently causally actualized thereby, as real, i.e. as *really ex-sisting* where *to be real is to be epistemologically metaphysically true*, and vice versa. Human-being-ex-sisting, much less human-being, may not be *real* at all, but is not exhausted by or exclusively *reality*, whether metaphysical or otherwise. To be real, after all is, and thus speaks the senses of, being a possession, a piece of property, a material resource, matter or a material combination that makes a whole entity, or any other being-ex-sisting or being-made-to-ex-sist that is actively actualized in the world or efficiently causally being actualized in the world, whether substantially or otherwise.⁹¹¹

To be is not to exist. To exist is necessarily to be, but does not and cannot exhaust what to be is: be-ing, as well as what or who is given of and from be-ing and belongs unconditionally and without exception to being. Human-being is neither exhausted by nor essentially human-existing or human-existence. Human-being is not human-beingness. A human-being is not a human-beingness. Human-being is lovingly, gently, calmly brought forth to the threshold of the clearing-opening of being-ex-sisting. Once *there*, on the bank of ex-sisting, human-being is—with no less love, gentleness, and calm—ushered out into the world that this clearing-opening holds in exceptionless, unconditional love and belonging-being-aware. With perfect, careful attention; with exceptionless and unconditional belonging; and from, of, with love, human-being is sent to stand up and out as a human-being-ex-sisting in world. Human-being is sendingly and

gently ushered out into being-ex-sisting. There and then, human-being-ex-sisting is lawfully gathered unto familiar paths of sense revealingly opening in and through the world and the world's sensibility. Human-being-ex-sisting is sheltered familiarly and in common with other human-being-ex-sistings on these paths of common sense and sensitivities. Human-being, then, is gently, givingly, and lawfully sent to stand out and up into the world, the world held and openingly revealed in the clearing-opening of being and the possibilities being gives *to* human-being *for* human-being's journey ex-sisting in the world. The ways of sense that always already gather and shelter human-being coming to ex-sist, gather and shelter human-being-ex-sisting in exceptionless and unconditional belonging and familiar, sensible community. These ways of sense are, and are of, that which openingly reveals world as the world, giving sensibility to the world: law, and way of sense *of* and *from* law. Human-being-subject, without exception, belongs to and fares the ways of sense openingly revealed lawfully of, from, and as epistemological metaphysics and the corresponding epistemological metaphysical understandings in advance of the world's sensibility.

Human-being is not human-being-subject. Human-being-subject is of human-being given to ex-sist in the world as gathered to, sheltered by, and faring lawfully familiar opening ways of sense in and through the world's sensibility. Law gathers and shelters human-being ex-sisting in the world to and in sense, and subsequently, understanding of the world's sensibility. Human-being is far from exhausted by human-being-existing in the world, much less human-being-subject in the world.

Human-being is *not* thrown—by means of the *act* of throwing, efficiently, effectively, forcefully—out into the opening-clearing and onto the possibilities of the world. Such throwing out and into leads, and can only lead, to the *falling* of the one thrown and, then—in continuously falling away from the thrower and left isolated in and with the burden of the world—the unceasing, insecure, skeptical demand for the security of a certain ground upon which to effectively ground oneself, one's very ex-sisting, and all ex-sisting, including the world. If to be is to exist, I demand certain ground in order to exist and, thus, in service to my ex-sisting and making ex-sist. Human-being-subject solves the problem of being thrown out and subsequent groundlessness by willing and, efficiently causally thereby, making, positing, and synthetically compositioning ground and belongingness, both necessarily ever ephemeral, transitory, lacking, and unfulfilled. (Prior to human-being-ex-sisting revealingly given to epistemological paths of sense upon which human-being-subject fares, metaphysical human-being-ex-sisting was given to understand in advance that the metaphysical, ex-sisting ground it required in order to ex-sist, and efficiently causally thereby to be, was by the willful act and thereby made, or enacted, by God the craftsman, God the producer, God the creator, God the *actus primus*, *actus purus*, and efficiently causally thereby, the activating *primum movens*. Yet such an act of metaphysical creation—including the original, divinely willful, grounding act of making human-beings ex-sist in the world—was an *act*, or what is the same, an efficient cause: efficient, effective, forceful just as is the act of throwing something or someone out, or against, or down upon the ground.

Again: Human-being is *not* thrown out unto or down upon possibilities *at all*. Human-being is not thrown out unto or down upon possibilities which human-being-ex-sisting must then will to capture and secure, willfully grasp at and appropriate, take into possession, stake out for itself and defend, etc.—all the while endlessly falling as being made, or forced, by the act of throwing to-ex-sist-in-the-world. Profound hurt, pain, fear, isolation, and distrust—not to mention severe skepticism and antagonism as protection from these wounds—can only come from being *thrown out*, or *thrown into*, or *thrown against* or *onto* by one (such, for example,

metaphysical God, a supreme being-ex-sisting, but a being-ex-sisting nonetheless) who—*supposedly*, as I now must write—loves, gives, forgives, attends, is open to, welcomes, holds and beholds, shelters and safe keeps, and cares, all without exception or condition, for human-being-existing. Neither human-being nor human-being-ex-sisting is efficiently causally being-thrown or its effect, thrownness. Human-being is not *made* to ex-sist or to be in the world. Human-being is not forcefully thrown out, or into, or down upon, for such action would be without love; such action would be without primordial, essential, exceptionless and unconditional belonging. Human-being is not thrown like a billiard ball, efficiently and forcefully, and thus essentially and primordially both *from* lack and scarcity *and* thus into world as essentially flawed, fallen, and false; into the world as fundamental and entropic scarcity and its complex, supervening effects; as unsurmountable and essential lack, unacceptability, and insufficiency; as means to ends, including, for example, ultimate and inevitable entropic stasis, or death in a perfectly functional spatiotemporally distributed equality; into care-is-not, belonging-is-not, love-is-not and cannot be; friendship-is-not and cannot be. If to be and to exist are to act and react, enact and interact, activate and actualize; if to be and to exist are to efficiently cause and be efficiently caused; if to be and to exist are to be force forcing and being forced, then loving, befriending, giving, forgiving, attending, holding and beholding, gathering, calming, keeping safe, sheltering, caring, and so on, are absolutely and unexceptionally *impossible*. Epistemologically metaphysically and relativistically metaphysically: Insofar as human-being-subject and “human-being-subject,” respectively, believes hopefully in these impossibilities, human-being-subject believes in what are—merely, exhaustively, and exclusively, but functionally of the *highest* value—effective and efficient, superveningly complex, contextually contingent strategies effectively and efficiently eco-biologically evolved for the scientific-epistemological survival of the human species in the scientific-epistemological universe.

Human-being and human-being-ex-sisting, I write again, are neither subjected to such an act as throwing nor are they—as a being-thrown or a being-thrownness—the effect of such an act. Even in the most devastating, dire, violent, or unjust worldly human circumstances and scenarios, human-beings-existing belong and are gathered, sheltered, and guided—with primordial, perfect, complete, exceptionless, and unconditional love. *This* is the giving of and into the opening-revealing of world as the world, the beginning and the end of the gathering and sheltering of world that is *the* world for and with human-being-existing. Human-beings-existing belong to and are proper to this loving, gently carrying, ushering out into always from and in unconditional belonging, and exceptionless and unconditional upholding, and not vice versa. In the clearing-opening holding the revealing-world, and whether standing in light or in darkness, human-beings-existing always already belong in this worldly existing to each other, and are always already proper to each other, regardless of human-beings-existing’s subsequent and endlessly varying perceptions, conceptions, perspectives, actions, reactions, interactions, actualizations, achievements, encounters, productions, constructions, renderings, framings, and so on, with, upon, for, against, or over one another, themselves, and other beings. The with-common-unity in the revealing-opening of world, with human-being given and human-being-existing therefrom in the world, is the comm-unity of this exceptionless and unconditional belonging. It is continuously primordial, presencing, and endingly ultimate. This belonging opens for, reveals, and lovingly *lets human-being be ex-sistingly*, and *freely* therefore, in the world as human-being-existing. *This* giving and givenly letting be in love, belonging, open welcome is a *gift*. This giving-gift gives and safeguards human-being in human freedom as, and for, human-being-existing in the world.

The bringing of human-being forth to the threshold of the clearing-opening; the lawful sending, and the ushering of human-being out into and up as human-being-existing in the world is also *from* the end, *towards* the end, and *in obligation to* the end given to human-being and, thereby, given to us, human-beings-existing, human-beings-living-in-the-world. From its birth into the world, human-being ex-sisting humanly in the world is oriented from and by, gently ushered, and called toward its end, where and when it passes over the threshold that is the far horizon of the world and, thus, of ex-sisting.

An end is neither an aim nor a goal. Human-being-existing does not make, produce, create, constitute, construct, or otherwise efficiently cause its own end. As with the ground of ex-sisting, human-being-ex-sisting does not and cannot secure, make certain, stake out, or otherwise forcefully appropriate or overthrow its end, efficiently causally thereby making its end a goal it willfully posits for itself, of itself, by itself, willfully moving itself in order to actualize its end-goal by achievement. Human-being-existing does not set up, invent, posit, or position its own end. To human-being-existing in the world, the end is given to it in love, with love, in belonging and attentive safe keeping; the end calls human-being-ex-sisting in love and care, guides and ushers it in love and care, as love itself. Human-being-subject does not, and indeed cannot, understand this. Epistemological metaphysics does not reveal this for sensing and thus does not give this to human-being-subject to understand in advance of its faring upon ways of sense through the world.

Human-being-subject—upon the opening-revealing way of epistemological metaphysics, and as carried lawfully through the world in epistemologically-metaphysically given understanding-in-advance—makes and posits goals willfully. Human-being-subject is given to the understanding-in-advance that it is to willfully and unceasingly set up goals in order to, by efficiently causally motivating itself, actualize these goals by (self-)sovereign, autonomously willful achievement. Human-being-subject, without listening to the call of essential questions, always only understands-in-advance that I willfully posit and efficiently move myself to actualize-by-achievement my aims and goals, thereby empowering myself to will further, more efficiently, more effectively, more (yet always not quite yet) self-sovereignly and autonomously and, effectively thereby, more (yet always not quite fully) freely.

Again: An end is not an aim or *to aim*; an end is not a goal or *to posit a goal*. The giving-gift that is the giving of the end—the end to which human-being-existing belongs and to which human-being-existing in the world is proper—originates, carries, ushers, upholds, and is the end even of all possible, potential, and actual causation or of any human logical (including even episteme-logical or relativity-logical) type or category of subjectively or objectively perceiving, conceiving, representing, framing, perspective-taking, world-viewing, etc.

For human-being to ex-sist, human-being must first *be*. For human-being to come to stand up and out, presencing existingly in the-world, human-being must first *be*. What or who is brought to the clearing-opening, sent out up into the clearing-opening, and standing there-presencing upon a way of sense, ushered into and through the world upon this way of sense? Human-being is. If human-being—*a being that is itself the receiving opening of a giving gift of being*—is to be given the gift of existing-in-the-world, human-being must first *be*. Human-being must first be human-being. And, yes, human-being *is*.

Human-being-existing in the world can both *practice* and *act*. *To practice*, however, is not *to act*, nor vice versa. Even so, both, and the capacity and faculties for both, are gifts to human-being for human-being-existing in the world. Neither human-being nor even human-being-in-the-world are exhausted by or exclusively its faculty and capacity for *praxis* (practice)

or for *poiesis* (acting and action, i.e. efficiently causing). To be is not to exist. To be humanly-existing is not to be act, acting, action, or activity, even when my ex-sisting requires activity at times, in certain places, and always under the governing wisdom of practical conditioning and limits. To be is not to act. To exist is not to act. To be human-being is not to be human-acting. To be human-being-existing is also not to be human-being-acting. Human-being-existing is not human-being-acting, is not human action, is not—much less efficiently causally by—human *poiesis*. Human-being-exisiting is not human-being-acting. Nor, however, is human-being-existing theory or theorizing. I have already written that human-being-existing is not *poiesis*. Human-being-existing, then, does not need to act in order to, progressively, willingly unify *theōriā* (θεωρίᾱ) and *poiēsis* (ποίησις) into—as human-being-subject is given to understand it in advance—*praxis*.⁹¹²

Human-being is not human-willing. To be human-being is not to be human-willfully-willing. To exist is not to will. Existing is not willing. Human-being-existing is not human-being-willing. To be human-being-existing is not to be human-being-willfully-willing. Human-being is neither *causa prima* nor *causa sui* of itself, whether efficiently causal or otherwise. Human-being is not the cause of being given to the clearing-opening of being, gently and lovingly sent out into the world, and being ushered into and through the world upon, as gathered to and sheltered in, a revealing way of sense.

Human-being does not belong to human-being, much less to human-being-ex-sisting's willfully (self-) willing, (self-) making, (self-) producing, (self-) constructing, (self-) constituting, *et al.*, nor again to human-being-ex-sisting's co-willing, co-making, co-producing, co-constructing, co-constituting, *et al.* Human-beings-existing *do not belong to ourselves*. I belong—in open and responsive freedom, faith, trust, and lawful obligation—to the giving-gift that gives human-being, as human-being, that human being is and may be.

Human-being is, or at least maybe, a being-receiving-revealing of being-giving-being into the open clearing that is essentially aware, fully or not, of being this special, opening receiving revealing of being into and, thus, as human being. Human-being belongs to the loving-giving-sending as the receiving of this giving-gift. Human-beings-exisiting belong, therefore, to that from which the what, the why, and the how of and from the giving-sending of human-being into the world comes. I am proper to this giving-gift that gives human-being to be-existing in the world and, in the world, to human-being-ex-sisting's freedom.

What human-being is, is the essential question to which I respond, and *am* responding as I fare along my way in the world. I respond in faith, trust, and lawful obligation; with awe, wonder, and piety; and with thankfulness, thinking, and humility.

5.14 Theory

Everyone knows that theory is the resulting effect, or product, of our theorizing. As this effect, theory is the product of our production of rule-like generalizations from validly methodologically validated experience. I strive to unify theory with our ongoing activities in order to make our activities as practical as possible and, *thereby*, more effective and efficient as *practices*. Only by actualizing by achievement this effective unification are our actions and theories productive of *pragma* and, thus, *pragmatic*. *Praxis*, or *practice*, is the efficient effect of our successful production and unification of our theory and actions. Such *praxis* is valuable in action as governing through scientific-epistemological application the ordering of our present and future activities and our resulting experience. What theory is, is by now common sense for

us all: our activity (including the crafting and positing of theories), function, and value. I have yet, however, to genuinely listen to, much less heed the question: *What is theory?*

What is theory? I learned that (i) “[a] collection of rules, even of practical rules, is termed a theory if the rules concerned are envisaged as principles of a fairly general nature.”⁹¹³ A theory is (ii) “a way of looking at a field that is intended to have explanatory and predictive implications.”⁹¹⁴ A theory is (iii) “a well-substantiated explanation of an aspect of $[x]$ that can incorporate laws, hypotheses, and facts [...] A theory not only explains known facts; it also allows scientists to make predictions of what they should observe if a theory is true,” where $[x]$ could be, for example, the natural world, or culture, or technology, or society, and so on, regardless of whether $[x]$ is more specific or more general.⁹¹⁵ (iv) “Theory”—the quotation marks are necessary—is a functional vessel, i.e. a term, to which we humans attach an individually or collectively invented and defined meaning in order to communicate. This meaning may be individually or collectively forged in response to, correspondence with, reaction to, or interaction with the experiential, affective stimuli of worldly activity. In the case of the term “theory,” the meaning I assign the term is: “an overarching explanation that has been well substantiated.” Of course, all the terms and their meanings constitutive of this definition are themselves terms and meanings I invent, define, inventory, and deploy at will to communicate. To each of these terms I—individually, socially, and culturally—have assigned invented and defined meanings, or more accurately, “terms” “to” “which” “I” “have” “assigned” “invented” “and” “defined” “meanings.”⁹¹⁶ (v) Theory is “a comprehensive explanation of some aspect of $[x]$ that is supported by a vast body of evidence,” where $[x]$ could be, again for example, nature or art or philosophy, and so on regardless of whether or not $[x]$ is more specific or more general.⁹¹⁷ (vi) Theory is philosophy, and vice versa; and therefore, *a* theory is *a* philosophy, and vice versa.⁹¹⁸ (vi, *continued*) A theory (or, what is the same, a philosophy) contains, or rather, is comprised of the ideas I operationalize in order to utilize as a means to compute, relatively quickly, the consequences of a prediction I make from the ideas and, subsequently, to test these computed consequences experimentally, i.e. to test the computed consequences against logically ordered experience. A theory that validly stands against the test of logically, systematically ordered experience tentatively explains the phenomenon represented by the system of ideas of the theory itself, while a theory unsubstantiated by the evidence produced by the test or comparison against logically ordered experience is invalid, incorrect, and can be discharged as useless.⁹¹⁹ (vii) A theory is a logically structured, i.e. a logically ordered collection of sentences (e.g. propositions, statements, claims, etc.) ordered so that the system may be tested against or compared to logically ordered experience, i.e. experiment; or, a theory is a logically structured, i.e. a logically ordered system of meanings ordered so that the system may be put to the test against or compared to logically ordered experience, i.e. experiment.⁹²⁰ (viii) A theory is the conceptual basis of a subject or of a study area, contrasted with practice; it is, as such, abstract knowledge or principles, or the system thereof, as opposed to practical experience or activity; theory, therefore, is a conception of something in order to realize it actively, in practice; in other words, theory is a systematic statement of rules to be followed, i.e. a method for the practical realization of practical activity *as* practical activity.⁹²¹

I have already thought through and come to understand (i) in detail, and shall only briefly return to it below. In (ii), theory is a way of looking at a field intended to have explanatory and predictive implications. Theory, that is, is a way of looking at a field *in order to* explain and predict. “Is a way of looking” is understood to be the same as “is a method of looking,” or “is a logic of observation,” either of which must *first* be evaluated and judged valid. This method of

looking orders what is looked at into a field. This field, as a field, is a logically ordered system, contoured and defined. So ordered, it is a means for the method of looking which is, in turn, a means for making explanation and prediction. In other words, the method of looking is the ordering into a field, or system, of who or what is to be viewed in order to be viewed validly methodologically in order to, in turn, produce an explanation of what or who is laid down and looked over—valuated, evaluated, examined, interrogated, compared, interviewed, investigated, experimented upon or with, etc. From the ground of such validly methodologically validated explanation, the viewer can formulate predictions and calculate outcomes of the field as it is ordered and re-ordered systematically beneath the view of the evaluator, examiner, experimenter, and explainer. *To explain is to act. To explain is, and speaks its senses of and from, ex-plānō and ex- -plānus.*⁹²² As I have learned, *ex-* says *out of, from out of, by, by means of.*⁹²³ *-Plānus* is and thus speaks of an even surface, a flat surface or plane, a level surface or plane, a horizontal surface or plane.⁹²⁴ *Explānare* is and, thus, speaks the senses of *to make flat or to flatten out, to make even, to make level, to make smooth.*⁹²⁵ An explanation is the effect of, or the product of, the action of explaining. To explain is to efficiently cause an explanation. The ordering out and under one's observing vision onto a plane, or the flattening of who and what is ordered out into a field for observational envisioning, is itself efficiently caused as a means to actualize by achievement a willed goal: the production of an explanation and, subsequently, the possible computation of a prediction, the calculation of outcomes, and perhaps putting the field explained up to the test—that is, to trial—in order to evaluate the predictive calculations against the logically ordered, actively mobilized, and actively realized experience generated efficiently causally thereby. In (ii), then, theory is a validly methodologically validated methodology for viewing logically set up by the viewer, i.e. the field or system, in order to produce explanations and formulate, calculate, and experimentally test predictions against experience. This method of viewing is a theory of method, i.e. a collection of generally conceived principles of procedure; it is, in other words, a practically, i.e., an actively realized and ordered methodology of observation, of viewing, and of sensing as a means of positing and actualizing by achieving goals (prediction, logically ordered experiential tests of the prediction, evaluation, explanation). The method of viewing, then, is *itself* the valid methodological production of logically ordered and thereby systematized experience: ex-plain-ing, observing, viewing, sensing, evaluating. In (iii), a theory comprehends in advance the active realizations—i.e. the making real, or actualizations—of the activities of commanding out and systematically, logically ordering into a field what or who is to be viewed in order to, in turn, valuate, evaluate, examine, interrogate, interview, investigate, etc., them in order to, once again, validly methodologically validate and, efficiently causally thereby, realize (i.e. make real) the validated activities that produce the evidence that, in turn, grounds (substantiates) an explanation of an aspect of $[x]$ which, in turn, permits scientists (or whoever) to formulate, calculate the outcomes of, and test the outcomes of their predictions upon over against both the already effected ordered system of viewing and the produced evidence. The recursivity here and apparent pleonasm are necessary. In general, a theory incorporates hypotheses, rules, and facts, each of which necessarily entails its own prior theories and validly methodologically validated methodologies of ex-plain-ing and viewing in order to validly methodologically realize, or efficiently cause, the subsequent activities (e.g. evaluating, predicting, calculating, putting to the test, experimenting upon, etc.) necessary to produce the subsequent, and consequentially valid, theory. What a theory is in (v) is identical to what a theory is in (iii).

In (iv), theory is an invented, operationalizable vehicle, or term, or logical system of terms posited in the form of one or propositions which carries an operationalizable meaning—meaning itself invented and defined in order to be operationalized as means to actualize-by-achievement the goal of communication. Communication is itself the willfully willed activity instrumental to positing and achieving some further goal, whether a necessary goal or aggregate of goals (satisfying basic needs, achieving survival) or a desired goal or aggregate of goals (producing an explanation; formulating a prediction; calculating the consequences of a prediction; testing the calculated consequences of a prediction against logically ordered experience; producing knowledge; asking for more dessert; getting a warm bath; securing a pay raise; enforcing justice; purchasing a bicycle; calling the plumber; scheduling an appointment or a meeting; *et al.*). In (vi), *theory* and *philosophy* are identical. A theory, then, is identical to a philosophy, and vice versa. A theory (or, identically, a philosophy) contains, or rather, is made up of the ideas I have *already* validly methodologically represented to myself by means of the prior activities of validly methodologically validating *to represent* as a true act at all and, then, validly methodologically representing the aforementioned ideas as valid ideas. Subsequently, I logically order these mental representations together, combining and unifying them, or setting them up into a system of ideas standing by ready for the activity of propositioning, itself the means to formulate a prediction. This formulation of a prediction must be achieved in order to then compute, relatively quickly, the consequences of the prediction I made from the ordered system of propositions that, in turn, validly methodologically represents the system of represented ideas. Next, once I have computed consequences (i.e. computed the efficient effects of the prediction), I test or compare these computed consequences experimentally, i.e. I test or compare the computed consequences against logically ordered experience I produce and mobilize, whether this testing and trying is achieved by means of formal experimentation or not. Then, as I have already written, the theory (or philosophy) that validly stands up and remains standing validly during the test or comparison against systematically ordered experience tentatively explains the phenomenon validly methodologically represented by the system of predictive propositions. A theory unsubstantiated, on the other hand—that is, left without validly methodologically validated ground by the evidence produced from the test or comparison against logically ordered experience—is invalid, and thus incorrect, and as incorrect, false. As false, the unsubstantiated theory can be discharged as useless. In (vii), theory is the combination of (iv) and (vi).

In (viii), a theory is a conceptual basis, or conceptual ground, for a subject area or a study area. The subject area or study area exists as what it is at all *upon over against* this conceptual ground. What is a concept? A concept is the efficiently caused effect, or product, of the willfully activity *to conceive*—or, written more haughtily, *to conceptualize*.⁹²⁶ *To conceive* and *to conceptualize* are, in turn, effects, or products, of the sequential series of prior efficient causes, that is, of the active realizations of the actions: (1) *to take, to take possession of, to capture, to take captive, to seize, to take hold of, to grasp*, where what or who is so taken, seized, or grasped is understood in advance to be one or more novel external stimuli forcefully—or what is identical—efficiently causally impinging upon my sensory mechanisms. Or, what or who is so taken, seized, or grasped and possessed thereby, could be one or more previous mental, emotional, reasonable (of ratio), or other types of actively realized and thereby produced and reproduced representations. Next, in step (2), what is taken, taken possession of, captured, or seized is: forced to stand out and up, or ex-sisted, i.e. made to stand out and up (upon the maker herself); or, made to stand out and up presencing (presencing upon the maker himself); or, set up

(up upon she who sets up); or, put up (upon he who puts, posits, propositions, positions, etc.); or, set up upon over against (up upon over against she who sets up upon over against). Next, in step (3), that which has been forced to stand out and up, or efficiently causally ex-sisted and thus made to presence ex-sistingly, is then evaluated, examined, validated, and thereby correctly verified and, by these means—all of which must *first* be validly methodologically judged to be validly methodologically validated realizations of valid actions—is, in effect, *truly* re-presented. The validly methodologically validated, or validly judged, existence now truly ex-sists as what it validly is: a *correctedly* presented and re-represented representation efficiently causally by and upon over against the *judge* of the methodological validity of all these prior actions. In other words, the validly methodologically validated existence now truly ex-sists as what it validly is upon over against the *subject* of all of these validly methodologically validated actions. Finally, in step (4), the validly methodologically represented and thereby validated existence is logically ordered and re-presented once more as a true *concept* (just as a principle is a re-represented representation, or a rule represented as a principle), and thus formally accepted and admitted by the subject (or judge) as a valuable, readily applicable concept. To summarize, this concept is a cogitatively made, validly methodologically validated and thereby true representation of the original, efficiently causal, cogitative making stand out and up presently (presentation) of the effects of external stimuli's active impingement upon sensory mechanisms, these mechanisms' automatic mechanical reactions, and the subsequent cascade of efficiently caused and, in turn, efficiently causal cogitative representations and judgements. A concept is an efficient effect, or product, of this cascade of validly methodologically validated realizations of actions, including the valid judgements as validated judgements. As an effect of actions *and* an action itself, a concept is, and can only be, a means to willfully achieve-by-actualize willed goals.

In (viii), a theory, as a conceptual ground, is one or more validly methodologically true concepts that efficiently causally *grounds* a subject area. A subject area is a study area. This validly methodologically validated conceptual ground—that is, or one or more concepts logically ordered, effectively unified, and systematized into a functional, operational whole, i.e. into a theory—is both the efficiently causative grounding and the valid and true ground of the subject area and all its constituent activities. The theory efficiently causes the subject area to ex-sist (and, as existing, to epistemologically be), and grounds it, i.e. validates and thereby verifies it as existing as the subject area that it is at all. A theory is the grounding-ground of the subject area and its constituent activities. As such, as I am given to understand-in-advance, the theory contrasts oppositely with practice, or the constituent activities of the subject area. *This* is the same as (i), and vice versa.⁹²⁷ A theory as (i) is the same as a theory as (viii), and vice versa.

Yet this is epistemologically contradictory, for theory is the *conceptual* basis of a subject area, and concepts epistemologically metaphysically exist only insofar as they are validly methodologically judged to have been validly methodologically validated as produced and valuable in their operationalizability. Produced by what or who? Produced, for example, by (means of the activity of) researchers in the incipient subject area or in another, already validly methodologically validated and thereby conceptually grounded subject area. As the conceptual grounding-ground of a subject area, theory is the abstract knowledge, or principles, and the system thereof, produced and functionally operationalized in order to actively realize the actions that are, in turn, efficiently causatively productive of something, where this something is *some-object*, *some-objective*, or *some-goal to be achieved* by the activities (e.g. research) of the subject area.

In light of all of these definitions: What is a theory? Simply written, in summary: A theory is an epistemologically metaphysically posited and systematically ordered statement of rules and principles that grounds a subject area and should be complied with—i.e. accepted on empirical grounds, accepted with empirically grounding modifications, or rejected on empirical grounds—in order to validly methodologically realize activity and its products as, respectively, comprised of true actions efficiently causative of true products. A such, a theory is a means of continually achieving-by-actualization the advancement, or progress, of the subject area and its products (e.g. knowledge, technology, policy, regulations, plans, pieces, publications of all sorts, experts and expertise, careers, etc.). I can summarize the same slightly differently: A theory is a validated methodology (a logically structured collection of generally conceived principles of procedure, i.e. a theory of method) for the active realization (this realization *itself* necessarily having been *already* validly methodologically, i.e. theoretically judged to be valid activity) of validated activity (activity that, if it is to be activity, must be, *after* its realization, validly methodologically judged to be efficiently effective, and thereby, true activity at all).

As before, *the relentless, exhausting recursivity and apparent pleonasm are necessary*. Indeed, it is essential to what I am epistemologically metaphysically given to understand a theory to be in advance. A theory, understood in advance, is valuable as a means for validly methodologically and thereby truly actualizing-by-achievement a goal (e.g. an explanation, a prediction, or the production of valid, true knowledge).

As I so often hear, and so often say, from my belonging to epistemological metaphysical understanding-in-advance: A theory is a tool I keep in my toolbox, made to standby ready at will, as willed, for operationalized deployment and application as means to actualize-by-achievement some willed goal. A theory is a tool I willfully fashion, inventory, and, at will, subsequently, pull out of my toolbox and operationally (or functionally) apply in order to actualize-by-achievement a goal I have willfully posited and willfully and skillfully strive to achieve. To strive with theoretical skill is to labor towards the goal with (greater or lesser) technical mastery of my tools and, in extraordinary of cases, competently skillful awareness of *my tools' own constitutively prior* principles of procedure (i.e. the valid methodologies, or tools, by which my tools are validly methodologically and, thereby, truly made to exist and standby as tools at all).

I should notice, in passing, that theory validly methodologically sets up, logically orders, and operationalizes in theoretically directed deployment and application the *theorists' own* capacities in order to achieve some goal—capacities including, for example, the human-beings-subject's observing, manipulating, objectifying, conceiving, making, constructing, constituting, representing, or other acts effectively productive for the progression of the subject area. Theory, in other words—whether during its inventoried standing by in a toolbox or its activation, mobilization, and deployment into application—functionalizes, instrumentalizes, operationalizes, and skillfully utilizes the *theorist* herself. Yet, this efficiently causal functionalization, instrumentalization, operationalization, and skillful utilization of the theorist is—oppositely, simultaneously, equally, and identically—efficiently causally *by* the theorist herself, *of* herself, *for* herself, and upon over against herself. The theorist efficiently causes the theory to ex-sist; validly methodologically grounds the theory upon herself; is validly methodologically grounded by the theory as validly, and thereby *correctedly*, and thereby again, as truly existing herself. The theorist, upon theorizing and utilizing the theory, is—oppositely, simultaneously, equally, and indistinguishably—utilized by the theory (i.e. the theoretical grounding-ground) in order to willfully actualize-by-achievement some one or another goal which the theory functionally and valuably serves as means to achieve. Human-being-subject is the grounding-ground, efficiently

causally *by, of, for,* and—oppositely, simultaneously, equally, and identically—efficiently causally upon over against itself as objectified object of itself as means to actualize-by-achievement willed goals.

Human-being-subject theorizes the theory that validly methodologically grounds her validly methodologically validated and thereby truly ex-sisting in the first place, i.e. her ex-sisting and, thereby, epistemological metaphysical being *at all*, whatsoever.

5.15 Experience

Praxis, I understand-in-advance, is my efficient unification of theory and practice. I will and subsequently strive to unify theory and practice in order to willfully posit and will to mobilize myself—always validly methodologically and, thus, truly—to actualize-by-achievement my goal. As individual efficient effects of forceful making (i.e. validly methodologically validated, or judged, realizations of actions, i.e. of efficient causation), *practice* and *theory* are epistemologically metaphysically necessarily in isolated separation. Both are effects of force. Or what is identical: Both are effects of efficient causes. Theory and practice must be, therefore, efficiently caused to approximate one another and to complement one another *in combination* from out of their original and essential separation. This unifying is synthetic compositing.

Human-being-subject's successfully effective unification of theory and practice is *praxis*. Epistemological metaphysical *praxis*, in turn, as the product of this unification, is the validly methodologically validated, or judged, and efficiently causally thereby, true condition of possibility, or the grounding-ground, for producing, validating, verifying, and thereby enacting further *theory*. Theory, insofar as theory or theories are to validly and truly be ex-sisted and thereby ex-sist at all—much less be tested, built upon, utilized, applied, adapted, revised, and renewed—requires necessarily the endlessly unendingly labor of constantly efficiently causing the constant overcoming of the opposing isolation of theory and practice so that human-being-subject can make any new theory at all, and only thus validly methodologically ground his or her actions. Theory and practice, I recall, are each products (or effects) of cascades of efficient causation—that is, of being validly methodologically forced to ex-sist as ex-sisting at all: made to ex-sist validly methodologically and thereby truly. Valid and true knowledge—as the effect of human-being-subject's validly methodologically validated and, efficiently causally thereby, practical unification of theory and practice—is *only thus* effectively *made* possible. Kant understood well this necessity of epistemological metaphysical *praxis* to human-being-subject and its endeavors, including those basic to achieving and perpetually securing its own ex-sisting:

[a] theory may be incomplete, and can perhaps be perfected only by future experiments [*Versuche*] and experiences [*Erfahrungen*] from which the [theorist-practitioner—Kant names physician, agriculturalist, economist] can and ought to abstract new rules for himself to complete his theory. It is therefore not the fault of the theory if it is of little practical use in such cases. The fault is that there is *not enough* theory; the person concerned ought to have learnt from experience. What he learnt from experience might well be true theory, even if he were unable to impart it to others and to expound it as a teacher in systematic general propositions, and were consequently unable to claim the title of theoretical [expert, natural philosopher, scientist, master practitioner]. Thus no-one can pretend to be practically versed in a branch of knowledge and yet treat theory

with scorn, without exposing the fact that he is an ignoramus in his subject [i.e. in his subject area and, thus, in his practice].⁹²⁸

What is the experience of which Kant writes? What is *to experience*? *Experience* speaks to us of *experior*: to make a trial of, to put to the test, to try; but also of to attempt, to try (in the sense of to attempt), to undergo or to undertake something.⁹²⁹ Note *experior* tells us not just of *to try* in the sense of *to attempt*, but also of in the sense of *to put on trial in order to judge*. *Experior* also and simultaneously speaks of *ex- -peritus*, where *ex-* says *out of, from,* and *-peritus* speaks of being *skilled, skillful, practiced* or of having *skills*.⁹³⁰ In other words, *-peritus* speaks of having competent or masterful know-how, or technical knowledge, corresponding to an activity or set of activities and thereby being *ex-pert* in the activities to which the skills, that is, the techniques or the know-how correspond. The domain of activity to which the techniques, i.e. the know-how, essentially belong is that of making a trial of, putting to the test, trying and judging (in the legal sense); but also of attempting something or of undertaking something, of testing one's capacity (or power) to realize something or to go through (undertake) something.

To experience is not, for example, *to fare*. *To fare* speaks of and from Middle English *fares* or Old English *faran*. *To fare* is *to go, to travel, to pass through along the way* or *along a way*. *To let fare*, for example, speaks of *to let go of*—to let go of in the sense of *letting a being go on its way*.⁹³¹ *How are you faring?* is a very different question than *What are you experiencing?* The latter may be an aspect or part of the former—even a necessary part for human-beings-ex-sisting livingly—but does not, and cannot, exhaust the former. *To experience* is, and can only be, subsequent to and subsidiary of *to fare* as human-beings fare *ex-sistingly* in the world. The German *Erfahren*, for example, likewise speaks of *er- -fahren*. *Er-* speaks in the sense of *beginning, out of, originally, in the beginning*.⁹³² *-fahren* tells of *moving forth, going, sailing, and traveling* as well as *proceeding forth, leaving, departing*.⁹³³ *Erfahren* is *not experience*. *Erhahren*, likewise, is neither *empirical* nor *empiric*. The latter may be a part or aspect of, or in, or during the former but is neither identical nor the same as the former, nor can the latter, nor does the latter, exhaust *Erfahren* or *to fare*.

Like *to experience*, *empirical* and *empiric* tells us of ἐμπειρία (*empeiriā*). Often, *empeiriā* is translated with the Latin *experientia*, or *experience*. *Empeiriā* tells us of acts, actions, and activity—or as I understand in advance metaphysically (and, thus, epistemologically metaphysically)—practice without knowledge of principles, i.e. without metaphysical theory.⁹³⁴ *Empeiriā*, in other words, is know-how without any knowledge of *why*. For the ancient Greeks, *empeiriā* was a kind of unthinking craftsmanship based in and concerned with mere experience alone and, thus, not genuine knowledge at all. Genuine knowledge was and required, minimally, a well-developed understanding of *why* for each and every *how*. *Empeiriā* is purely and entirely technical and, thus, of *banausic* (βαναυσος) arts and crafts.⁹³⁵ An *empiric* is a mere technician whose immediate skills, however expert they maybe, are, nonetheless, exhaustively of, informed by, and correspond solely to know-how. *Empeiriā* speaks, in turn, of ἐν- (*en-*) -πεῖρα (*-peîra*): *En-* tells of *in, within, among, and by*.⁹³⁶ *Peîra* is *to make trial of, to try* (in the legal sense *to put on trial in order to judge*), *to test, to experiment, to attempt against one* or *to attack*.⁹³⁷ *Peîra* speaks in *empiric*, telling of a means to actualize-by-achievement a willed goal, namely *to judge by means of* and *regarding the use of technique*, or know-how. *Experience* and *empiric* speak to us of the same: mere know-how, mere technique (one might say *technique for the sake of technique alone; know-how for the sake of know-how alone*), know-how without any understanding or knowledge of *why*—much, much less of *what*. Technique, know-how, and

technical skill are and can only be means to actualize-by-achievement willed goals, however lofty or mundane, and well-intentioned or not these goals may be. These are tools and *mere know-how* efficiently causally *by* action and, subsequently, *for* action—i.e. in service to *action*.

To experience, then, is to apply particular techniques, or technical skills, or know-how as means to actualize-by-achievement some end-goal. Particular techniques, technical skills, or know-how belong to one or another domain of activity. Know-how is knowing *how* and belongs to domains of technical activity. The domains of activity to which techniques belong are those of *to put to the test*, *to make a trial of*, *to try*. These skills are *in order to*; they are *instrumental to*; they are *a means to* actively and thus efficiently causally realize (*to realize* validly methodologically and thus practically judged to be practical in advance, or what is the same, to actualize-by-achievement) the actions of *to put to the test*, *to make a trial of*, *to try in order to judge*, as well as *to test's one's power to practically go through something*. *To experience* is to deploy and apply techniques, or know-how (technical knowledge) to the activities of making a trial of, putting to the test, trying. *To experience* requires, *in advance*, that there be an agent or an actor to efficiently cause (i.e. to validly methodologically practically realize, or actualize) and, thereby, to ground *experience* as experience. This grounding-ground, I am given to understand-in-advance, is human-being-ex-sisting—the same human-being-existing that experiences at all only insofar as it is efficiently causally affected by and represents external stimuli must *first* efficiently causally ground experience as experience.

I may begin to glimpse here what is essential to human-being-*subject*; that is, to human-being given to ex-sisting lawfully as opened and revealed in the lawful gathering and laying forth of world *as the world* of, from, and in epistemological metaphysics. Human-being—insofar as human-being is to come to *ex-sist*, and thus epistemologically metaphysically judged *to be* epistemologically metaphysically at all—must necessarily be the efficiently causal *subject* of its experience and this experience's evaluation, validation, and, thereby, verification as *true* experience *at all*. Likewise, human-being must *subject itself* efficiently causally *by, of, for,* and—oppositely, simultaneously, equally, and identically—*upon over against itself* as an *effective object of* grounding experience and, thus experiencing. Insofar as human-being-subject is to validly methodologically exist at all, human-being-subject must efficiently causally—i.e. forcefully and willfully subjectively—objectify itself upon over against itself as an validly methodologically validated and thus true object of itself.

For human-being-subject, the stakes of these activities—or, as I am given to understand in advance, practices—are no less than *existential*. There are no higher stakes for human-being-subject. Human-being-subject must efficiently cause *experience* if human-being-subject is to exist (and thus epistemologically metaphysically to be) at all. What is *essential* to human-being-subject is to perpetually *self-ex-sist* (*auto-ex-sist*) and—oppositely, simultaneously, equally, and identically—to perpetually efficiently causally be *ex-sisted* by and upon over against itself. What is lawful, and thus essential, for human-being-subject is to perpetually *experience* and to perpetually efficiently causally be experienced validly methodologically upon over against itself. Human-being-subject exists insofar as human-being-subject validly methodologically experiences and grounds experience. *To experience* for human-being-subject is and can only be—exhaustively and exclusively—to experience itself, *by* itself, *of* itself, *for* itself, and upon over against itself as the epistemological metaphysical ground of experience exhaustively and, thus, at all. Human-being-subject must necessarily be an ex-pert of making itself experience, of experiencing itself, and of efficiently causally thereby existing itself as an effect of itself. In

order for human-being-subject to actualize itself by achievement requires expertise of the most essential epistemological metaphysical kind.

To *experience*, then, is *technical*. For human-beings-existing, *to experience* belongs to the essential *poietic* disposition: *technē*. *Technē* is not of *prássō* (*prássein*) and, therefore, is neither of nor corresponds to *práxis*. *To experience* requires necessarily *know-how*. *To experience* is possible only and necessarily by means of *know-how*, *as know-how*. This *know-how* is *techniques* and their corresponding skills belonging to a particular domain of technical activity. *Know-how* is the *technical knowledge* that corresponds essentially and exclusively to the question: *How?* In other words, the techniques of any particular domain of know-how are an ongoing response to the question, *How?*, such as: *How to actualize this or that goal? How to realize this or that action? How to posit this or that goal? How to validly methodologically practically judge action or activity and its agents such that this judgement can be validly methodologically judged to be valid judgement at all? How to efficiently cause action or activity as an agent? How to represent x, y, or z? How to frame x, y, or z? How to view x, y, or z? How to explain x, y, or z? How to interpret or explicate x, y, or z? How to certify x, y, or z? How to validate x, y, or z? How to correct x, y, or z? How to verify x, y, or z? How to conceive this or that problem as a problem at all? How to conceive the solution to this problem?* Or, more generally: *How to survive? How to thrive? How to achieve? How to actualize x, y, or z by such achievement?* And so on.

Technē, again, does not belong to *praxis*. Technique, know-how, technical knowledge, and technical skill belongs in essence to *how?* and, thus, to *poieîn*. *Technē* is the essential human disposition, or sensible orientation along a way of sense in world *as the world*, belonging to *poieîn*, and thereby, to *poiēsis*. *Poieîn* lawfully disposes human-being-ex-sisting technically, orienting human-being-ex-sisting upon an revealing-opening way of sense in and through world *as the world* by, of, and as technique and the *poietic* result, product, creation, creature, constitution, construct, or other efficient effect thereof.

But have I listened to and faithfully heeded the call and claim of prior essential questions, questions whose call is *essential* to human-being? Of experience and empirics, such questions ask: To put *what* or *who* to the test? To make trial of *what* or *who*? To test *what* or *who*? To try *what* or *who*? To judge *what* or *who*? To test's one's power to go through *what* or *who*?

And then, after human-being-existing has responded faithfully to these questions of *what?* and *who?*—*if* human-being-existing listens at all—further questions *themselves* come before us, calling us, claiming us: *Why* to put *what* or *who* to the test? *Why* to make trial of *what* or *who*? *Why* to try *what* or *who*? *Why* to judge *what* or *who*? And, in the response to all of these questions: *Why this particular what or this particular who* at all, at this particular time and place? *Why* is it necessary or desired to put *this particular what* or *this particular who* to the test at this particular time and place?

How? follows, and *can only follow*, these questions, *regardless of whether or not* human-beings-existing respond to these prior essential questions with open attention, concern, and intention (intention, that is, with awareness directed *in obedience* to the law and its questions as these call and, in calling, claim human-being-ex-sisting).

How? is, at best, a third order question, *even if* it is an essential question. Insofar as human-being-ex-sisting faithfully listens to, attends to, heeds, and responds with greatest priority, effort, concern, and urgency, or exclusively and exhaustively, to *this* third order question, human-being-ex-sisting is and will remain *entirely* a mere technician.⁹³⁸ Human-being-ex-sisting is and will remain a technician of *what?* Human-being-ex-sisting is and will

remain entirely a technician of *know-how*. Epistemologically metaphysically, for example: of know-how-to will to power to will; of know-how-to force, i.e. of know-how-to efficiently cause; of know-how-to be forced, i.e. of know-how-to be efficiently caused; and of know-how-to efficiently causally ground (including of the ground itself validly methodologically *as ground*) as efficient *causa prima* and *primum movens* and—oppositely, simultaneously, equally, identically—know-how of how to be efficiently causally grounded as an effect, i.e. as efficient *causa sui* itself. *This is human-being-subject*. Human-being-subject is *entirely* and necessarily a technician. Human-being-subject is human-being lawfully, i.e. epistemologically metaphysically given to ex-sisting and sensibly oriented to understand itself and world as *the world technically*. Human-being is given to presencing-in-the-world and, there, being sensibly oriented to itself ex-sisting in the world in the understanding in advance lawfully belonging to epistemological metaphysics.

The questions yet remain without my response: To put *what* or *who* to the test? To make trial of *what* or *who*? To test *what* or *who*? To try *what* or *who*?

The lawful response proper to epistemological metaphysics: human-being-subject itself, efficiently causally by itself upon over against itself. Human-being-subject necessarily puts human-being-subject itself to the test. Human-being-subject necessarily makes trial of human-being itself. Human-being-subject necessarily epistemologically judges human-being-subject itself. Human-being-subject test's its power to put up and try human-being-itself itself efficiently causally upon over against itself. If human-being-subject puts human-being-subject up to the test; if human-being-subject makes trial of human-being-subject; if human-being-subject itself tries (legally or scientifically-philosophically) human-being-subject, then human-being-subject *first* and *primordially* encounters and counters, and *can* first and *primordially only* encounter and counter—*exclusively* and *exhaustively*—human-being-existing subjectively itself.

If human-being-ex-sisting sets or puts itself up, efficiently causally thereby positing itself in order to subject human-being-ex-sisting itself to trial or test efficiently causally by itself, of itself, for itself, and upon over against itself, then human-being-subject has *already* put world to the test, made trial of world, tried (in order to epistemologically judge) world as the world at all. This putting to the test, making trial of, and trying in order to epistemologically judge is borne of profound fear and skeptical distrust in the face of insolvable epistemological metaphysical insecurity, uncertainty, and invalidity. It is borne from the epistemologically metaphysically lawful demand, and then the command, for epistemological metaphysical validity to be secured—i.e. to be made secure and, insofar as possible, ascertained. Thus, where no validly methodologically secured and thus validly methodologically validated judgement can be bestowed upon that whose very existing is put up to be tested, is made trial of, and is epistemologically judged, human-being-subject efficiently causally abolishes as invalid and thus false the particular being-existing, all beings-existing of world, and even the world as the world itself. Epistemologically metaphysically, no-thing (*nihil*) validly remains in origin or essence or beginning, no-thing at all validly methodologically comes to presence and stands enduring in the world—or *can* come to presence and stand enduringly in the world—*as given to the world*, except human-being-subject efficiently causally causing itself to ex-sist validly methodologically with always unendingly tenuous effective security. No-thing remains except human-being-subject laboriously epistemologically metaphysically encountering and countering itself, forcefully, willfully, and endlessly unendingly, and from this experience, experiencing all that which human-being-subject validly and thereby truly makes stand out and up, forced to ex-sist as ex-sisting at all, efficiently causally *by* and *upon over against* human-being-subject objectively.

5.16 Action

Everyone knows that: the theory and theorizing; the birth and birthing; the existing and presencing; the living and surviving; the absencing and dying; the consciousness and self-consciousness or, even, just the primordial being-aware; the loves, hates, passions, and other emotions; the reflecting, reasoning, solving, and reckoning; and the experience and experiencing of human-beings-ex-sisting involve in origin, in essence, and in ultimate end-goal the perpetual activity comprised of acts and actions. Indeed, the earth, the world, and the universe or cosmos themselves are and can only be by, of, and perpetually acting and, thus, in action and activity. A small but by no means insignificant quantity of these acts and actions—perhaps including even the *highest* such acts and actions as well as, no less, the most mundane—come to exist at all only insofar as they are efficiently causally *by* human-beings-existing as the *actors* or *agents* of these actions and the activity they comprise in effect. *What is action?*

In book seven, chapter seventeen of *Confessions*, Saint Augustine, addressing himself to God—that is, opening himself attentively towards God—writes: “*tunc vero invisibilia tua per ea quae facta sunt intellecta conspexi.*”⁹³⁹ Augustine writes: Then I have *looked* [*conspexi*] and *understood* [*intellecta*] your invisible *truth* [*vero invisibilia tua*] through the *beings* that are [*here*] in the world [*per ea quae facta sunt*]. Augustine’s understanding is of his faithful gathering of (*inte-* - *legere*) and corresponding with that which comes to presence before him, revealing itself to him. With lawfully guided awareness and thinking responsibility, it is towards the sensible (or worldly) revealing-coming-to-presencing that Augustine looks, or attends. Through his extraordinarily lawful responsibility and heedful thinking in the world, he is led before God’s invisible truth, truth which gives but is not and cannot be either exclusive to or exhausted by sense and sensibility of world lawfully openingly revealed as *the* world of sense and sensibility.⁹⁴⁰ Thus, I include *here* parenthetically to remind us that Augustine is, thinks, and subsequently writes *here*, a human-being-exsisting, or what is the same, a human-being *in the world*, sensing, attending, thinking, responding. A human-being-in-the-world is a human-being-ex-sisting, and vice versa. If Augustine has looked to and thereby understood the invisible truth of God through beings, he has *done so*, practically, through the beings that are in the world, and therefore, through the beings with and among which *he* is, too, being-ex-sisting *here*, in the world.

Sunt says *they are*. What or who is? *They* are. Who or what is *they*? To understand in advance that *they* are *creatures, things, subjects, objects, actions, or effects*, or that they are only insofar as they exist or presence, whispers to us of the understanding-in-advance *to which* I belong and in which I am lawfully and, therefrom, sensibly carried into and through the world. *They* are beings (which could include, perhaps, *creatures* or *things*, etc.) in the world that *are given by, of, and from* God. Immediately I find myself before a question. Regardless, for now, of what they are: Are *they*—these beings that are in the world—*of* God or *efficiently causally by* God (e.g. *made by, created by, existed by, crafted by, formed and materialized by*, etc.)? I shall return to this question.

What *are* these beings and beings in the world? Augustine tells us in his exceptionally lawful thinking-responding to the questions before him, calling him: *They* are *facta*. *Facta* (singular *factum*) speaks of and from *faciō* (*facere*). *Faciō* tells us of *to make, to build, to construct* (out of parts or raw materials, for example), *to cause to be or become, to cause to exist, to make exist* (or more simply, *to exist* as if it were transitive), *to produce, to create, to bring forth into existence, to compose, to achieve by one’s efforts, to do or perform an action*, and so

on.⁹⁴¹ *Facta* speaks to us unequivocally of *actors* and their *activism*, of *agents* and their *agency*, of *acts*, *action*, *actualizations*, *activations*, etc., and the *activity* these comprise. *Facta* speaks to us of *action* and the essential orientation of human-being-ex-sisting in the world corresponding to *acting*: *ars* (art). Or, what is the same, *facta* speaks to us of *poiēsis* and the essential orientation of human-being-ex-sisting, i.e. of human-being in the world, that corresponds to *poieîn*: *tékhnē*. *Facta* speaks to us, then, telling us unambiguously of *to efficiently cause*, of efficient causes and their effects. Thus, Augustine speaks with great lawfulness and lawful sensibility, that is, of and from metaphysics, when he writes *per ea quae facta sunt*.

In contemporary English, I ubiquitously and commonsensically speak or write of *to act* as the same as, for example, *to do*, *to carry out*, *to fulfill*, *to complete*, *to undertake*, *to sense*, *to devote*. As I will come to understand, metaphysically and, thus, epistemologically metaphysically, *to exist* at all, whatsoever, and its very possibility, is *to act*. All else follows.

To act is to force. As I have already learned, *to act is to efficiently cause*. *To force* is to *efficiently cause*, and vice versa. Metaphysical formal, material, or even final (or distinctly, end) *causes*, insofar as they *act* or are *actions*, are themselves *caused efficiently* in origin, continuation, and termination. These metaphysically necessarily subsidiary three causes *efficiently causally* limit, condition, and qualify efficient causation. Here I should recall my reading of Kant and his extraordinarily lawful giving-voice to the giving and opening-revealing law of epistemological metaphysics and, thereof, to the unconditional, unlimited, unqualified willfully willing and willed universal and eternal autonomy and self-sovereignty of human-being-subject, i.e. of will power itself.

To efficiently cause is to act. *To act* speaks to us of *agō* (*agere*): *to drive*, *to move*, *to propel*, *to be in motion*, *to cause to move*, *to force*, *to push*, *to press*, *to throw*, *to impel*, *to agitate*, *to compel*, *to induce*, *to make* (in the sense of *to make one act*, e.g. *to make one stand up*, *to make one march forward*, or *to make one come forth*), *to conduct*, and so on.⁹⁴² *To cogitate*, for example, is an outstandingly essential expression and, thus, effect of *agere*. *To act is to make move*, *to put into motion*, *to mobilize*, and otherwise *to efficiently cause to move*, where the motion or the movement are the efficient effect and—metaphysically epistemologically oppositely, simultaneously, equally, and identically—the efficient cause. *To act is to force*. *To act is to efficiently cause*. To have the power to act is to have the power to force. To have the power to act is to have the power to efficiently cause. To have the power to act is, epistemologically metaphysically oppositely, simultaneously, equally, and identically—to have the impotency of being efficient causally determined, or effective. This is *passivity*, *passion*, and even *compassion*. To have the power to act is to have the power to will. To act is to will. To will is to will to will, and to will to will is to will to power to will further, endlessly unendingly without limit, condition, or qualification. That is, to will to will, or an epistemologically metaphysically good will, is an autonomous, (self-)sovereign will, universally and eternally willing for the sake of willing will to will itself.

To actualize, *to make actual*, and *to be actual* follow in their very possibility from what *to act* is. I come closer to understanding *to actualize-by-achievement*. What or who is actually achieved by act, action, and activity is not, and cannot be, an end. Such achievement is force's actualization of force forcing. Such an achievement is will's actualization of will willing will to will further, unendingly without end.

Likewise, metaphysically and, thereof, epistemologically metaphysically, *to exist* is *to be actualized* and efficiently causally thereby *to be actual*. Even, for example, a memory or a dream exists and, thus, metaphysically is at all only insofar as it is *actual*—i.e. only insofar as it

is *actualized* efficiently causally—the only mode of *to actualize* that there is or can be. Metaphysically and, thereof, metaphysically epistemologically, *to exist* is *to be actualized* and, efficiently causally thereby, *to be actual*. As I have already learned, metaphysically and, thereof, epistemologically metaphysically: *to be* is *to exist*. Metaphysically and epistemologically metaphysically, insofar as a being *is*, a being *exists*. Insofar as a being—or even its mere possibility—exists, a being (or its possibility as possibility) is necessarily actual as actualized and actively being actualized actually.

To act is not, and cannot be, an end in itself. There is no act or possible act, action, or activity that is or can be, has been, or ever will be an end in itself. Why?

To act is *to force*. Force and its activity, as force forcing and being forced, is not and cannot be an end in itself. *Force* is not sufficient unto itself. *Force* is endlessly unendingly essential lack, essential scarcity, essential entropy, essential incompleteness, essential insufficiency, essential absence, essential want, essential deficiency, essential deficit, essential destitution, essential deprivation, and on and on. *Force* necessarily, absolutely is and can only be a means to an end. This end, in turn, is only force itself having forcefully and powerfully overcome itself *in order to be force at all* and, efficiently causally thereby, *to force*. This end, then—the end of force—is an endlessly unending end. This end—the end of force, force's end—is *merely*, universally and eternally, an end-goal—an end-goal, of course, force forcefully posits by itself, for itself, upon over against itself. An end-goal is a means to will and to consequently efficiently cause the positing and actualization-by-achievement of a further end-goal. Epistemologically metaphysically, force—insofar as force is and can be at all—is the willfully, powerfully, forcefully constant conquering and overcoming of force itself. Epistemologically metaphysically: *This is force*.

Will to will is, epistemologically metaphysically and thus lawfully, the good will, and vice versa identically. Will to will *is force*—force forcing and being forced by, from, towards, and upon over against itself. Will to will is will to power to will. *Will to power to will* is *force forcing itself and—oppositely, simultaneously, equally, and identically—being forced forcefully*. *To efficiently cause* is *to force* and—oppositely, simultaneously, equally, and identically—*to be forced*. Force is only insofar as it is efficiently causing and—oppositely, simultaneously, equally, and identically—efficiently caused.

Force is only insofar as it is efficiently causing and efficiently caused; and vice versa identically, an efficient cause is only insofar as it is force forcing and being forced. Epistemologically metaphysically given to understanding, *force* is (efficient) *causa prima* and *primum movens* and—oppositely, simultaneously, equally, and identically—(efficient) *causa sui*. Epistemologically metaphysically, *to act* is—oppositely, simultaneously, equally, and identically—*to be enacted by* or *to be actualized by*. Epistemologically metaphysically, *to be active* is—oppositely, simultaneously, equally, and identically—*to be passive*. This is the contradicting-contradiction of epistemological metaphysics. This is the contradicting-contradiction that human-being-subject *is*.

Thus, for example: *Vita activa* is *vita per vim*, *vita cogere*: life by force, forceful life.⁹⁴³ *Vim* is force. *Cogere* speaks of and from *cum-* *-agere*: with force, by force. Even *vita contemplativa*, understood in advance as a domain of human-being-ex-sisting's life dedicated to mental or intellectual activity, is *vita per vim*, *vita cogere*. The distinction between the activity of work and the activity of labor—both of which, as domains of activity of human-ex-sisting, are and are of *poiēsis* and its essential orientation of human-being in the world, *tékhnē* —

metaphysically gives way opening-revealingly, as it must, to its epistemological metaphysical grounding-ground: endlessly unending labor.

Metaphysically and, thereof, epistemologically metaphysically: *Vita activa* is *vita validus*: valid life. As *vita validus*, *vita activa* is efficiently causally *verificatur vita*: verified life. Active life is the valid life, the strong life, and thereby, the healthy life, the vigorous life.

Active life is, efficiently causally thereby, true life, where validly methodologically validated life is truth: *vita veritas*. Life is truth, of course, lawfully gives way to endlessly unending validly methodologically validated experiential and empirical truths and, relativistically metaphysically, “truths.” Today, this is all increasingly commonsense.

Metaphysically and, thus, epistemologically metaphysically, the highest act of existing is the supreme act of sovereignly willing will to will that both is and is *in order to* make universal and eternal law unto itself, for itself, efficiently causally by itself. Of humanly existing, or of human-being-livingly as I am in the world (human-beings-ex-sisting), I may write: Epistemologically metaphysically, *vita activa* is *voluntarium vita*, *vult ad vitam* or *vult vivere*: willful life, will to life. To will to life is to will to life to will to power to live in order to willingly will further, more powerfully, without end unendingly—i.e. without limit, condition, or qualification, autonomously, (self-)sovereignly. To will to life is to will to live. To will to live is to will to exist in the world.

I come to understand that both Kant and Nietzsche—both with extraordinary faith, lawful reverence, and obedient, thinking openness to the call of essential questions—gave voice for common sense to the opening-revealing of epistemological metaphysics preparing the way for, or destining the lawful arrival of, relativistic metaphysics. *To destiny* speaks of *de- -stano*, or *de-stō* (*stāre*). *De-* says *from* or *of*. *Stō* tells us of *to stand*, *to stand up*, *to stand firm* (e.g. *in battle or combat*), *to be in an upright position*, *to be set up or in the ground or other support* (*stand*), *to take up or to be in position* (*troops, ships, etc.*).⁹⁴⁴ I should listen ever so closely, for I may likewise hear here the whispering of ἱστῆμι (*histēmī*), from and of which *episteme* speaks, as well as the rustling murmur of *sistō* (*sistere*), from and of which *exist* speaks to us as I give voice to the word.

Epistemologically metaphysically, to will to be is to will to exist. *Vita activa* is *to will to exist livingly* and thus *to will to be in the world livingly at all, whatsoever*. What exists and, efficiently causally thereby, is? *Vita activa*, which is will willing to will itself further, will willing itself to empower itself to will further and more imperiously, unendingly without end. *Vita activa* is, necessarily, *vita laboris* and *laboriosum vita*.⁹⁴⁵ *To act* is not and cannot be an end in and of itself. *To act* for the sake of acting is, and can only be, a means to posit and actualize-by-achievement end-goals in endlessly unending progress. *To act* for the sake of acting is, and can only be, labor—an endlessly unending labor.

Metaphysically epistemologically, *to work* is, exhaustively and exclusively, *to labor*. Insofar as *to work* and *to think* and, thereby, *to world* are species of *to act*—as I am given to understand-in-advance—the work of art is the activity comprised of actions, including but not limited to human-being-existing’s actions.⁹⁴⁶ The metaphysical and, thereof, the epistemological metaphysical act of disclosing—*in, from, through, and as* the work of art itself—discloses the activity comprised of the endless actions that—in their ex-sisting totality, throughout space and time, or universally and eternally—efficiently cause and, thus, both are and are of the world. The work of art is, thus, both efficiently causally *by* and efficiently causally *for* acting for the sake of acting as an end-goal in itself. There are at least three senses *the work of art* speaks to us. First: The work of art is the activity that is a willful means to a goal, or in other words and

what is the same, the willfully conducted efficient causes (e.g. *cūdere, agere, agitāre, facere; poieîn*) whose combined effect is the art, willfully actualized by achievement: the effect, product, outcome, result, yield, composition, creation, piece, display, performance, script, poem, novel, *et al.* The work of art is to efficiently cause the effect, where the work is *a means to* and, thus, willed in order to and thereby willfully, functionally deployed in order actualize by achievement the art, i.e. the artwork. In this first sense, then, art, or the artwork, is the effect, the product, the outcome, the result, the composition, the piece, etc. of this activity, of this efficiently causing—that is, of this willful work. In this first sense, the *work* of the *the work of art* is and can only be, exhaustively and exclusively, *labor*: the labor of art. *To work* is, exhaustively and exclusively, *to labor*, and *to labor* is unceasing, willful activity without end (to labor endlessly unendingly) in order to, i.e. as a means to, willfully actualize by achievement perpetually progressive end-goals: art, or artworks. *The work of art* speaks to us in second and different, sense, as well. This second sense is, perhaps, opposite of the first: The work of art is, principally and essentially, the artwork—that is, the work of art is the artwork itself: the effect, product, outcome, result, yield, composition, creation, piece, display, performance, script, poem, novel, *et al.* The work of art is the artwork. But what is required to actualize by achievement such art, that is, such a work, or an artwork? Labor is required. Labor is required in order to effect, or make, or produce, or render, or compose, or constitute, or frame, or set up, etc. the work of art, i.e. the artwork. This labor is, as before, activity, including especially the activity of disclosing the epistemological metaphysical world as lawfully given to us in advance, and I to it, as a eternal and universal totality of *activity*. As activity, labor is endless and, thus, endlessly unending. The labor required in order to produce the artwork is, for example: *cūdere, agere, agitāre, facere; poieîn*. Yet, if the work of art—i.e. the artwork, or the effect, product, outcome, result, yield, composition, creation, piece, display, performance, script, poem, novel, *et al.*—efficiently causally *by* this activity is, as it is, an effect, then the artwork, too, is necessarily and can only be a means. The artwork can never be an end in itself. The artwork can never be for the sake of the artwork. But of what or who and for what or who is the artwork a means? Now I come to hear, and perhaps to listen, to a third sense of *the work of art*. Third: The artwork (i.e. the work or art in the second sense) is a means to *further activity*. The artwork is a means to will, and then willfully actualize by artistic achievement further activity. In other words, the artwork is efficiently causally effected, produced, made, created etc. in order to *itself work*. And what is this *work* the artwork is effected or produced to perform? The artwork is effected, produced, made, etc. in order to be effective, efficient, productive, active. The artwork is effected, produced, made, etc. in order to, in turn, *itself* efficiently cause one or more effects upon or over against, for example, those who see it, hear it, or otherwise sense it. The artwork *itself*, as an effect, is produced or made in order to *labor*—that is, in order to, in its turn, efficiently cause an effect. The artwork *is a laborer*. As a laborer, the artwork *labors endlessly unendingly* in order to artistically actualize by achievement further—or perpetually progressing—willfully willed end-goals. *This* is the work of artwork. In the third sense, *this is the work of art*.

I recall that *ars* is the lawful, guiding orientation and disposition of human-being-existing in the world, as well as the means of, from, and for, and always corresponding to, *activity* (e.g. *cūdere, agere, agitāre, facere*). What is the same, I recall that *tékhnē* the lawful, guiding orientation and disposition of human-being-existing in the world, as well as the means of, from, and for, and always corresponding to, *poieîn*. The artistic, or technical, activity of *effectively* disclosing truth as lawfully given to epistemological metaphysical understanding-in-advance discloses *what* epistemological metaphysical lawfully gives to and as the sensibility of

the world and, thus, of ex-sisting itself: truth is activity, of activity, for activity, efficiently causally by activity grounded upon activity (efficiently effectively grounding) itself. Epistemologically metaphysically, the work of art is and can only be actualized-by-achievement through labor. Simultaneously, equally, and perhaps indistinguishably, the work of art *is* both the *laborer* and *the labor* of the laborer. The work of art, as the truthful disclosing of action for the sake of acting as an end-goal in itself, for itself, and efficiently effectively by itself, is an effect and, without exception, a means to further end-goals, including more art and its worlding, or world-making, activity. Epistemologically metaphysically, and thus lawfully as I am given to understanding in advance, a human life lived actively—including what I understand to be practical activity—is a laborious life of progressive productivity without end or an end—only the positing and actualizing-by-achievement of end-goals.

Active life is life of labor and, thus, laborious life. Again, *vita activa* is not, and cannot be, an end in itself. *Vita activa* is, and can only be, at best, an end-goal that is, in essence, a means to willfully posit, will to achieve, and to willfully thereby actualize-by-achievement a further willed end-goal. *Vita activa* is will to will. *Vita activa* is of, from, for, and by will to empower will to will, endlessly unendingly, for the sake of effectively willing will itself. *Vita activa* is not, cannot be, does not, and cannot achieve or actualize—much less cause to be, ground, secure, validate, verify, reinforce, edify, or make certain (ascertain), however ephemerally—human-being free and human-being's freedom, including human-beings-ex-sisting in the world.

If *vita activa* is exhaustive of or the essence of human-being-ex-sisting in the world, then *vita activa* nihilates in advance the very *possibility* of human-being of and in community of any kind (including political), of human-being-belonging, of human-being-fulfilled, of human-being-well (well-being), of human-being-joyful, of human-being-loving and of human-being-loved, of human-being-friend and of human-being-befriended, of human-being as an end in itself and, as such, giving itself lawfully, in mercy and love, forgivingly, for the sake of another. Mercy, love, and forgiveness do not forsake, however, nor are they immune to, honesty not only to *who* is, but also to *what* one is. One cannot love another before one is able to love and forgive one's self—gently, kindly, and respectfully but with *undiminished* honesty and firm courage to, with time and slow healing, hear and then attentively listen to, see and then attentively look, and only thus understand the truth, in truth of what *and* who one is, of what and who others are, and, simultaneously, the truth of one's relations with one's self and others.

Insofar as I am given to metaphysical and, thereof, epistemological metaphysical understanding-in-advance, the highest end of human-being-ex-sisting is the willfully willed end-goal of human-being-living actively, including but not limited to the *vita activa*. As belonging to the ways of sense and sensibility of the world epistemologically metaphysically opened and revealed: action—especially when and when effectively unified with theory, or as I am given to understand, as *prâxis*—exists and can exist only as *poiēsis*. *Prâxis* is *poiēsis*, but not vice versa. As *poiēsis*, *prâxis* is efficiently caused by *poieîn*. *Poieîn* has forcefully overcome and willfully, epistemologically ordered-to-order (commanded forcefully) *prâxis* to act of and as *poiesis*. As given to us to understand lawfully upon the ways of sense of epistemological metaphysics, *prâssein* is *poieîn*, and therefore, *prâxis* is *poiesis*: *to act, to create, to make, to frame, to craft, to constitute, to construct, to render, et al.* *To act* is *to efficiently cause*. *To act* is *to force*. Epistemologically metaphysically, *to efficiently cause* is—oppositely, simultaneously, equally, and identically—*to be efficiently caused*; *to force* is, likewise, *to be forced*. Metaphysically and, thus, epistemologically metaphysically and relativistically metaphysically: All *prâxis*, insofar as

it exists or can exist at all, is understood-in-advance to be *poiesis*. *Prâxis* is *poiesis*, and the activity of action and its technical disposition is what is essential and primordial for human-being-ex-sisting in the world. *Prâxis*, that is, as *prâxis*, has been efficiently causally nihilated—made *nihil*. What remains, then, for human-being-ex-sisting is to will, and thus to will to will. What remains for human-being-ex-sisting in the world is to will to power to will. Epistemologically metaphysically, what human-being-ex-sisting is is force forcing and being forced, and what remains—exhaustively and exclusively—for human-being-ex-sisting to do in the endlessly unending encounter with force is *to act*, i.e. to efficiently cause and be efficiently caused, constantly, unceasingly, endlessly unendingly overcoming itself as what human-being-ex-sisting is insofar as human-being-ex-sisting is to epistemologically metaphysically exist, and efficiently causally thereby be, at all.

I repeat what I write because it is not commonsensical, not even among *avant-garde* academic or scholarly commonsense: *To act is not and cannot be an end in itself. To act is not and cannot be for the sake of action itself. Why?* This is because *to act* is efficiently causal. *To act is to efficiently cause. To efficiently cause is to force*, and vice versa identically. *To act* is the same as *to make, to produce, to create, to constitute, to construct, to frame, to forge, to set up, to generate, to originate*, etc. *To act* is not, and cannot be, *practice* or *practical*. *To practice* is not *to act*, nor vice versa. *To act* is of the same as *poieîn*; *to act* and *poieîn* speak senses of and from the same. *To act* is not, and is not of the same as, *prâssein* (πράσσειν). Action (or *poiēsis*) is not, and is not of the same as, practice (*prâxis*). *To act* is not, and cannot be, practical. *To act* is not, and cannot be, *to practice*, nor vice versa. *An action* is not, and cannot be, *a practice*, nor vice versa. *Activity* is not, and cannot be, *practice*, nor vice versa. *To act* is not of or from, and cannot be of or from, one dispositioned in and as *phrônēsis*. *Phrônēsis* belongs essentially to *prâxis*. It is not of or from *poiesis*. *To act*, actions, activity: these are *poiesis* and its essential orienting and disposing of human-being-living in, of, and from *technē*. *To cause* is not, and cannot be, of or from *prâxis*. *To act is to efficiently cause. To efficiently cause is to force. To cause* is by, of, and for *poiesis*. *To act* is by, of, and for *poiesis*. *Poiesis* is *force forcing* and—oppositely, simultaneously, equally, and identically—*being forced*.

At the least, metaphysically epistemologically, *to cause* is *to efficiently cause*. *To cause*, in any form, unified or singular, is *to make be*. *To cause* is, insofar as it is and can be at all, *by, of, and for* to *efficiently cause*. Metaphysically and, thus, epistemologically metaphysically, all other causes follow in effect, as efficient effects and therefore and only thereby as efficiently causal in their own regard, whether formally, materially, or, let us write, finishingly (*not endingly*).

To act is not, and cannot be, *to practice*. *To practice* is not, and cannot be, *to act*. Activity is not, and cannot be, practical. Practice is not, and cannot be, active. *Prâxis* is not, and cannot be, *poiesis*, nor vice versa. To this I shall return in due time below.

5.17 Passion: *Passiō, Patior (Patī)*

The opposite of *to act* is *to suffer, to endure an act, or to undergo an act* as well as its further cascade of efficient effects, such as hurt, pain, fear, shame, distress, distrust, illness, disease, ailment, or—for living beings—even death. The opposite of *action* is *to suffer an action, to endure an action, or to undergo an action* as well as its further cascade of efficient effects. Thus, as comprised of actions, the opposite of *activity* is *to suffer activity, to endure activity, or to undergo activity* as well as its further cascade of efficient effects. *To act* is to

efficiently cause. To efficiently cause is to force. To act is to force. To act is to be force forcing. To act is to be efficient cause causing. The opposite of to act, then, is to be efficiently caused, or to be an efficient effect. The opposite of to act, then, is to be forced by force. The opposite of to act is to suffer, to endure, or to undergo being efficiently caused. The opposite of to act is to suffer, to endure, or to undergo being forced by force forcing. The opposite of to act, then, is to be passive.

The opposite of *to practice* is not, and cannot be, *to be passive*. The opposite of *practice* is not, and cannot be, either *passion* or *passivity*. The opposite of *practicality* is not, and cannot be, *passivity*. The opposite of *to be practical* is not, and cannot be, *to be passive, to be passionate, or to be patient, or what is the same: to be ineffective, to be inefficient, to be unmotivated, to be unmovable or unmoving, to be immobile, etc.*

To practice is essentially other than *to act* and *to be acted upon*. *To be practical* is essentially other than *to be active* or *to be passive, to be passionate, to be patient*. *To practice* does not need, entail, require, command, demand, or will necessarily *to act* and *to be acted upon; to efficiently cause* and *to be efficiently caused; to force* and *to be forced*.

The opposite of *activity* is *passivity*. The opposite of *action* is *passion*. Likewise, the reverse: The opposite of *passion* is *action*. The opposite of *passivity* is *activity*. And so on.

What is passion, and what senses does *passion* speak into the world's sensibility? What is passivity, and from and of what does *passivity* speak its senses?

Passion is, and speaks senses of, *passiō*: the act or condition of suffering, of enduring, of undergoing, of pain; the act or condition of suffering, of enduring, of undergoing hurt, pain, fear, shame, distress, distrust, illness, disease, ailment, or—for living beings—even death; the pain or distress caused by illness, disease, ailment; the state or act of being acted upon or of suffering, of passivity, of effect; an affection of the mind, passion, emotion.⁹⁴⁷ This affectation, this emotion, is the movement or the motion *efficiently caused* by one or more actions. In other words, this emotion is the movement or motion produced by, resulting from, yielded by, etc.: *being forced to move, being made to move, being put into motion, being motivated, being mobilized, etc.* This affection and emotion are efficient effects, or products, or constitutions, etc., as well as—oppositely, simultaneously, equally, and perhaps indistinguishably—themselves efficient causes upon and over against the acts and actions. Such emotion *is* motion and movement, but it is, nonetheless, far from being exhaustive of all movement and motion, as I shall learn.

Passiō is, and speaks its senses of and from, *patior (patī)*. *Patior* is, and speaks the senses of and from: *to suffer; to endure; to undergo; to be affected; to experience; to be acted upon; to be afflicted with or by; to bear, to submit to, to allow, to permit passively or submissively.*⁹⁴⁸ Passivity is, and speaks of and from, the condition efficiently caused by the action and reaction, i.e. the efficient cause and its effects, i.e. the force forcing and being forced of *patior (patī)*: *to be passive.*⁹⁴⁹ Likewise, one who is *patient* is one who is *passive*, and vice versa.⁹⁵⁰ Thus, listening and responding thinkingly, I come to understand: *To be passive* or *passionate* is *to be acted upon, to be subjected to action, to suffer an act or to suffer an action, to undergo an act or to undergo an action. To be passive* or *passionate* is *to suffer being efficiently caused* or *to undergo being efficiently caused*. Epistemologically metaphysically, at least, *to be passive* or *passionate* is *to be determined, or to suffer determination, or again to suffer being efficient caused, even in one's very existing and even insofar as they are to exist at all as made-to-ex-sist* or created. *To be passive*—as I am epistemologically metaphysically given in advance to understand—is *to be caused heteronomously* by actions; to be the effect of or the product of actions; to be the outcome, result, or yield of actions or activity; or even to be inactive,

unmotivated, immobile, unmoving and unmovable, etc. In its extreme, *to be passive is to be enslaved* in and efficiently causally by totalizing heteronomous determination. *To be passive*, then, is *to suffer force forcing*, that is, *to suffer being forced* or *to undergo being forced*.

To be passive is utterly and viciously anathema to our common modern and contemporary sensitivities. Lawfully, or epistemologically metaphysically, the very *possibility* of passivity is a endlessly looming, always and everywhere imminent and urgent, existential threat—that is, a threat of the highest stakes. Insofar as human-being-subject validly methodologically ex-sists and is to ex-sist at all, human-being-subject ex-sists on guard, primed in skepticism, and (self-) deployed and, thereby, (self-) operationalized, minimally, into the activity (including reactivity, interactivity, and intra-activity) of defense, no matter how subtle or quiet. I rest easy, I let be (including myself), I let go, if I rest or let be or let go at all, only in the wake of successfully or productively satisfying activity and in preparation for future activity—which is not rest or letting be at all. I *act upon*, *react to* and *resist*, or *inter-* and *intra-act* with foreign acts, actions, and their activities by willing and then striving to activate (including myself), actualize (including myself), actualize potentials (including myself, or my own), actuate, be active, be proactive, be activists, act, take action, call for action, demand action, resist acts or actions, counteract, transact, enact, act out, produce, be productive, be effective, be efficient, affect, move (including myself), be in motion, mobilize myself, motivate myself, be motivated, progress, make my futures, make myself, be constructive, craft, solve, posit, make, build, construct, deconstruct, re-construct, constitute, frame, represent, render—and on and on, common-sensibly.

Metaphysically and, thus, epistemologically metaphysically, human-being-ex-sisting is human-being-ex-sisting only and at all, whatsoever, insofar as human-being-ex-sisting is actively activating, actualizing, acting, enacting, interacting, intra-acting, and so on. Contemporarily, human-being-subjects are—perhaps nearly without exception—unrelentingly, incessantly, and continuously given in advance to the business of activity (including, e.g., productivity, and so on), especially as means to willfully, relentlessly, incessantly, and endlessly unendingly overcome the opposing and thereby unyielding existential threat of passivity. Epistemologically metaphysically: Autonomy and (self-) sovereignty are the effects, or products, or actualized achievements, of my activity. Human freedom, then, as human-being-subjects are given lawfully to understand it in advance, is actualized exclusively and exhaustively by the achievement of, and thereby as the effect or product of, *my* activity—that is, *by myself*. Human freedom, in other words, truly ex-sists at all, whatsoever, as the product, or the efficient effect, of my activity—that is, by means of my making, producing, constructing, constituting, and generally active, and actively progressive thereby, business.

Action and passion; activity and passivity; to be active and to be passionate, patient, or passive: as opposites and equal, each of these belongs to one another. Action and passion, *et al.*, however, belong to one another only as belonging essential to the same, as being of and from the same: *to efficiently cause* and *to be efficiently caused* and, thus, *to force* and *to be forced*.

The opposite of *vita activa* is *vita passiva*. What, then, is *vita passiva*? As the opposite of *vita activa*, *vita passiva* is too *vita per vim*, *vita cogere*: life by force, forceful life. Yet, opposite *vita activa*, the *by* of *life by force* is life efficiently caused to exist, i.e. forcefully forced to live. *Vita passiva* is ex-sisting livingly, or being alive in the world, that is the efficient effect of, the product of, the creature of, the yield of, *et al.*, action and the activity thereby comprised, including but not limited to that of *vita activa*. *Vita passiva* is *being efficiently caused to live*, *being forcefully forced to live*.

To live is to livingly exist in the world, and vice versa. While *to live*, or *to livingly exist*, does not exhaust *to exist* in the world, herein I have focused on *vita*: existing livingly, or life. Epistemologically metaphysically, *to be* is *to ex-sist* in the world—that is, to validly methodologically ex-sist. Epistemologically metaphysically, *to live is to exist livingly*—that is, to be validly methodologically validated (judged) as truly living-ex-sisting. Epistemologically metaphysically, *vita passiva* is *to be efficiently caused to exist livingly* and only thereby *to be* and *to be alive*. *Vita passiva*, as I have written, exists and can only exist from and as being efficiently caused. In other words, *vita passiva* exists and can only exist as what is efficiently effectively determined by action: a product or an effect of action, i.e. of and by efficient causation. Epistemologically metaphysically, *vita passiva* is *to be forcefully forced to exist livingly* and only thereby *to be* and, thus, *to be alive*. Yet, lacking the power to act—much less autonomously enacted action—*vita passiva* is *vita invalida*: As *invalida*, *vita passiva* does not and cannot stand out and up upon and, thus, over against ground by means of its own power. As *invalida*, *vita passiva*, does not and cannot, of its own power, come to stand and, thereby, stand out an up upon validly, with valor, the metaphysically (and, thereof, epistemologically metaphysically) validly validated ground. Metaphysically—and, thus, epistemologically metaphysically—that which cannot not or does not come to stand and stand out and up validly upon over against the validly validated ground cannot and does not ex-sist validly. That which does not ex-sist validly does not ex-sist at all, whatsoever. Epistemologically metaphysically, *to be* is *to be validly methodologically validated* to truly ex-sisting. Epistemologically metaphysically: Only efficiently causally by means of this judgement does, and can, a being-ex-sisting effectively come to ex-sist and, thereby, effectively ex-sist at all, whatsoever.

Epistemologically metaphysically, as *vita invalida*, *vita passiva* is not and cannot be *vēra vita*: true life. *Vita passiva*, however, is not merely *vita no vērificāta*: unverified life, or a being-ex-sisting-livingly awaiting—in original and primordial deficiency and lack that must efficient causally be overcome—verification. *Vita passiva* is, rather, essentially and in origin lacking *verificātiō vērūs*: valid methodological validation of living and, efficiently causally thereby, *true verification* as existing livingly *at all*. *Vita passiva* is *vita falsa*: false life. Metaphysically and, thereof, epistemologically metaphysically, that which is false is not, and cannot be, true. Metaphysically and, thereof, epistemologically metaphysically, that which is not true does not, and cannot, exist and, therefore, does not and cannot be, livingly or otherwise. Epistemologically metaphysically, *vita passiva* does not, and cannot, exist. *Vita passiva*, therefore, is not, and cannot be. *Vita passiva* is not even so much as is not: *nihil*.

Vita passiva is the invalid and, thus, false life of one who does not, and perhaps cannot, stand up validly, exercising power forcefully in order to claim, establish, define, secure, and actively defend his or her ground with valor over against all contravening forces that he or she encounters in the world. *To encounter*, I am given to understand, is *to relate*, and vice versa. *To relate*, I am given to understand in advance, is *to interact*. And, as I have learned, *to ex-sist* at all is to act, to be active. The world itself, in and as its relations encountering one another universally and eternally, ex-sists at all only insofar as it is, and is efficiently causally by, the endlessly unending activity of actions encountering one another.

Vita passiva is invalid life, weak life, and, therefore, *vita passiva* is unhealthy life, feeble life. *Vita passiva* is *unempowered life*. *Vita passiva* is efficiently *ineffective* life. Epistemologically metaphysically, *vita passiva* is *false life*, and as *false life*, epistemologically metaphysically *incorrect life*. Epistemologically metaphysically, *false life* is *false (living) existence*, and ex-sisting falsely, whether livingly or otherwise, is to not epistemologically

metaphysically exist at all. If one does not exist, epistemologically metaphysically one is not. Epistemologically metaphysically, *vita passiva* is to not exist *at all*. Epistemologically metaphysically, *vita passiva* is only insofar this *is* is not at all, whatsoever: *nihil*.

I come before the lawful contradicting-contradiction of epistemological metaphysics and, thereof and therefrom, human-being-subject—that is, of both *who* and *what* human-being-subject *is*. *Vita passiva*, I recall, is life that is the efficient effect of, the product of, the creature of, the yield of, *et al.*, actions and the activity these actions comprise, including but not limited to those activities of *vita activa*. *Vita passiva* is the effect of *being efficiently caused to live*, of *being forcefully forced to live* by foreign acts, actions, and activities. If *vita passiva* is efficiently caused by *action*; if *vita passiva* is forcefully forced by *action*; then *vita passiva* necessarily exists. *Vita passiva* is and—oppositely, simultaneously, equally, identically—is not *falsa vita*. Epistemologically metaphysically, insofar as *vita passiva* exists, *vita passiva* is. And, epistemologically metaphysically, and thus oppositely, simultaneously, equally, and identically, insofar as *vita passiva* is *vita invalida*, *vita passiva* does not, and cannot, ex-sist and, thus, is not at all: *nihil*.

Let us recall—as an extraordinarily lawful and lucid giving-voice to the sending and opening-revealing of sense and sensibility epistemologically metaphysically—Newton’s third law of motion, as I have read it earlier: *to every action there is always opposed an equal reaction: or the mutual actions of two bodies upon each other are always equal, and directed to contrary parts.*⁹⁵¹

Epistemologically metaphysically, *action* is—oppositely, simultaneously, equally, and identically—to *be acted upon over against*. Epistemologically metaphysically, every action is encountered simultaneously by an *equal* and *opposite* action. Epistemologically metaphysically, every efficient cause is encountered simultaneously by an *equal* and *opposite* efficient cause. *Epistemologically metaphysically*, it is *impossible* to validly methodologically discern, and thus to validly methodologically validate (or judge), and thereby, to verify one action as *efficiently causing* the *reaction*, and vice versa. Epistemologically metaphysically, *oppositeness*, *simultaneity*, *equality*, and *mutuality* collapse necessarily into *identity*. Science-epistemology proceeds forth without end, perpetually progressing—contemporarily as much as at the time of Descartes, Newton, or Kant, for example—from this epistemological metaphysical necessary, and thus lawfully necessary collapse: *efficient causa prima* (i.e. *primum movens*) is—oppositely, simultaneously, equally, and identically—*efficient causa sui*, and vice versa. It is only thus, without exception, that in the world to which human-being-subject is given, human-being-subject’s freedom as autonomy and self-sovereignty of the will for the sake of willing will itself can not only exist, but be possible at all. Yet this freedom is, and must be, epistemologically metaphysically contradictory. Such freedom, as Kant gave voice, is epistemologically metaphysically identical to evil: epistemologically metaphysically, the good will is evil, and vice versa.

Epistemologically metaphysically, every force forcing is oppositely, simultaneously, equally, and identically forced. Epistemologically metaphysically, every efficient cause is oppositely, simultaneously, equally, and identically efficiently caused. Epistemologically metaphysically, every efficient effect is oppositely, simultaneously, equally, and identically the efficient cause of the efficient cause that caused it. Epistemologically metaphysically, insofar as *vita passiva* is the effect of action, *vita passiva* necessarily exists. Metaphysically and, thereof, epistemologically metaphysically, insofar as *vita passiva* exists, *vita passiva* is. This, I write

again, is because epistemologically metaphysically, *vita passiva* is necessarily opposite, simultaneous, equal, and identical to actions and the activity these comprise.

But, epistemologically metaphysically, and thus oppositely, simultaneously, equally, and identically: *vita passiva* is not even so much as *is not: nihil*. *Vita passiva* is *vita invalidus*. Epistemologically metaphysically, as *vita invalidus*, *vita passiva* is *falsa vita*: false life. If *vita passiva* is not, then, epistemologically metaphysically, *vita activa* is not and cannot be even so much as *is not: nihil*. This is the contradicting-contradiction of epistemological metaphysics. This is the lawful contradicting-contradiction that—oppositely, simultaneously, equally, and identically—both *is* human-being-subject and *is* perpetually, endlessly unendingly, annihilating and thereby terminating human-being-subject ex-sisting—that is, annihilating and terminating human-being-subject—as well as its epistemological metaphysical possibility of ex-sisting at all, whatsoever, universally and eternally.

What or who is to save human-being-subject? *How* will the *what* or *who* save human-being-subject? What or who will save *us*? What saves the very possibility, much less the potentiality, the actuality, or the reality of *action* and, efficiently causally thereby, *ex-sisting*, whether livingly or otherwise? *How* will the possibility—as well as the potentiality, the actuality, and thus the reality—of *action* and, efficiently causally thereby, *ex-sisting* (whether livingly or otherwise) be saved? What or who will redeem us? *How* will this *what* or *who* redeem us? What or who will validate and re-validate us? *How* will the *what* or *who* validly methodologically validate and re-validate us? What or who will value and re-value us? *How* will this *what* or *who* validly methodologically value and re-value us?

Human-being-subject *is* both—oppositely, simultaneously, equally, and identically—the *solution* and the *means to solve* this problem efficiently causally by itself, for itself, upon over against itself. *To act*, I learned in chapter 4, is *to will*. *To will* is *to force* and vice versa identically. Will willing itself to will progressively ever more autonomously and (self-) sovereignly saves *vita activa* and, thereby, saves human-being-subject—which is the same as to write: human-being-subject saves itself and, upon saving itself, saves the world: human-being-subject, the grounding-ground. It is thus, and only thus, that human-being-subject wills at all, and ex-sists at all. Will willing itself to will is its own saving-salvation, saving itself willfully from the contradicting-contradiction that is epistemological metaphysics and human-being thereof and therefrom given to and revealed to itself to be in the world as existing in the world. Will willing itself to will is its own grounding-ground, a grounding-ground that is only *epistemologically metaphysically* contradictory. Will wills the constant overcoming of this contradicting-contradiction. This is the same as: will wills itself to will further, more powerfully, more imperiously. *To act* is *to will*. *To be passive* is *to be willed*. *To be passive*, then, *is to be will itself willing itself*, as means of will to will itself, for will wills itself to will.

The understanding-in-advance to which I am given is not and cannot be faith. This is not to write that there are none who, through thinking in lawful response to essential questions, bring this understanding into the light of their attentive awareness and hold it their utmost care and concern. Only thus would it be faith—epistemological metaphysical faith. This is a faith in the invalidity of faith, to be sure, but faith nonetheless; a trust in the absolute (universal and eternal) invalidity of any trust lacking validly methodologically valid validation (i.e. validly methodologically valid judgement), but a trust nonetheless. *Faith*, insofar as it is *faith*, is not and cannot be *in advance*. *Faith* is, and must be, sensibly attentive and, thus, comes of attentive, discerning, and thinking awareness; *lawful obedience*; and, thereof, *responsibility* to the call of and the path opened for us by essential questions themselves. The understanding-in-advance of

which I speak, to which I am given lawfully and carried into and through world as *the* world epistemologically metaphysically, is for many of us, contemporarily, not even so much as faith.

5.18 *Poieîn* (ποιεῖν) and *Páskhein* (πάσχειν)

What is *poieîn*? What sense does *poieîn* speakingly give to the sensibility of the world and, thus, to us that I—human beings ex-sisting in the world—may come to sense the world with ever greater sensitivity?

Poieîn is, and thus speaks the senses of, *to make, to produce, to create, to construct, to fashion, to render, to constitute, to form or perform, to fabricate, etc.; to cause; to judge, to execute judgement, to make a judgement; to labor, to do work, to be operative, to exercise activity.*⁹⁵² *Poiēma* (ποίημα) is, and thus speaks senses of: *that which (i.e. what or who) has been made, produced, created, constructed, fashioned, rendered, constituted, formed or performed, fabricated, etc.; that which (i.e. what or who) has been caused to exist or caused to be, or an effect; the result, yield, product, creature or creation, construct, constitution, judgement, etc. of who or what poieîn.*⁹⁵³ *Poiēsis* (ποίησις) is, and thus speaks senses of: *a making, producing, creating, constructing, forming or performing, fashioning, rendering, constituting, fabricating, etc.; an efficient causing; judging or an executing of judgement; laboring, an operating or operation, an acting or action.*⁹⁵⁴ *Poiētēs* (ποιητής) is, and thus speaks senses of: *he or she that efficiently causes; he or she that makes, produces, creates, constructs, fashions, renders, constitutes, forms or performs, fabricates; he or she that efficiently, effectively judges; he or she that labors, operates, or acts.*⁹⁵⁵

An efficient cause is not, and cannot be, an end—much less an end in, of, by, or for itself. An act or action is not, and cannot be, an end—much less an end in, of, by, or for itself. *Poieîn*, likewise, is not, and cannot be, an end—much less an end in, of, by, or for itself. Thus, for example: Insofar as a *poem* is lawfully composed for the sake of the poem itself, or for the sake of the *poet*, or for the sake of affecting the *poet's* audience, a *poem* is of, from, and by and, thus, belongs no more and no less to *poieîn* as an effect of efficient causation, or *poiēma*, than: a dam that impounds a river and its engineers and constructors; a sky scrapper and its architects, engineers, and constructors; an act of justice and its actor, judge, or activist; a rule, regulation, policy or law made by a lawmaker, regulator, ruler, or policy author; any and every machine or device and its engineers and constructors, including for example, disturbingly, a nuclear missile and its engineers and constructors; and so on. A *poem* that is composed, or made, by the autonomous and (self-) sovereign activity—or, at least, by an actor that wills to such autonomy and (self-) sovereignty—is, and can only be, *merely* and *absolutely* (i.e. universally and eternally) the effect of efficient causation; a product; a composition; a yield; that is, a means to endlessly unendingly actualize by achievement end-goals. Insofar as *poieîn* is and, thereby, makes its own law; insofar as a poet is and, thereby, makes his or her own law as well as the law governing the poet's *poieîn* and thus necessarily wills to will him or herself as the autonomous, (self-) sovereign law of him or herself; insofar as *poetry* is of the autonomous, (self-) sovereign will and consequent activity of the poet, all that the poet-actor makes, produces, composes, compositions, creates, constructs, fashions, fabricates, constitutes, *et al.*—i.e. all such *poetry*—is *merely* and *absolutely* (i.e. universally and eternally) a means to end-goals, an effect, a product, *et al.* to will and actualize by achievement further end-goals. Such poetry can and, contemporarily does, cause an enormous effect, whether among popular or *avant-garde* audiences of any one persuasion or another; such poetry can affect its audience in modes and

manners so ground shaking or revolutionary that it, literally, makes or remakes history as I am given in advance to understand it. Yet, none- and nevertheless, such poetry— as the yield of a poet's willful, willfully autonomous and (self-) sovereign making, producing, composing, crafting, forming, *et al.*—is and can only be itself an efficient effect and—oppositely, simultaneously, equally, and identically—an efficient cause. Such poetry, even in light of this poetry's unendingly varying and evolving multiplication of causes, affects, makings, producings, framings, renderings, perspective makings and takings, constitutings, composings, constructings, *et al.*, and their effects, or multitudinous forms and matters, universals-eternals and contexts, histories and geographies, etc.; such poetry, whether a poetic composition on paper; a building; a refrigerator; a microwave oven; a lawn mower; a missile; a map; a cellular phone; a large hadron collider; a plow; a sculpture or painting; a novel; or a scientific-peer reviewed publication; such poetry does not, and cannot, give voice to beauty, to truth, or to what is good.

As I am given to understand lawfully, i.e. epistemologically metaphysically: the poet's degree of freedom is the degree to which the poet willfully actualizes by achievement her autonomy and (self-) sovereignty, and vice versa. Epistemologically metaphysically: Human freedom is autonomous, (self-) sovereign activity, and vice versa. Epistemologically metaphysically, human freedom is force autonomously, (self-) sovereignly forcing and—oppositely, simultaneously, equally, and identically—being forced. Epistemologically metaphysically, human freedom is absolutely, without exception or condition, contradictory and, thus, epistemologically metaphysically impossible. In other words, epistemologically metaphysically, to be free and—oppositely, simultaneously, equally, and identically—to autonomously, (self-) sovereignly free oneself is both to be made by, or produced by, or created by, or constituted by, or otherwise efficiently caused by (self-) labor as labor's effect and—oppositely, simultaneously, equally, and identically—to (self-) labor endlessly without end.

What is *páskhein*? *Páskhein* is, and thus speaks senses of: *to suffer, or endure, or undergo an act or an action* and, effectively thereby, *to be affected*; that is, *páskhein* is *to be passive* and, what is the same, *to be affected*.⁹⁵⁶ *To be passive* and *to be affected* are *to suffer an act or action, to undergo an act or an action, to be acted upon or against, to be inflicted or impinged upon or against*. *To be affected* is *to be passive*, and vice versa. *To be affected* is *to be efficiently caused*, and thus is *to be forced*. That which is suffered is an action, that is, an efficient cause. *To be affected*, then, is *to be passive* with regard to that which affects. That which affects is the efficient cause. Who or what affects is who or what acts. Who or what affects is who or what efficiently causes; i.e. is who or what forces. For human-ex-sisting, who or what affects is who or what wills, which is who or what efficiently causes, which is identical to who or what forces. Who or what *affects* is *active* or an *activist*. Who or what *is affected* is *passive*, or a *passivist*, regardless of whether the efficient cause is internal or external, inside or outside, individual or collective, private or shared, interaction or intra-action, etc.

Affect and *affection* are *passion*. *Affect* is the *effect* of one or more efficient causes, regardless of whether the efficient cause is internal or external, inside or outside, interaction or intra-action, etc. *Affect* is the disposition, orientation, inclination, mood, or feeling one experiences. The experience of affection, or of affect, is the effect of one or more efficient causes—that is, of *being efficiently caused*, or what is identical, of *being forced*. *Affect* is the product, emotion, constitution, construct, etc. of being forcefully forced. *Affect* is an efficiently caused *effect*.

When a human-being-ex-sisting is affected by another human-being-ex-sisting or by a god, this affect and affection is the effect of being acted upon, that is, of being willed. *To will* is

to efficiently cause or, what is identical, to force. Affectivity, then, is passivity. Affect, affection, and to affect, all speak of *ad- -facere*, of *ad- -facio*.⁹⁵⁷ *Ad-* says to, up to, into, towards.⁹⁵⁸ *Facere* is to make, to do, to produce, to construct, to fashion, to render, to frame, to cause to be, to cause to exist.⁹⁵⁹ *Facere*, in other words, is to efficiently cause. *Facere* is the same as, and thus speaks senses of and from the same as, *poieîn* and—oppositely, simultaneously, equally, and absolutely indistinguishably—*páskhein*.

As are *poieîn* and *páskhein*, *facere* is to force and, thus, speaks senses of force and to force. For human-being-ex-sisting, *facere* is to will to will. *Facere*, then, is of and from the same as *poieîn*; *facere* is of and from the same, and thus speaks of and from the same, as *poiēsis*. To affect is to make, to do to, to subject to, to inflict upon. Affect is the efficient effect of this to affect, i.e. of this to efficiently cause. This effect is a disposition, orientation, inclination, appetite, emotion, mood, or feeling. Affect is the product, the creature or creation, the construct, the frame, the rendering, etc. of to affect, i.e. of the activity of one or more efficient causes. To affect, affect, and affection are by, of, from, for, and upon over against force forcing and—oppositely, simultaneously, equally, and absolutely indistinguishably—being forced forcefully.

Given voice by the ancient Greeks, *poieîn* (ποιεῖν) and *páskhein* (πάσχειν) are of the same and belong to one another. As being of the same, these two words speak senses that are, in essence, of and from the same as to act and to be affected by action, respectively; action and the effect of action, respectively; action and to be determined by action, to suffer an act or action or to undergo an act or action, respectively; to act and to be passive, respectively. *Páskhein* is to suffer an act, to suffer under or from an act or an action against or upon one, to be affected, to undergo an act or action, to be acted upon or against.⁹⁶⁰ The opposite of *páskhein* is not *prássein* (πράσσειν). The opposite of *páskhō* (πάσχω) is not *prássō* (πράσσω). The opposite of *pathētikós* (πάθητικός) is not *prāktikós* (πράκτικός).⁹⁶¹ The opposite of *páthē* (πάθη) and *páthos* (πάθος) is not *prāxis* (πράξις).⁹⁶² The opposite of passivity, passion, or to be passive is not practicality, practice, or to practice.

The opposite of *páskhein* is *poieîn*, and vice versa.⁹⁶³ The opposite of *páskhō* is *poiéō* (ποιέω), and vice versa. The opposite of *pathētikós* is *poiētikē*, and vice versa.⁹⁶⁴ The opposite of *páthē* and *páthos* is *poiēsis* (ποίησις), and vice versa. The opposite of passivity is activity, productivity, creativity, and efficient effectivity, and vice versa. The opposite of passion is action, production, creation, constitution, etc. and vice versa. In other words, the opposite of passion is efficient causation: *poiēsis*. The opposite of to be passive is to act, to be active, to activate, to actualize, to make, to produce, to create, to constitute, et al. To act et al. is to efficiently cause and, thus, to force. The opposite of to be passive is to force.

For human-being-ex-sisting—including but far from exhausted by human-being-ex-sisting given to the ways of sense of epistemological metaphysical understanding-in-advance—to act is to efficiently cause, and vice versa identically. Likewise, for human-being-ex-sisting, to efficiently cause is to force, and vice versa. For human-being-ex-sisting, to act is to force, and vice versa identically. When human-being-ex-sisting wills, and thus wills to will, human-being-ex-sisting acts. The will activates and mobilizes itself, as well as any and all means to its goals, in order to actualize itself by means of achieving itself willfully in order to will further, with ever greater power, i.e. with ever greater effectivity and efficiency. For human-being-ex-sisting, then, to will is to act, for the will willing is the will (self-) activating and (self-) mobilizing in order to actualize itself by means of achieving itself willfully. For human-being-ex-sisting, to act is to efficiently cause. For human-being-ex-sisting, to will is to act. For human-being-ex-sisting, to

will is to efficiently cause. For human-being-ex-sisting, to will is to will to will, and to will to will is to will to power to will. For human-being-ex-sisting, to will is to force. To will to power to will is to force itself forcefully to force. To will to will is force forcing itself to force itself further, more effectively, more efficiently, in order to actualize itself by achievement as means to actualize more power to force itself forcefully to actualize by achievement its goals of exercising itself with the greatest effectivity and efficiency.

The opposite of *to be passive*, then, is *to will to will for the sake of willing will itself*, or what is identical, *to will to power to will*. In other words, for human-being-ex-sisting, the opposite of *to be passive* is to act for the sake of enacting and actualizing activity itself in order to act with ever greater active power, with ever greater effectivity, and with ever greater efficiently. The opposite of *to be passive* is *to act*, which is *to efficiently cause* or, identically, *to force*. For human-being-ex-sisting given to the ways of sense openingly revealed as, of, and from epistemological metaphysics, *to will* is *to act*. Epistemologically metaphysically, to act is to efficiently cause or, identically, to force *autonomously* and (*self-*) *sovereignly* with ever greater effectivity, efficiency, and power.

To be passive—or, what is the same, *to be efficiently caused, to be affected, to be effected, to be acted upon, to be enacted, to be forced, to be made, to be produced, to be created, et al.*—is *páskhein*. Again, the opposite of *páskhein* is *poieîn*, and vice versa.

5.19 (I) Compassion as activity-passivity and its comprising actions-passions (*poieîn-páskhein*)

But: What about compassion? What about sympathy? Does not even a cursory consideration of *what* compassion and sympathy are, much less the senses their words speak, demonstrate all of the preceding to be grievously, even outrageously incorrect and, thus, perfectly and undoubtedly false?

What is compassion? Compassion is, and thus speaks senses of and from, *compatior* (*compatī*).⁹⁶⁵ I learned above of *patior* (*patī*). *Cum-* says *with, together with, along with*. *Compatior* (*compatī*) is, and thus says: *to suffer one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to endure one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to undergo one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to be affected with or together with another human-being-ex-sisting or other ex-sisting being; and so on.*

There are at least two general categories of compassion. The first is compassion which is both (i) the effect of one or more foreign actions, or what is the same, the effect of one or more foreign efficient causes, *and*—oppositely, simultaneously, equally, and indistinguishably—(ii) an act or action upon and over against the opposite, equal, simultaneous, and indistinguishable aforementioned foreign action. I may write (ii) differently: Compassion of the first category is an efficient cause upon and over against the aforementioned opposite, simultaneous, equal, and indistinguishable foreign efficient cause. Compassion, then, is the action I commonsensically speak of as *reaction*, though it is not and cannot be temporally or spatially distinguishable whatsoever from the opposite, simultaneously, and equal action to which it belongs in essence, and vice versa. This action upon over against the foreign action, i.e., this *reaction*, is compassion. As opposite, simultaneous, equal, and indistinguishable action upon over against the foreign action, compassion of this first category is *interaction*. Epistemologically

metaphysically, compassion of the first category is necessarily opposite, simultaneous, equal, and *identical*—not merely indistinguishable or absolutely indistinguishable—to the action (or what is the same, the efficient cause) that produces this compassion as an effect.

This first type of compassion, then, is both the effect of one or more foreign actions (or what is the same, efficient causes) and—oppositely, simultaneously, equally, and indistinguishably—an action (or efficient cause) upon over against, at least, the one or more actions (or what is the same, the one or more efficient causes) enacting, i.e. causing this compassion. This category of compassion necessarily entails, therefore, compassion for the one or more foreign actors or agents, i.e. the one or more foreign efficient causes, that one encounters in interaction. This compassion is reaction, or rather, the opposite, simultaneous, equal, and absolutely indistinguishable action upon over against the foreign action or actions. Interaction, then, necessarily entails this type of compassion: suffering, enduring, undergoing, etc. one or more foreign actions as well as oppositely, simultaneously, equally, and absolutely indistinguishably acting upon over against, at least, this one or more foreign actors or agents, i.e. efficient causes. Compassion of this category is—oppositely, simultaneously, equally, and absolutely indistinguishably—one or more actions, or efficient causes, upon and over against the opposite, simultaneous, equal, and indistinguishable foreign action.

This type of compassion is oppositely, simultaneously, equally, and indistinguishably both by and of (i) the foreign action (or, what is the same, the foreign actor or agent, or the foreign efficient cause) and (ii) one's own action upon over against this foreign action (and thus one as the efficient cause and, thereby, the actor or agent action upon over against the foreign actor or agent). Both the foreign action (or what is the same, the foreign efficient cause and, thus, the foreign actor or agent) and one's own action (and, thus, one's own efficient cause as actor or agent) are compassionate, or compassionate, in their interactive encounter.

The first category of compassion is, is of and from, and efficiently causally perpetuates the moving, or the motion, or the movement that *is* activity-passivity, action-reaction, action-passion, being-active/being-passive, being-acting/being-acted-upon or against. In other words, the compassion of this first category is *both* (i) the effect of of *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*, and oppositely, simultaneously, equally, and absolutely indistinguishably (ii) *is kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. This is the category of movement both efficiently caused by and efficiently causing. This is the category of movement that *is* absolutely, or universally and eternally, force forcing and—oppositely, simultaneously, equally, and absolutely indistinguishably—force being forced efficiently causally, i.e. actively, by force.

5.20 What is motion (*kínēsis*; *mōtiō*)?

Motion is being; and of, and from, and in being, being-presencing; and of, and from, and in being-presencing, being-existing; and of, and from, and in being-presencing, beings-presencing; and of, and from, and in being-existing, beings-existing. Whether or not being is exclusively or exhaustively motion is a question I sense only suddenly, unexpectedly, and glancingly from out of what is far beyond even the unforeseeable, the un-sensible, and unthinkable for me, and thus beyond my capability to respond here. Motion, however, is, but is not and is never, exclusively or exhaustively motion from A to B, or 1 to 2, or vice versa in

either case, whether relative or absolute, where A and B or 1 and 2 could be spatial, temporal, logical, mathematical, or otherwise. Rest, being-still, and being-quiet, too, whether relative or absolute, are each of, from, and in what motion is.

5.21 (I) *Kīnēsis; mōtiō*; motion, movement

The first category of compassion calls my attention to at least one general category of movement and motion. Compassion of this first category is compassion that is, exhaustively and exclusively, absolutely indistinguishable from the foreign activity suffered, endured, or undergone with, together with, or among one or more beings in the world, i.e. *com- -passion*. This suffering, enduring, or undergoing with, together with, or among one or more other beings in the world is *itself* activity whose comprising actions are opposite, simultaneous, equal, and absolutely indistinguishable from the foreign activity these beings suffer, endure, or undergo together, i.e. the foreign activity that efficiently causes the compassion of which I write. On one hand, one's own compassion is—oppositely, simultaneously, equally—identical to one's own com-activity upon and over against the one or more foreign activities and their comprising actions that one suffers, endures, and undergoes compassionally with other beings in the world. On the other hand, the foreign activities and their comprising actions are, in and of themselves, identical to the foreign compassion efficiently caused by one's own compassionate activity upon and over against the foreign activity. Foreign and own compassionally-activities efficiently *causally* encounter and—oppositely, simultaneously, and equally—efficiently *effective* one another such that one's own com-activity-com-passion both is the cause of and the effect of (or *by*) the foreign com-activity-com-passion and—oppositely, simultaneously, equally, and absolutely indistinguishably—the foreign com-activity-com-passion is both the cause of and the effect of (or *by*) one's own com-activity-com-passion.

Epistemologically metaphysically, this absolute indistinguishability dissolves necessarily into an encounter of what is identical: autonomous, (self-) sovereign own activity-compassion upon over against autonomous, (self-) sovereign foreign activity-compassion, warring forcefully upon over against one another in rupturing identity, utilizing itself as means to identify itself, i.e. an identity that perpetually forcefully severs itself in order to war upon over against itself by means of itself in order to, i.e. as means to, unify itself and, efficiently causally thereby, actualize itself as one unification by means of its activating achievement. Autonomous, (self-) sovereign own activity-compassion upon over against autonomous, (self-) sovereign foreign activity-compassion wars forcefully upon over against one another in order to make itself two in order to produce itself as one product, i.e. in order to efficiently cause itself to be one by means of efficiently causing itself to divide and conquer (or *convince*) itself by means of its willfully overcoming itself in order to will itself together, more powerfully, more effectively, more efficiently into a unified product.

Epistemologically metaphysically: This autonomous, (self-) sovereign activity-(com)passion in which, in *pure* belligerence, one's own is foreign and what is foreign is one's own. This is *patho-logical*, or what is the same, *poiēo-logical*. This *patho-légō* (λέγω) or, what is the same, this *poiēo-légō*, is the epistemological metaphysical understanding in advance to which human-being coming to ex-sist in the world epistemologically metaphysically is given, and as given, to which these human-beings belong, exceptionlessly and unconditionally, as human-being-subjects. It is the lawful understanding in advance in which human-being-subject

is gathered, sheltered, and carried *as human-being-subject* along paths of sense in and through the world's sensibility openingly revealed of, from, and as epistemological metaphysics.

This *patho-légō* (λέγω) or, what is the same, this *poiēo-légō* is pure belligerence, warring upon over against itself in order to unify itself by means of activating itself in order to actualize itself by its own achievement. Belligerence is, and thus speaks its senses of and from, *belliger*.⁹⁶⁶ *Belliger*, in turn, is and speaks its senses of and from: *bellum* and *gerō* (*gerēre*).⁹⁶⁷ *Bellum* is, and speaks the same senses as *war*. *Gerēre* is and, thus, speaks senses of bearing (e.g. an activity), carrying or carrying on (an activity), waging (e.g. an activity), acting (in a specified manner), conducting (e.g. an activity), performing (an activity), transacting. *Agō* (*agēre*) and *gerō* (*gerēre*) are, and speak senses of, the same: *to move, to drive, to goad, to throw, to wound*.⁹⁶⁸ This (self-) activating, (self-) mobilizing, (self-) actualizing, and thus—oppositely, simultaneously, equally, and identically—(com-passively, i.e. with self) suffering such belligerent (self-) agitation makes epistemologically metaphysical comm-unity possible at all, whatsoever, only by means of necessarily efficiently causal unification, i.e. unification by means of a *cause* actively *made* common, and only efficiently causally thereby, a common cause. In other words, truthful comm-unity is not even so much as is not: *nihil*.

The motion that both *is* this activity-passivity, or com-activity-com-passivity and—oppositely, simultaneously, equally, and absolutely indistinguishably—is *by* foreign activity-passivity, or what is the same, *by* foreign com-activity-com-passivity, both is *kīnēsis poiētikós* (κίνησις ποιητικός) and—oppositely, simultaneously, equally, and absolutely indistinguishably—is *by kīnēsis poiētikós*. As both *kīnēsis poiētikós* and *by kīnēsis poiētikós*, this action-passion (or com-action-com-passion) is, in essence, opposite, simultaneous, equal to, and absolutely indistinguishable from, *kīnēsis pathētikós* (κίνησις πάθητικός). This metaphysical sameness (though not epistemological metaphysical *identi-fication*) of active and passive movement (or com-active-com-passive movement), or of *kīnēsis poiētikós-kīnēsis pathētikós*, speaks its senses in Latin from and of this metaphysical sameness: *mōtiō āctīvus* and what is in essence opposite, simultaneously, equal, and absolutely indistinguishable, *mōtiō passīvus*.⁹⁶⁹ And again, the sameness of *mōtiō āctīvus* and *mōtiō passīvus*—or, again, what is absolutely indistinguishable and thus speaks senses absolutely indistinguishably in ancient Greek, *kīnēsis poiētikós* and *kīnēsis pathētikós*—is and, thus, speaks its senses in English as, *active motion* and *passive motion*; *active movement* and *passive movement*; *actively moving* and *passively moving* (passively moving, i.e. *being actively moved by foreign activity while oppositely, simultaneously, equally, and indistinguishably actively moving upon and over against this same foreign activity*); *being-active/being-passive*.

All motion, movement, and moving that is and is by *kīnēsis poiētikós-kīnēsis pathētikós*—or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active motion-passive motion*—is: efficiently causal and—oppositely, simultaneously, equally, and identically—efficiently caused. As activity-passivity, and or what is the same, as efficiently causal and the effect of efficient causation, all such motion, movement, and moving *is* absolutely (i.e. universally and eternally) force forcing and—oppositely, simultaneously, equally, and absolutely indistinguishably—force being forced by force itself. Metaphysical indistinguishability opens lawfully into epistemological metaphysical identity.

5.22 *Stásis* (στάσις)

Stásis (στάσις) is not necessarily, if at all, the opposite of *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. *Stásis* is, and thus speaks senses of and from: *standing, setting, standing still, stationariness; the place in which one stands or should stand*.⁹⁷⁰ *Stásis* is similar to what *hístēmi* (ἵστημι) is and, thus, *stásis* speaks senses very close to those spoken by *hístēmi*. *Hístēmi* is, and thus speaks senses of and from, *to cause to stand, to make stand, to put, to place, to set, to make stand by, to cause a person or a thing to make stand or to keep his or her place or position*.⁹⁷¹ These senses are transitive. *Hístēmi* is also, however, and thus also speaks senses of and from, simply *to stand, to stand still, to stop and come to a standing still, to stand by another, to stand near or with*.⁹⁷² These senses are intransitive.

Though very similar, *hístēmi* is neither the same as nor identical to, and thus does speak either the same or identical senses as, *epístamai* (ἐπίσταμαι) and, therefrom and thereof, *epistēmē* (ἐπιστήμη).⁹⁷³ This difference is very important to listen to attentively—not merely to hear—with awareness. *Epí* (ἐπί) is, and speaks senses of and from: *on, upon, over, upon over, onto, against, upon against, over against, up upon over against*.⁹⁷⁴ These are far from exhaustive of the senses *epí* speaks. These senses, however, are the senses human-beings given to ex-sisting in the world openingly revealed as metaphysical and, thereof and therefrom, epistemological metaphysical and relativistic metaphysical sensibility, are given to understand and sense in advance. *Epí* (ἐπί) tells human-being-subjects and “human-being-subjects” nearly exhaustively and exclusively—in my belonging in advance to and sensing lawfully along the ways of sense of epistemological and relativistic metaphysics—that one stands or is made to stand *upon, on, over, against, up upon, over against, up upon over against* something or someone else, some other being or ex-sisting that either *is* or *functions as ground* or *fundament* or *surface*. Though it is very difficult for human-being-ex-sisting given to ex-sisting metaphysically, and thus to the ways of sense and the world’s metaphysical sensibility, to come to understand with attentive awareness and, therefrom, sensitivity: *Hístēmi* does not entail, necessarily or otherwise, the being, presencing, or ex-sisting of ground, of foundation, of fundament, of surface to securely, if not certainly, stand upon over against. To come to understand this and, then, begin to sense this difference with attentive and sensitive awareness, is difficult for human-beings given to ex-sisting epistemologically metaphysically or relativistically metaphysically and, thus, to the ways of sense and the world’s epistemological or relativistic metaphysical sensibility.

Though very similar, and speaking senses very close to one another, there is a very important difference between *stásis* and *hístēmi*. *Stásis* is, and thus speaks its sense of and from, *a standing, a setting, a standing still, a stationariness, a place in which one stands or should stand*. This standing *could* be the effect of being made to stand, being set, being made to stand still, being made to be stationary, being put standing or made to stand in a place or position. In other words, *stásis* could be the efficient effect of *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. Yet *stásis* is not necessarily, much less exhaustively or exclusively, the efficient effect of *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*.

Stásis can be, simply and, for example, *practically, a standing, a setting, a standing still, a stationariness, a place in which one stands or should stand*. The movement and motion of such *stásis* is not necessarily, much less exhaustively or exclusively, of *kínēsis poiētikós-kínēsis*

pathētikós, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. *Stásis* may or may not be or entail movement and motion *at all, whatsoever*. *Stásis* may be but is not necessarily, much less is exhaustively or exclusively, existing or descriptive of what or who ex-sists. *Stásis* may, but does not necessarily, much less exhaustively or exclusively, entail *ex-sisting* or that that which is static be *ex-sisting*.

Stásis can be standing or a standing that is *restful* and *restfulness*, *still* and *stillness*, *quiet* and *quietness*, *calm* and *calmness*, *settling* and *settled*, *unmoving*, *not moving*, *without force*, *without will*, *without activity or passivity*, *without effectiveness*, *efficacy*, and *efficiency*, *without being either productive or unproductive*, and so on—regardless of whether *stásis* speaks of a being, a being-presencing, or a being-ex-sisting. Being can be *stásis* or in *stásis* without being whatsoever, much less being caused by, *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. A being can be *stásis* or in *stásis* without being whatsoever, much less being caused by, *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. Being-presencing can be *stásis* or in *stásis* without being whatsoever, much less being caused by, *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. A being-presencing can be *stásis* or in *stásis* without being whatsoever, much less being caused by, *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. A being-ex-sisting can be *stásis* or in *stásis* without being whatsoever, much less being caused by, *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. *Stásis* is not necessarily, much less essentially, exhaustively, exclusively, in beginning or in end, *active movement-passive movement* or caused by *active movement-passive movement*.

Such understandings, and the ways of sense to which these understandings correspond, are not merely foreign to human-beings given to come to ex-sist in the world openingly revealed metaphysically in sense and sensibility. Likewise, these understandings, and the ways of sense to which these understandings correspond, are not merely foreign to human-beings given to come to ex-sist in the world openingly revealed epistemologically metaphysically in sense and sensibility. Metaphysically, and thereof and therefrom, epistemologically metaphysically, *to be* is exhaustively and exclusively, absolutely, *to ex-sist*, and *to ex-sist* is exhaustively and exclusively, absolutely, both (i) to be *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement* and (ii) (with absolutely, i.e. universally and eternally, only one exception) to be the opposite, simultaneous, equal, and absolutely indistinguishable effect of *kínēsis poiētikós-kínēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*.⁹⁷⁵ *Stásis* that is, and thus speaks senses of and from, movement that is *not* active movement-passive movement; *stásis* that is, and thus speaks senses of and from, no movement at all; *stásis* that is, and thus speaks senses of and from, *restful* and *restfulness*, *still* and *stillness*, *quiet* and *quietness*, *calm* and *calmness*, *settling* and *settledness*, *unmoving*, *not moving*, *without force*, *without will*, *without activity or passivity*, *without effectiveness*, *efficacy*, or *efficiency*, *without being either productive or unproductive*, and so on: These possibilities of what *stásis* is and can be and, thus, what *stásis* says and can say sensibly into and as part of the sensibility of the world, are not merely foreign to human-beings-ex-sisting metaphysically and, thereof and therefrom human-beings-ex-sisting epistemologically

metaphysically. *Stásis* is and can be *peace* and *peaceful*, and as *peace* and *peaceful*, also *grace* and *graceful*, *tranquility* and *tranquil*, *harmony* and *harmonious* and, again, thus, *rest* and *restful*. *Stásis*, therefore, is given speaking senses of into the sensibility of the world of *peace* and *peaceful*, and as *peace* and *peaceful*, also *grace* and *graceful*, *tranquility* and *tranquil*, *harmony* and *harmonious* and, again, thus, *rest* and *restful*. These senses are given as gifts that human beings given to ex-sit in the world might not only hear, but listen; might not only see, but look; might not only sense, but be-lovingly-aware of *what* and *towards what* *stásis* guides and governs us in sense, whether common or not.

Stásis is—and thus speaks of, in its ways of senses—exemplary, most excellent *practice*, as well as of what and of who are *practical* (even if never perfectly so).

However, carried into and through the world in metaphysical and epistemological metaphysical understanding in advance and belonging to metaphysically or epistemologically opening and laying-before-us ways of sense: These other possibilities of *stásis* and their ways of sensing the world's sensibility do not ex-sist *at all*. They are not *merely* impossible. Metaphysically and epistemologically metaphysically, they do not *ex-sist* at all, absolutely (universally and eternally), whatsoever. Therefore, metaphysically and, thereof and therefrom, epistemologically metaphysically, these other possibilities of *stásis* and the senses *stásis* can and does speak into the world's sensibility, for human-beings-ex-sisting to sense, *are not: nihil*. Let us be very, very careful and attentive: This is not to write—not even to hint or imply—that such possibilities do not or cannot ex-sist; that they do not or cannot presence; *much, much less* that they do not or cannot *be* and, from and of being, be-being-given to human-beings and human-beings given to ex-sisting in the world. Such possibilities are, and they are given to human-beings-ex-sisting.

However: Since law has metaphysically given and openingly revealed world as *the* world; since law has given and openingly revealed world as the world of metaphysical sensibility, comprised of metaphysically opened and revealed senses and sensitivities; since metaphysics has given and opening revealed paths of sense through the metaphysical sensibility that is *the* world lawfully given and openingly-revealed metaphysically: Human-beings that have been given to come to ex-sist in the world in essential existential belonging to the law that is metaphysical sensibility, and thus the world openingly revealed and laid forth metaphysically, have been given in advance to understand *all* motion, *all* movement, and *all* moving to be—absolutely, exhaustively, and exclusively, without exception—*kínēsis poiētikós-kínēsis pathētikós, mōtiō āctīvus-mōtiō passīvus*, active motion-passive motion, activity-passivity, action-passion, acting/being-acted-upon. This is not all. As I have said: Human-beings that have been given to come to ex-sist in the world in essential existential belonging to the law that is metaphysical sensibility, and thus the world openingly revealed and laid forth metaphysically, have been given in advance to understand *to be* to be exhaustively and exclusively *to exist*, and *to exist* to be exhaustively and exclusively, in essence, and in beginning and in end, *activity-passivity* or what is the same, *efficient causing-efficiently being caused*. Human-beings-ex-sisting givingly sent to come to presence standing up and out ex-sistingly in world as *the* world of metaphysical sensibility; human-beings-ex-sisting in essential gathering, sheltering, and unconditional, exceptionless welcome, love, safe-keeping, friendship, belonging, and community among and along the ways of senses that are, and lawfully of and from, the world metaphysically openingly revealed in its metaphysical sensibility—these human-beings-ex-sisting are given in advance to the essential forgetting of any other type or category of motion, movement, and moving, of all ex-sisting, of all presencing, and of all being, except one: *kínēsis poiētikós-kínēsis*

pathētikós, mōtiō āctīvus-mōtiō passīvus, active motion-passive motion, activity-passivity, action-passion, acting/being-acted-upon. Contemporarily, these human-beings-ex-sisting *are us*: human-being-subjects and “human-being-subjects.”

Within all modern and contemporary philosophy and, thereof and therefrom, within all contemporary science-epistemology: *to be is to validly methodologically ex-sist*, and *to validly methodologically exist is to validly methodologically interact (i.e. to act, react, intra-act, et al.)*. I may write the same differently: Epistemologically-metaphysically and, increasingly, relativistically-metaphysically, all motion, movement, and moving is understood in advance to be—absolutely, i.e. universally and eternally, in beginning and end, without alteration, exception, or condition whatsoever—interacting-interactions (including necessarily and absolutely, without exception, *all* actions, reactions, and intra-actions and the endlessly unending ex-sisting activities and passivities these comprise in the world). Epistemologically metaphysically and relativistically metaphysically, *to be is validly methodologically to exist*, and *to validly methodologically exist is to validly methodologically interact (including to act, to react, to intra-act, et al.)*. *To act, to react, to interact, to intra-act, et al.* are *to efficiently cause* and *to be efficiently caused*. *To efficiently cause* and *to be efficiently caused* are *to be force forcing* and *forced being forced forcefully*. Epistemologically metaphysically and relativistically metaphysically, *to be is to exist*, and *to exist is—exhaustively and exclusively, absolutely, in essence, in beginning and in end: to force forcing* and *to be force forced forcefully*.

5.23 (II) Compassion as practice (*prâxis*)

The second general category of compassion, like the first, is compassion that is, and thus speaks senses of and from, *compatior (compatī)*: *to suffer one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to endure one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to undergo one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to be affected with or together with another human-being-ex-sisting or other ex-sisting being; and so on*.

The second general category of compassion, however, unlike the first, is compassion that does not, and cannot, *encounter kīnēsis poiētikós-kīnēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*, including the first type of compassion. Rather, this type of compassion *meets active movement-passive movement*. This type of compassion *meets* the first type of compassion. *To meet* and *to encounter* are not the same. *To encounter* is both an active movement-passive movement and an effect of active movement-passive movement. *To encounter* is to efficiently cause and to be efficiently caused. *To encounter* is to force and to be forced. *To meet* is not necessarily, if at all, either active movement-passive movement or an effect of active movement-passive movement. *To meet* is not necessarily, if at all, to efficiently cause or—oppositely, simultaneously, equally, and absolutely indistinguishably—to be efficiently caused. *To meet* is not necessarily, if at all, to force and to be forced.

The compassion of the second category, however, does not merely meet active movement-passive movement (including the first type of compassion). The second type of compassion is already open in advance to meeting and, in meeting, receives with open welcome *kīnēsis poiētikós-kīnēsis pathētikós*, or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*, including the first type of

compassivity. The second type of compassion receives with open welcome efficient causation. The second type of compassion receives with open welcome force forcing.

Yet, the second type of compassion is not, and cannot be, either active movement-passive movement or be by, that is, the efficient effect of, active movement-passive movement. The second type of compassion is not, and cannot be, either efficiently causal or the effect of one or more efficient causes. The second type of compassion is not, and cannot be, force or force being forced.

When the second type of compassion openingly and welcomingly receives the first type of compassion, it does not act, react, or interact *with*, i.e. upon over against it at all, whatsoever. When the second type of compassion openingly and welcomingly receives active movement-passive movement or, what is each the same, *kīnēsis poiētikós-kīnēsis pathētikós* or *mōtiō āctīvus-mōtiō passīvus*, it does not act, react, or interact with, i.e. upon over against it at all, whatsoever. When the second type of compassion is efficiently caused, it openingly and welcomingly receives this efficient causation, noticing it, and letting it be that this efficient causation may come to rest and, in resting peacefully, cease to be active, and efficient, and effective at all. When the second type of compassion openingly and welcomingly receives force and is thereby forced by force, this type of compassion does not force this force back in counter whatsoever, at all; it does not effectively or efficiently resist this force, forcing the force thereby back upon over against itself forcefully.

When this second type of compassion meets the first type of compassion; or what is the same, active movement-passive movement, or what is each the same again, *kīnēsis poiētikós-kīnēsis pathētikós* or *mōtiō āctīvus-mōtiō passīvus*; then the first type of compassion, or active movement-passive movement, find no one, nowhere, and no when to act, react, and interact upon over against with any efficiency or effectively whatsoever, at all. When this second type of compassion meets one or more efficient causes and is, effectively thereby, caused, this one or more efficient causes encounters no one, no where, and no when to efficiently cause, i.e. to act, react, or interact upon over against. When this second type of compassion meets force and is, to be sure, forced thereby, this force—none- and nevertheless—encounters no one, no where, and no when to force or by which to be forced oppositely, simultaneously, equally, and absolutely indistinguishably.

The compassion, or compassion, of the second category meets all activity-passivity, active movement-passive movement, *kīnēsis poiētikós-kīnēsis pathētikós*, *mōtiō āctīvus-mōtiō passīvus*, efficient causation, and force *as these are*, without asking, expecting, or transacting anything of them other than that they be what or who they are, why they are, and how they are. The compassion of the second category *lets them be as they are, openingly and welcomingly receiving them one and again as they are*, without asking, expecting, or transacting anything of them other than that they *do come* to this meeting and that they *do come as what or who they are, why they are, and how they are*.

When the first type of compassion comes actively, reactively, interactively, causatively, and, thus, forcefully to the always already open and always already welcomingly receiving of the second type, the first type of compassion *comes home*. When the first type of compassion meets the first types of compassion, the former returns home. The first type, upon coming home, is openingly, warmly, and welcomingly gathered into unconditional and exceptionless belonging in advance; into safekeeping; into gentle and soothing, peaceful and calming, abundant and giving, forgiving and graceful attention (i.e. being attending to, unconditionally, exceptionlessly). When the first type of compassion comes *home*, it is openingly, warmly, and welcomingly received

as if it had never left home at all. The second type of compassion openingly, warmly, and welcomingly receives the first type home as this first type is, without expectation or demand that it be other than it is, other than why it is as it is, or other than how it is as it is.

The second type is unconditionally and exceptionlessly forgiving of the first, but the second is always truthful and, thus, lawfully, thankfully, thoughtfully, and gently honest. The second type of compassion *does* suffer, *does* endure, *does* undergo, *is* affected by the first. Let us write this again: the second type of compassion—unconditionally and exceptionlessly opening and welcoming the first to come and be with itself as the first is, without expectation, demand, or force—*does* suffer from the activity-passivity of the first, *does* endure the efficient causation of the first, *does* undergo the *forceful being forced* by the first. This can *hurt*. This can be *painful*. This can be *frightening*. This can be *confusing* and disorienting. There is *no doubt* that all of this is true.

The second type, however, notices. The second type of compassion *is noticing-being-aware* of all of this. The second type of compassion is not activity, and thus does not act, react, interact; it is not activating or actualizing, and thus does not activate or actualize; it is not effectively or efficiently motivating or mobilizing, and thus does not effectively or efficiently motivate or effectively or efficiently mobilize. The second type notices, but it is not force and, thus, it does not and, indeed, cannot force, much less force back or resist a force acting upon it. The compassion of the second category notices. The second type of compassion can, and does speak truthfully and, governed from truth, honestly to the first of the hurt, and the pain, and the fear, and the suffering the first is causing

This requires unfathomable *courage*—that is, lawfully thinking-being-aware, noticing gently and lovingly, and, thus, practicing from, of, and with and governed lawfully and truthfully of and from the *heart-mind: cor* or *kardiā* (κᾶρδιᾶ).⁹⁷⁶ As sensed and, then, given voice by the ancient Greeks, *kardiā* is the same as, and thus speaks senses from and of the same as, *phrēn* (φρήν) and that which belongs in essence to and is governed from and of thereof *phrēn: phronēō* (φρονέω), *phronēma* (φρόνημα), and *phronēsis* (φρόνησις).⁹⁷⁷ This *courage* is a gift givingly given. It is *neither an efficient cause nor efficiently caused*; it is not a means to an end-goal; it is not will or willful; it is neither forceful or being forced. This courage is a gift lovingly being-givingly-given from the fathomthelessly abundant source that is love-loving, friend-befriending and friend-being-friend, and freedom freeing. *These are gifts-being-giveingly-given*. To be a friend, one must be *freeing* of the other, unconditionally, exceptionlessly: the compassion of the second category lets be and, thus, frees, without condition or exception, the compassion of the first to be what or who it is, why it is, and how it is. The compassion of the second category frees, without condition or exception, the compassion of the first to come home as it is, why it is, and how it is, to come home to unconditional and exceptionless belonging, safekeeping, and to the gentle and soothing, peaceful and calming, abundant and giving, forgiving and graceful attention (i.e. being attending to, unconditionally, exceptionlessly) that *is home*. The second type of compassion *loves* the first, but not necessarily vice versa.

In coming home, the compassion of the first category *can rest* in the unconditional and exceptionless gathering into belonging, the protecting and safekeeping, and the gentle and soothing, peaceful and calming, abundant and giving, forgiving and graceful attention (i.e. being attending to, unconditionally, exceptionlessly) *as what or who it is, why it is, and how it is*. In coming home, the compassion of the first category comes to love, to friendship, and to freedom. In coming home, the compassion of the first category *can rest*. From be let be in belonging, in protection and safekeeping, and in gentle and soothing, peaceful and calming, abundant and

giving, forgiving and graceful attention (i.e. being attending to, unconditionally, exceptionlessly) *as what or who it is, why it is, and how it is*, the first type of compassion can come to love itself, to befriend itself, and to be free. That is, the first type of compassion can heal. From rest in belonging, the protecting and safekeeping, and the gentle and soothing, peaceful and calming, abundant and giving, forgiving and graceful attention (i.e. being attending to, unconditionally, exceptionlessly) *as what or who it is, why it is, and how it is*, the first type of compassion can come to love itself, to befriend itself, and to be free. Again, the first type of compassion can heal.

The first type of compassivity is the same as, in each case: activity-passivity, action-passion, active movement-passive movement, *kínēsis poiētikós-kínēsis pathētikós, mōtiō āctīvus-mōtiō passīvus*, efficient causation causing and efficiently being caused, and force forcing and being forced forcefully. What I have written of the compassion of the first type coming home to the unconditionally, exceptionlessly open, warm, and welcome meeting and gathering into unconditional and exceptionless belonging of the second type, I could write of activity-passivity, action-passion, active movement-passive movement, *kínēsis poiētikós-kínēsis pathētikós, mōtiō āctīvus-mōtiō passīvus*, efficient causation causing and efficiently being caused, and force forcing and being forced forcefully coming home to compassion of the second category—that is, coming home to love-loving, befriending and being-friend, and being-freed and, thus—but *not* efficiently causally thereby—being free.

Being home; loving (including oneself); befriending and being-friend (including oneself); being free; belonging; attending to and noticing with open, warm, welcome receiving; being and letting be; rest and restfulness: these are *gifts* that are-being-givingly-given. Being home *with, together with, along with* the compassion of the second category, the compassion of the first category can rest, and thus can heal, and thus can learn to love and, therefrom and thereof, can *be home in* its end of being-lovingly-aware and openingly, warmly, and welcomingly receiving of the activity-passivity, action-passion, active movement-passive movement, *kínēsis poiētikós-kínēsis pathētikós, mōtiō āctīvus-mōtiō passīvus*, efficient causation causing and efficiently being caused, and force forcing and being forced forcefully as these war upon over against, endlessly unendingly convincing in order to overcome themselves in severing and unifying *identification*, as lawfully given to and gathered belonging into ex-sisting sensibly in the *patho-légō* (λέγω) or, what is the same, this *poiēo-légō* of metaphysics and, thereof and therefrom lawfully as given of law, epistemological metaphysics and relativistic metaphysics and the world openingly revealed in and as epistemological and relativistic metaphysical sensibility.

5.24 Sympathy, (I) and (II)

Sympathy is the same as, and thus speaks the same senses, as compassion.⁹⁷⁸ *Sym-* says: with, together with, along with.⁹⁷⁹ *-Pathy* is, and thus speaks senses of, *to suffer, to endure, to undergo, to be acted upon by foreign acts; to be affected*.⁹⁸⁰ Thus, *sympathy* is, and thus speaks senses of: to suffer one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to endure one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to undergo one or more actions with or together with another human-being-ex-sisting or other ex-sisting being; to be affected with or together with another human-being-ex-sisting or other ex-sisting being; and so on.

As with compassion, there are at least two general categories of *sympathy*. I may write the same for the first general category of *sympathy* that I wrote for the first general category of

compassion. Likewise, I may write for the second general category of sympathy the same that I wrote for the second general category of compassion. I need not elaborate upon these two categories again here.

5.25 (II) *Kínēsis*; *mōtiō*; motion, movement

Compassion of the second category gathers and guides my attention and sensitivity towards the call of further questions. Activity-passivity, and thus the actions-passions that comprise activity-passivity, is active movement-passive movement, or what is the same again, *kínēsis poiētikós-kínēsis pathētikós*, or again, *mōtiō āctīvus-mōtiō passīvus*. Yet activity-passivity, and thus compassivity of the first category, far from exhausts what compassion is. Rather, compassivity of the first category is, in essence, in beginning, and in end, givenly-being-given of and from, and can return home—as what, why, and how it is, without expectations or demands—to the essential gathering into the unconditionally, exceptionlessly open, warm, welcoming, and protective belonging of compassion of the second category. Active movement-passive movement, or what is the same again, *kínēsis poiētikós-kínēsis pathētikós*, or again, *mōtiō āctīvus-mōtiō passīvus*, are not, and cannot be, exhaustive of *kínēsis*; or what is the same, *mōtiō*; or what is the same again, motion or movement. Active movement-passive movement, or what is the same again, *kínēsis poiētikós-kínēsis pathētikós*, or again, *mōtiō āctīvus-mōtiō passīvus*, are not, and cannot be, in essence what *kínēsis*, or *mōtiō*, or *motion* and *movement* are, both in beginning and in end.

What is *kínēsis*? What is *mōtiō*? What is *motion* and *movement*? [change (metabole) is not necessarily movement, motion (kinesis)]

Before I can begin to respond to this question, I come before and must begin to respond first to another question: Are *kínēsis*, *mōtiō*, and *motion* and *movement* the same and, of and from being the same, do they speak senses of and from the same into the sensibility of the world?

Kínēsis (κίνησις) is, and thus speaks the same senses as: motion, movement.⁹⁸¹ *Kínēsis* is of and from, and thus speaks of and from, *kīnēō* (κινέω): *to set in motion, to move, to cause, to be moved, to go, to be put in motion; to disturb, to arouse, to stir up*.⁹⁸² *Kīnēō* is the same as, and thus speaks its senses of and from the same as the classical Latin *ciēō* (*ciēre*): *to put in motion, to move, to stir, to shake; to cause to go, move, stir, drive; to put any course of action into progress or any passion into motion, e.g. to excite, to stimulate, to rouse, to produce, to effect, to cause; to call, to summon*.⁹⁸³ *Motion, movement, and to move* each are the same, and thus speak their senses of and from the same.⁹⁸⁴ *Motion, movement, and to move* are, and thus speak their senses of and from, *moveō* (*movēre*): *to move, to be in motion, to cause to move, to impart motion to, to impel, to stir, to shake, to produce, to put forth, to excite, to affect, affect with emotion, to cause to derive or issue from, to disturb, to bring into commotion*.⁹⁸⁵ *Kīnēō, ciēre, and to move* are the same and, of and from the same, speak their senses into the world's sensibility of and from the same.

Kīnēō, ciēre, to move are not in essence, in origin, or in end—much less absolutely (i.e. universally and eternally) or necessarily—*poiētikós-pathētikós*, or what is the same, *āctīvus-passīvus*, or what is the same again, *active-passive*. *Kīnēō, ciēre, to move* are not in essence, in origin, or in end—much less absolutely (i.e. universally and eternally) or necessarily—*poiēin* and *páskhein*, or what is the same, *agere-agitāre* (as well as, for example, *cūdere, facere*) and *patī*, or what is the same again, *to act-to effect-to cause* and *to be passive*, i.e. *to be acted upon over against, to be enacted, to be the effect of, to be effected, to be caused*. *Kīnēō, ciēre, and to*

move are not in essence, in origin, or in end—much less absolutely (i.e. universally and eternally) or necessarily—to *will*, and thus *to will to will*, and what is the same, *to will to power to will*. *Kīnéō, ciēre, to move* are not in essence, in origin, or in end—much less absolutely (i.e. universally and eternally) or necessarily—to *efficiently cause* and oppositely, simultaneously, equally, and at least absolutely indistinguishably, *to be efficiently caused by*. *Kīnéō, ciēre, and to move* are not in essence, in origin, or in end—much less absolutely (i.e. universally and eternally) or necessarily—to *force* and oppositely, simultaneously, equally, and at least absolutely indistinguishably, *to be forced by force*.

Insofar as *kīnēsis poiētikós-kīnēsis pathētikós*, and *mōtiō āctīvus-mōtiō passīvus*, and *active motion-passive moving and motion* are at all, whatsoever, they are at all, whatsoever, they given of and from, and thus are of and from, and therefore belong in essence to and are limited, conditioned, and thus practically governed by, the being of *kīnéō, ciēre, and to move*. Insofar as *poiēsis* and *páthē* or *páthos*, and what is the same, *āctiō* and *passiō*, and what is the same again, insofar as *action* and the *activity* it comprises and *passion* and the *passivity* it comprises are at all, whatsoever, they given of and from, and thus are of and from, and therefore belong in essence to and are limited, conditioned, and thus practically governed by, the being of *kīnéō, ciēre, and to move*. The very possibility of the being of *kīnēsis poiētikós-kīnēsis pathētikós*, and *mōtiō āctīvus-mōtiō passīvus*, and *active motion-passive moving and motion* is at all, whatsoever, given of and from, and thus is of and from, and therefore belongs in essence to and is limited, conditioned, and thus practically governed by, the being of, from, and for the being of *kīnéō, ciēre, and to move*. The giving to ex-sist in the world at all, whatsoever, and therefrom and thereof the ex-sisting in the world and the world's sensibility, of *kīnēsis poiētikós-kīnēsis pathētikós*, and *mōtiō āctīvus-mōtiō passīvus*, and *active motion-passive moving and motion* is the giving-gift of and from, and therefore belongs in essence to and is limited, conditioned, and thus practically governed by, the being of *kīnéō, ciēre, and to move*.

Kīnēsis poiētikós-kīnēsis pathētikós, and *mōtiō āctīvus-mōtiō passīvus*, and *active motion-passive moving and motion*—which are each the same as the others and, thus, speak their senses of and from the same—are, in their very being, much less their ex-sisting in the world, in origin, in end, and in essence of *kīnéō, ciēre, and to move*. That is, insofar as *kīnēsis poiētikós-kīnēsis pathētikós*, and *mōtiō āctīvus-mōtiō passīvus*, and *active motion-passive moving and motion* are to be at all—much less to ex-sist in the world—they are in origin, in end, and in essence given to be of and from, and thus are of and from, and therefore belong in essence to and are limited, conditioned, and thus practically governed by, the being of *kīnéō, ciēre, and to move*.

5.26 Love and friendship

What is love? It is beyond the scope of this work to respond herein to this essential question. This question cannot be responded to without responding to others, perhaps most importantly: *What is friendship? What is to be a friend to another? What is freedom? What is to forgive?*

Even though I will not respond to these questions in writing, I will indicate what love is not and cannot be. I will give an indication, that is, of what I am lawfully given to understand love to be epistemologically metaphysically and, perhaps, relativistically metaphysically; i.e. what I am given to understand love to be in advance, commonsensically in the world metaphysically openly revealed in and as its sensibility.

First: Love is not, nor can it be exhaustively, exclusively, or absolutely, presencing or presence. Love is not, nor can it be exhaustively, exclusively, or absolutely ex-sisting, ex-istence (i.e. ex-sisting itself), much less *of, from, for*, or effectively *by* ex-sisting or some one or another specific being-ex-sisting (including God understood in advance metaphysically) or set or species of beings-ex-sisting. These latter—presencing and ex-sisting, and beings-presencing and beings-ex-sisting—are given of and from, and are governed by, what is love-loving.

Second: Love is not, and cannot be, activity, reactivity, interactivity, intra-activity, or any other form, manifestation, or supervening excitation of activity. Love is not, and cannot be, in essence, origin, or end, exhaustively, exclusively, or absolutely, action, reaction, interaction, or any other type of action or the activities such action comprises. Love is not, and cannot be—much less be *of, from, for*, or *by*—*kínēsis poiētikós-kínēsis pathētikós*; or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement*. Love, therefore, is not, and cannot be, force. Rather, force and the faculty, capacity, and capability to force and sense force are at all a gift being-given of and from and governed by love-loving for *beings-ex-sisting* in the world. *Kínēsis poiētikós-kínēsis pathētikós*; or what is the same, *mōtiō āctīvus-mōtiō passīvus*, or what is the same again, *active movement-passive movement* are, and only thus *ex-sist* at all, of and from and governed by love-loving.

Insofar as to be is, exhaustively and absolutely, to ex-sist, and to ex-sist is, exhaustively and absolutely, both to be a force forcing and—oppositely, simultaneously, equally, and absolutely indistinguishably—to be the effect of force forcing and being forced by force itself; or what is the same, *kínēsis poiētikós-kínēsis pathētikós*; or what is the same again, *mōtiō āctīvus-mōtiō passīvus*; or what again is the same, *active movement-passive movement*: then, love is not even so much as is not, and cannot be. If love is not even so much as is not, and cannot be, then friendship, befriending, and being-a-friend is not even so much as is not, and cannot be. If love is not even so much as is not, and cannot be, and, thus, friendship, befriending, and being-a-friend is not so much as is not, and cannot be, then human being's freedom—including human-beings being-given to presencing and ex-sisting in the world—is not even so much as is not, and cannot be. This is truthful not only for metaphysics and epistemological metaphysics as correct and, effectively thereby, true; this is truthful not only for relativistic metaphysics as “correct” and effectively thereby, “true” or “a truth” or “a perspective” or “a worldview.” This is truthful as being of and from truth. Period. I write this as I am given and, in faith and trust, obligated (though not, and never, forced) to write lawfully.

Third, let us respond to a relevant and very common but subsidiary question: Is narcissism self-love? No, narcissism is not and cannot be self-love. Narcissism, in any degree or form, is not love at all. Narcissism is the closing and shutting down and away of one's faculty and capacity to open to the opening of one's being-aware fully and vulnerably, even to and as oneself. Narcissism is not opening, does not open, and cannot open oneself in love, for love, from love, and of love, lovingly. Narcissism is not love. The narcissist, insofar as his or her narcissism is all encompassing and consuming—which, perhaps, thankfully does not ever, or at least not often, occur—does not and cannot love *at all* from out of his or her narcissism. Narcissism is protection *from* and *against* opening oneself, as one is, vulnerably and trustingly, in good faith, to oneself as well as, therefore, to and with others, *in friendship* and, thus, love. One begins to heal from narcissism the moment one begins to sense, to warmly and welcomingly summon into one's being-aware, and love the fear, the hurt, and the pain narcissism steadfastly and loyally guards against and vehemently protects. The moment one begins to learn, in opening, to love oneself *as one is*, including the hurt, the pain, and the fear or terror one carries

with or inside of one, one begins, or can begin, to heal one's narcissism. One begins to heal one's narcissism, in other words, when one begins to open to one's self and, thus, begins to allow one's self to heal. One begins to heal one's narcissism when one begins to love, or to learn to love, oneself, welcoming into full awareness of one's being-aware, in unconditional belonging, *both what and who one is* as one is. Metaphysically, and therefrom, epistemologically metaphysically and relativistically metaphysically, I am not given to understand this. Love, after all, is a complexly supervening activity comprised of the interactions for which—at best, most realistically—I invent the terms *love* and *to love*, define their meaning, and have categorized thereby their real referents under *love* and *to love* in order to communicate, theorize, scientifically-epistemologically test or experiment, etc.

Truthfully, one cannot love another if one does not, even if only in degrees, first love oneself. Yet to love oneself is not, and cannot be, action, passion, *poiesis*, pathos, or pathos-logical. To love oneself is to open oneself, as one is in exceptionless and unconditional belonging, to oneself and, in so doing, to others, to ex-sisting, to presencing, to the world, and to being, and in so doing, to open oneself to belonging, love, friendship, community, and companionship. In loving oneself, one opens oneself to finding oneself in others, and others in oneself.

In a world, and thereof, in an epistemological metaphysical and, thereof, scientific-epistemological universe in which, as *as which*, the very ex-sisting of possibility *as* possibility, and thus all ex-sisting absolutely as well as ex-sisting itself as ex-sisting, is without exception or condition the limitless activity of actions, reactions, interactions, and intra-actions, of operationalizations, of functionalization and its functions, and of evaluation and its values: love and friendship are impossible. Love and friendship as the supervening complex behaviors of evolutionary action, interaction, and intra-action is not even so much as: Love is not. Befriending and friendship are not. Belonging is not. Community is not. Human freedom, therefore, is not. In the world, when and where love and friendship are impossible, human freedom in the world is impossible.

What is *not* love? What is love *not*? *To love* is not and cannot be *to act*. *Love* is not and cannot be action. Love is not and cannot be reaction, interaction, or intra-action. *Love* and *to love* are not and cannot be one or more activities, for they are not and cannot be activity at all. Likewise, love is not, and cannot be, the efficiently causal opposite of action: the effect of action, the reaction to action, and that which is efficiently caused by action. Love is not, and cannot be, passive, passion, or passionate. These are each, exclusively and exhaustively, the effects of efficient causes. These are each, exclusively and exhaustively, products of efficient causes. As effects of efficient causes, they are each reactions to one or more efficient causes. Yet, as reactions, and thus as interactions with the originating actions, these they are each *themselves*—oppositely, simultaneously, equally, and indistinguishably, as well as exhaustively and exclusively—efficiently causal. They are each—opposite, simultaneously, equally, and perhaps indistinguishably, as well as exhaustively and exclusively—efficient causes *of* the efficient causes of which they are the effects, the products. *Epistemologically metaphysically*, each of these is oppositely, simultaneously, equally, and *identically* both—exhaustively and exclusively—an effect (reaction) of an efficient cause and *itself* an efficient cause upon and over against, and thus *of*, the efficient cause of itself. Such action and reaction is, for example, making, producing, constructing, crafting, constituting, rendering, unifying, etc. (*cūdere, agere, agitāre, facere; poieîn*). In other words, love is not and cannot be activity or passivity, action or passion, active or passive, etc., for these are force forcing and being forced; these are efficient

causes and effects causing and counter-causing oppositely, simultaneously, equally, and—at least epistemologically metaphysically—identically, without exception. Love is, therefore—without exception or qualification—impossible. Where love is impossible, so is friendship, and vice versa. And where love and friendship are impossible, human-being-ex-sisting's freedom is—*without exception or qualification*—impossible.⁹⁸⁶ What is, and all that is, is force: force forcing and—oppositely, simultaneously, equally, and identically—being forced by forced itself, by itself, for itself, upon over against itself, as cause and effect of itself exhaustively, exclusively, oppositely, simultaneously, equally, and identically. Metaphysically, at least, and thus epistemologically metaphysically, this is contradictory.

However, everyone knows contemporarily that *to love* is an *activity*. *To love* is *to act* or, at the very least, the product (or what is the same, the effect) of my actions, reactions, and their interactions. Love is action, reaction, and interaction. Love is *active*. One can be loved *passively*, but one cannot love unless they *act*, that is, unless they love actively. Likewise, as I am epistemologically metaphysically given to understanding-in-advance, *to relate* is exclusively and exhaustively *to act, to react, to interact, and to intra-act*.⁹⁸⁷ Relations and relationships are and can only be—as I am given lawfully, that is, epistemologically metaphysically to sensibility and understanding in advance—actions and the activity they comprise. It is *only* from lawfully be given to the understanding-in-advance of epistemologically metaphysics, of lawful or epistemologically metaphysically opened and laid forth sense and sensibility that Arendt, for example, can write:

For love, although it is one of the rarest occurrences in human lives, indeed possesses an unequalled power of self-revelation and an unequalled clarity of vision for the disclosure of *who*, precisely because it is unconcerned to the point of total unworldliness with *what* the loved person may be, with his qualities and shortcomings no less than with his achievements, failings, and transgressions. Love, by reason of its passion, destroys the in-between which relates us to and separates from others. As long as its spell lasts, the only in-between which can insert itself between two lovers is the child, love's own product.⁹⁸⁸

Epistemologically metaphysically revealed in and *as* sense and sensibility, love possesses and exerts *power*. Insofar as love exerts power, love is *a power*. *To love* is *to exert power*. Power, I am given to understand in advance, is the faculty and capacity to exercise force effectively towards some end-goal, even if only as resistance (*re- -sistō*) and reaction.

Lawfully, that is, epistemologically metaphysically: Love is both *action* and *passion*. *Passion*—or to be passive, to be passionate—is to suffer being acted upon or against, where this suffering is the reaction from and back against the action of being acted upon and over against. Yet, of course, epistemologically metaphysically love is—oppositely, simultaneously, equally, and identically—active. *To love* is *to act*. Thus, *to love* is, exclusively and exhaustively, *to make, to create, to produce and reproduce, to yield*: “the only in-between which can insert itself between to lovers is the child, love's own product.” *Love* is both—oppositely, simultaneously, equally, and identically—*actions and the activity comprised thereof*: for example, *cūdere, agere, agitāre, facere*) and *its effects*: *Love* is *poiesis* and requires essentially human-being-ex-sisting to be oriented sensibly in the world technically as a *technician*. Yet *to love* is *to act*, and *love* is *action* even if only passive reaction, or *passion*. Again, Arendt gives voice lawfully to epistemological metaphysics: All *praxis*, insofar as *praxis* can exist at all, whatsoever, is—

minimally—efficiently caused by *poieîn*. *Praxis* exists at all, and can only exist, as *made*, as a *product* of action. *Praxis*, insofar as it can exist at all, is an *effect* of *poieîn*. *Praxis*, as I am given to epistemological metaphysical understanding in advance, cannot, therefore, be an end in itself. Epistemologically metaphysically, there is no exception. *Praxis*, insofar as *praxis* can exist at all, is and can only be *a means to actualize-by-achievement willful end-goals*. *Praxis* is, in other words, a *tool*, or a *strategy*, or a *tactic*, or a *technique* of some other kind, but a technique nonetheless and, thus, essentially *of poieîn*, and efficiently effectively thereby, of *poiēsis*.

Human-being-ex-sisting, writes Arendt, *is* a product of activity-reactivity—that is, a product of the interactivity that, as she seems to understand, is love. A *product* is an *effect* of efficient causation. Human-being-ex-sisting is an *effect*—an *effect of cascades* of efficient causation. Human-being-ex-sisting is, then, and can only be insofar as it exists and only insofar as human-being-ex-sisting—exhaustively, universally and eternally—is a *means to actualize-by-achievement end-goals*, even if this end-goal is a predetermined efficient effect of the act of *love-making*, or lovingly *relating*, between to *lovers*. Human-being-ex-sisting—that is, human-beings in the world—are and can only be insofar as they exist, and they exist only insofar as they are *means to end-goals*—i.e. the *products* or, what is the same, *the effects of activity*, the activity of *making-love*. Again: Of what is human-being-ex-sisting a product? Not only of actions, reactions, interactions, and intra-actions, but of *my actions*, reactions, interactions, and intra-actions, whether willful, willfully resisted, or passively submitted to! I must remember that even passivity is *reaction* to the imposition of action. *To act* is *to efficient cause*. *To act* is *to force*. *To efficient cause* is *to force*, and vice versa identically. *To reacted* is *to be efficiently caused*. *To reacted* is *to be forced*. *To be efficiently caused* is *to be forced*, and vice versa identically. Arendt gives resounding voice, with exceptional clarity and assurance, to the sending and opening-revealing of law, that is, of epistemological metaphysical and, thereof, scientific-epistemological understanding-in-advance—despite, clearly, her best intentions, anxieties, and scholarly understandings.⁹⁸⁹

That is, at the very least, as Arendt gives voice clearly and assuredly (regardless of whether or not she understands that she does so), love is, for example, a scientific-epistemological phenomenon, i.e. a biochemical or physiological activity regardless of whether or not I understand these biochemical and physiological interactions (i.e. epistemological metaphysical relatings) to be scientifically-epistemologically (i.e. efficiently causally) determined, or freely enacted by free human actors and agents, or somewhere in between. In any and all of these: *Love* exists and can only exist insofar as love is *force*. *To love* is, as an activity, *to force* and *to be forced*. In order to love, one *wills to love* and only thereby, from *willing love* or *willing one's will to love* one *wills to forgive*, whether oneself or another to or with whom one relates. *To forgive*, too, then, exists and can only exist insofar as it is epistemologically metaphysically *to will to power to will*: i.e. to will one's will to forgive one's self for one's actions, reactions, interactions, or intra-actions. *To love*, writes Arendt, in any sense other than *amor mundi*, is an activity that is not only anathema but dangerous to political activity, resulting in a meta-war of forces upon forces, of love encountering politics, and vice versa. Yet even *amor mundi* exists and can only exist insofar as *to love* is *to act* and *be acted upon*, or *to be passive* and, thus, patient, passionate, compassionate, *empathetic*, or *sympathetic*. As Arendt understands-in-advance and gives voice to so clearly: “Love, by its very nature, is unworldly, and it is for this reason rather than its rarity that it is not only apolitical but antipolitical, perhaps the most powerful of all antipolitical human forces.”⁹⁹⁰ *To love* is *to force*. What, then, is

politics? Politics, of course, is exclusively, exhaustively, and essentially political *activity*. *To be political is to be politically active* and even, at an extreme, an *activist*. Epistemologically metaphysically, love and politics share in common an essential togetherness to which I am not given to understand epistemologically metaphysically. Rather, I am given to lawful forgetting. *Amor mundi* is then, and can only be, unfortunately, the active exercise of force in and upon over against the world, including upon over against myself and others. Love, friendship, and freedom are impossible. All letting-be—with the gentle but undiminished honesty, the attentive trust, and the immense courage this requires—is impossible. All comm-unity—private or public, political or otherwise—is impossible. To exist, at all, whatsoever, is to act or be action. To exist, at all, whatsoever, is to force and be forced. Yes, as I am carried into and through world as *the* world epistemologically metaphysically openingly-revealed in sense and sensibility, this is the lawful human condition. A condition, I recall, is a limit or a qualification.

5.27 *Kīnēsis poiētikós-kīnēsis pathētikós; Mōtiō āctīvus-mōtiō passīvus; Active movement-passive movement (action-reaction)*

Epistemologically metaphysically, to be is to validly methodologically ex-sist, and to validly methodologically ex-sist is to act validly. Action is active-passive movement, and vice versa. Human-being-subject is the validly methodologically validated *causa* and the validly methodologically validated judge of what and who validly comes to ex-sist and, thereby, truly ex-sists at all, including itself. Human-being-subject is the *actus purus* that efficiently causes, at will, as will wills, the *actus purus* itself, of, from, for, efficiently causally by, and upon over against itself. Human-being-subject is, then, the efficient *causa prima* and oppositely, simultaneously, equally, and not only causally indistinguishably, but *identically*, efficient *causa sui*, or the grounding-ground. To will is to act. To act is to force and to be forced. Human-being-subject wills to act with unconditional effectivity and efficiency. Action, however, is not, and cannot be, an end. Human-being-subject is—oppositely, simultaneously, equally, and identically—both the means and the perpetual end-goal of its own endlessly unending laborious activity for itself, causally by itself, upon over against itself. Activating itself, human-being-subject mobilizes itself to labor endlessly in order to free itself, actualizing-by-achievement thereby its freedom as autonomous and (self-) sovereign. Human-being-subject's freedom is actualizing pure activity, absolutely effective and efficient, achieved by means of activity, without impurities of passivity and invalidity. The motion that both is this activity-passivity and is oppositely, simultaneously, equally, and identically by activity-passivity is both active motion-passive motion and is oppositely, simultaneously, equally, and identically by active motion-passive motion. Practice is not, and cannot be, active-passive motion, nor vice versa. The validity of human-being-subject's ex-sisting is perpetually an epistemological metaphysical problem. Know-how to solve this problem is of the highest value. Philosophy is the lawful giving of human voice for common sense to the essentiality of technique for human-being as, exhaustively and exclusively, human-being-ex-sisting actively.

Chapter 6

A conclusion; that is, a way of beginning again

I respond to essential questions that come before me as I try to understand what the Eel River and its beings are and what the ecology of the Eel River is.

*Redundant but perhaps important to acknowledge:
I respond only as I am able, and this is from where and when I am existing in the world,
as I am, and as I am understanding today
(but may not tomorrow understand in, of, and from the same senses).*

6.1 What is the ecology of the Eel River?

Just as my question—*What is ecology?*—is not new, neither is my answer. Even so, I answer nonetheless so that I may be immediately responsible for what I write. Ecology speaks to me, giving and inviting me, far beyond what I am given in advance to hear and to understand it to be epistemologically metaphysically or relativistically metaphysically. Ecology *does* speak to me through conventional historiographical knowledge of, for example, of the science of ecology. An example of such contemporary historiographical knowledge could be as follows: In 1866, Ernst Haeckel coined (or invented) the term “ecology.” He defined this term’s meaning in order to name and draw scientific attention to an emerging domain of scientific-epistemological study, its various corresponding techniques and technicians, and its potential for advancing our scientific-epistemological knowledge of the conditions of existence of living organisms in their environments.⁹⁹¹ Yet ecology speaks to well me beyond such contemporary scientific-epistemological knowing and the understandings in advance that carry me and govern me in our knowing the world.

What is ecology? I can begin to notice any tendencies I have to re-phrase the question from out of understandings-in-advance. The question is not, for example: What is the *meaning* of ecology? Nor is the question: What is the *definition* of ecology? The question is not, then, *How is ecology defined?* The question is not, likewise, *How do I interpret ecology’s meaning?* or *How do I interpret Haeckel’s meaning when he defines “ecology”?* The question is not: *How do I deploy the term “ecology” in our everyday activities and practices such that “ecology” means what it does for us collectively here and now and functions, always relative to contextual contingencies, to communicate what I will to communicate?*

Each of these questions already has a prior understanding of what ecology is. For example, with the question *What is the meaning of ecology?* I understand-in-advance that ecology is a meaning. It is the meaning I assign to the term “ecology.” In other words, “ecology” carries the meaning that I assign to the term “ecology,” where the term “ecology” is an originally empty linguistic vehicle I have invented, or coined, and utilize in order to communicate culturally, socially, or individually created meanings I subsequently assign to the term by means of our definitions—definitions I formulate and posit in light of the effectivity of our utilizations of the term.

The question *What is the definition of ecology?* is similar. What is ecology? Ecology is a definition. Who formulates, posits, debates and adjudicates, delineates, and accepts or rejects, and operationalizes the definition, and upon what grounds? Who validates these grounds as valid grounds, and thus as grounds at all, and by what means? Are these means of validation of

this ground *themselves* validated? By whom or upon what validated grounds are these means of validation validated, and how? On so on. So who validly defines “ecology,” and how do they do so? *I* do, whether collectively with others, individually, or both. I, in my own or with our collective judgement, now as through time, am the *original* and *final* grounds for judging and enforcing acceptance or rejection of any one definition or another, *as definitions*, even if I rule, for example, that the ground of an acceptable definition should be the effectivity of utilization and ease of deployment, or should be empirical scientific testing, evaluation, or calculation, and so on. That is, *I* posit, rule, and enforce the *criteria* upon which I validate and thereby ground our valid judgement of a definition *as validated judgement* and our consequent acceptance or rejection of the validity of the definition I have posited. I am, in this way, the grounding-ground by which and upon which I validate, judge, and accept or reject our criteria as the ground itself. Our validated criteria, in turn—whatever they may be—then function as the valid ground for our validated judgment and consequent validation or invalidation and, respectively, acceptance or rejection of one or another of our definitions.

At the least, when I write that each of these responses comes from out of understanding-in-advance, I wish to say that each of these responses *necessarily, unavoidably* comes from an understanding-in-advance of what language is, of what the world is, of what human-being is, of what other beings are, of what life and *to live* are, and of what *to be* and *to exist* are. There are commonsensical ways to respond to this. For example: If I respond by asking which of these understandings-in-advance and its corresponding notions, concepts, hypotheses, and theories is best evidenced or supported by empirical scientific data, I likewise betray the same: a host of responses belonging to an understanding-in-advance.

I must, therefore, begin again. To begin again, I *stop*, come *to rest*, and welcome our various willing, strivings, goal-setting and goal-achieving, and such other activities home again, that they, too, may rest, however momentarily. From home, restfully, I can think, and think sensitively. Then I begin once more.

What is ecology?

Ecology maybe the study of home. Who studies? We study, of course. Insofar as it is the study of *home*, and we are those who study, whose home do we study? We study our home. Ecology maybe, *perhaps*, our study of our home. Yet, if we are to study our home, we must *already* be home. If we are to study our home, our home must already be a *home*. If our home is indeed *our home*, we belong to it as we are.

This home is not a home among homes, or gatherings and shelters among gatherings and shelters each standing by ready to be made into homes—homes commensurable or perhaps equal in value to and thus substitutable or exchangeable at will for any other shelter, lodging, or house to be *made* yet another home. No. This home, if it is to be home *at all*, must be *our* home. We are home, as we are, in the belonging that *is* home. It is this essential belonging that gathers us and shelters us in *it* as we are. A home is not the product of activity, of making, of producing—least of all of *our* activity. A home is not willfully *made* to be a home, least of all *by us*. *We*, as we are, *already* belong home, and thus *to* home, and in this belonging that gathers *us* into it as its own, and only thus, is it *our* home. What *we* make, create, or produce is proper to our making, creating, and producing and, thereby, belongs to our making, creating, and producing. What we make, create, or produce therefore, directly in this way, belongs to us—it would and could not be at all without or willful making, creating, and producing. We cannot make, create, produce, or

otherwise will a belonging into existing into which, from outside of, we subsequently will, i.e. *make* or *force* ourselves to belong *as if* we had always already belonged in, of, and to this belonging. This belonging that we make, as well as the making ourselves belong to this belonging that is the product of our labors, are and can only be the efficient effects of our will and will-directed labors. There is no home to be had in such making, in such willing what we make to claim us as we are so that we may belong as we will, at our will, and effectively thereby be in a home. This is not belonging at all. Home, insofar as it is home, is the the belonging that always and already—i.e. from our coming to existing through to our departure from existing—selects, gathers, and welcomes us *as we are* in its sheltering *as belonging*. We belong, in other words, *as we are*—no more and no less—to this belonging. In the world, we come to exist in and of this belonging in which we are given to abide here and now, or there and then. The belonging awaits *us* and gently gathers *us* to it as we are and come to exist—that is, as we are giving to existing in the world. Only thus is home *our* home. *We* belong *to* the belonging that *already* shelters us here and now. We belong among all those beings likewise belonging to this belonging that gathers us together and shelters us. Gathered and sheltered, without exception, in this belonging *as we are*, we belong together and abide in this belonging as our belonging. Only thus is home *our* home, and thus home at all.

What, then, does *ecology* say? The English language received *ecology* from the German *Ökologie*. *Öko-*, like *eco-*, speaks of and from οἶκος (*oikos*).⁹⁹² Most faintly, perhaps, *oikos* whispers *to enter, sit down, and settle in*.⁹⁹³ To settle is to come to abide and, in abiding, dwell where, when, and within what one enters. Upon entering, settling, and thus coming to abide and dwell, one abides and dwells with and among those already settled or those coming to settle *there* and *then* (in that place, at that time). In faintest whispering, then, *oikos* tells us of *where* and *when* the what and the who that enters into and settles *is*: The what or the who that enters into and settles down is both *in* the sheltering of one's house and among all those that belong to the house's hold. To belong to a house's hold, and thus to be of the household, or proper to the household, is to belong to the holding of the shelter, or the holding of the sheltering, in which one abides. One is held in belonging. In other words, one is held in such a way that they *can* enter, they *can* settle, and the *can* abide and dwell. One is able to settle, abide, and dwell in such gathering into and sheltering under when one is watched over, when one is kept and safely protected, when one is tended to in a manner that they *can* safely enter as they are, they *can* safely settle as the are, and they can abide and dwell as they are in the house's hold.⁹⁹⁴

To be of a household, then, is to belong *as one is* to the watching over and keeping of one, to belong to the being protected, and to belong to the being tended to in safe keeping. What holds? The *house* holds. In its hold, the house gathers and shelters one in belonging. The household, then, is the house and all those beings that belong to the house's hold, in the belonging of this house's hold as they are, thus abide in the shelter of this belonging. This house—keeping watch over and tending to the household which belongs to it—is one's *home*. One enters, sits down, and settles into the belonging in and to one's house, the belonging to one's household, and the belonging among all those beings that, in their belonging as they are to the house's hold, are *likewise* abiding in the belonging that *is* home. A home is, after all, where one belongs as they are given to exist, from the beginning and until the end. A home is the gathering welcomingly of one as they are into its sheltering belonging from one's *first* passing over into the world and, once here and now, coming to settle and abide in this essential sheltering of belonging in the world until one's departure of the distant horizon of the world. Only thus, belonging as one is, is one *home*. This passing over into, or entering, the gathering and sheltering of

belonging, and abiding here and now until one passes across the distant threshold of this belonging's far horizon, is the same as *faring* along, and belonging to, our way through the world. *This* is *oikos*. From and of the being of *oikos*, these are the senses the word gives to us.

We listen to the *word's* speaking and telling, givingly awaking for us ever more sensitivity to the sensibility of the world.

Ökologie is also, no less, *-logie*. *Ökologie*, then, also speaks of and from *-logie*. What is *-logie*, and of and from what does it speak to us? *-Logie* is, and speaks of and from, *λόγος* (*lógos*). What is *lógos*, and of and from what does it speak?⁹⁹⁵ Perhaps most immediately, *lógos* is a word or words and the saying and telling of this word or words. In this sense, *lógos* is the telling, or the giving an account of in language, the giving voice to the speaking senses of words in *their* telling or their giving an account of senses.⁹⁹⁶ To give an account of or to tell a story, or to speak or to say, the account giver and the storyteller must *first* select, gather, listen to, and order the senses of words he or she is to give his or her listeners. The giving of an account, then, or the telling of a story, is the giving *of words*. The giving of words is the giving of the sense-speaking and sense-telling that are words to one's listeners. One who gives an account or tells a story *speaks* and *says*, in an ordered way, thus bringing to and giving his or her listeners the senses of which the words themselves tell. Yet the one gives an account or tells a story, the one or speaks and says, must first *open to, listen, and receive*, gathering himself to the speaking and the saying *of words themselves* as *these* give him or her their senses with which to hear, with which to see, and thus, subsequently, to give *human* voice. Words, and the way and manner of *their* speaking and telling senses, bringing these to the sensibility of the world, belong to the giving of language.

When *lógos* speaks to us, telling us of the sense giving of the speaking and saying of words, or when *lógos* tells of us of the giving of an account of or the telling a story, *lógos* gives us a sense of much more than this. The account giver, the storyteller, and the speaker have each already heard, then listened, and selectively gathered words to themselves. *Only subsequently* can the account giver, the storyteller, or the speaker *order* the words so as to give their own human voice to the words' senses in the manner proper to what he or she intends, or *means*, to give an account of, to tell, or to say. But this is not all.

The account giver, the storyteller, the speaker: he or she has *already* been, in advance of his or her own speaking or saying, telling or accounting—that is, in advance of his or her own gathering and selectively giving human voice the senses of words—her or she has already been selected and gathered to *open, listen, receive, correspond with*, and only thus and then, to give, in turn, his or her human voice to the senses the words themselves say and, in their speaking, bring to the sensibility of the world. It is the words' saying and telling that gathers the human account giver, the storyteller, the speaker to the words' senses. Being so gathered, and thus opening to, listening to, receiving, and thoughtfully corresponding with the words bringing senses to the world, the human account giver, the storyteller, or the speaker can, therefor *may then decide*, in their turn, to take upon these words-giving-senses unto themselves, order them, and selectively and meaningfully—that is, intentionally—give human voice the the senses the words give to the sensibility of the world. Deciding to give our human voice to senses that have *already* selected, gathered, and spoken to us, and thereby deciding to give our voice—with our attention, our intention, and our purpose—in our account, our story, our speaking and saying, we give to other human beings in the world what we have been ourselves already been given and are continually given. *To give* is not an act. Giving is not activity. *To give* is to practice. Giving is practicing. This gift—the gift of words giving their senses to the world and to us in the world—gives us our

senses, and thus *to* our senses that we may hear and perhaps listen, see and perhaps look, and so on, to the sensibility of the world. Words bring us, continually, to our senses and, thus, to increasing sensitivity for the sensibility of the world.

The human ordering of the senses we receive, listen to, and selectively gather unto ourselves—the senses belonging to and *given* in the speaking of words *themselves*—and thus of the words bringing these senses in order to give an account, tell a story, or speak—whether vocally or with graphical representations—is possible at all only once the account giver, the storyteller, or the speaker has opened themselves, listened attentively, received, gathered, and selected from among the senses spoken by the words to the open listener. *We can hear*, and thus we can *decide to listen* to this offering of sense *before* we meet and, thus, long before we can *comprehend* unto ourselves the *word* giving senses. Perhaps we only every hear or see, but never listen to or look for or look at, respectively, one or another particular *word* giving its sense to our hearing, our seeing. And, in such a case, perhaps, we *never* meet, much less come to know, much less again *comprehend* and take unto ourselves for our purposes the word that speaks the senses we hear or see. Its surely true that this happens *all the time, everywhere*, for human beings in the world. Never- and nonetheless, only once the human account giver, the storyteller, or the speaker has opened themselves, listened attentively, received, and selectively gathered from among the senses spoken by the words to the open listener, can he or she come to meet, comprehend, and—*prehending* the words as these speak—take up these words unto him or herself. Only subsequent, again, to this meeting, this prehending, and this attentive, careful taking up of the *words* giving sense, can the account giver, the storyteller, or the speaker order the words in order to give his or her human voice selectively and purposively, or meaningfully, to the words' senses, and thus to the sensibility of the world, in a manner and tone both adequate and appropriate to his or her giving of *this* account, or telling of *this* story, or speaking of what is to be spoken *here* and *now* to those humans who shall hear and, perhaps, decide to listen. Human beings in the world are *constantly*, individually and collectively—from our respective households here and now, or there and then, with these or those beings among and with whom we abide and dwell in the belonging of home—*responding* both *practically* and, distinctly, *actively* to and with the sensible speaking of words. We are, thus, as we exist in the world, constantly and continually *corresponding* with the senses brought and, in this bringing, given to the world in and as the world's sensibility, and therein, given to us. We are continually and constantly brought to our senses and *given* to awaken to greater sensitivity of the world's sensibility.

Lógos, however, is of and from, and thus speaks sensibly—that is, givingly brings its senses to the world—of and from λέγειν (*légein*), of λέγω (*légō*).⁹⁹⁷ What is *légein*? *Légein*, as is obvious to everyone, is a word: *légein*. In being a word, *légein* is as *lógos* is: both are words. Yet *lógos* is *of* and *from*, and thus speaks and tells sensibly of and from *légein*. That is, *lógos* is of and from, and thus givingly brings its senses to sensibility in its speaking of and from *what légein is*. Likewise, if *légein* is a word, then it, too, must givingly bring its senses to the world, openingly speaking these senses *as* senses that might be heard and to which, perhaps, we may listen. The word *légein* speaks its senses *as* senses that these can be sensed *as* senses givingly brought to belong to the sensibility of the world. What, then, does *légein* say? What is *légein* saying? That is, what senses is *légein* speaking as *légein* comes into the world as the word that it is, bringing the senses that it does? What senses is *légein* bringing, giving these to the sensibility of the world that, *here* and *now*, or *there* and *then*, that we may, in turn, sense them at all *as* senses for our hearing and, perhaps, listening?

The word *légein* speaks the senses of *to select, to gather, to collect, to bring together*.⁹⁹⁸ *Légein* speaks these senses, bringing them thus into the sensibility of the world *as the senses* from which our hearing and listening, or seeing and looking, etc., begin and are from this beginning, thus, attuned (or, at least, capable of attuning). Yet, if the word itself is the speaking of these senses, these senses can be spoken at all only as *already* selected and gathered into *and* as the word itself. The word, as what it is—the bringing of these particular senses into the sensibility of the world, the speaking them forth as it comes into the world to be heard and listened to, seen and looked for—is *given* as the word that it is, *légein*, from this word's belonging and being born of, and thus coming to be from the giving and selective gathering together of senses *as* senses at all. This giving and selectively gathering of sense into and as word sends word, and thus sense speaking, as the sensibility of the world. In this way, the word's speaking sense *belongs in advance to*, as destined for, giving its sense to the sensibility of the world. A word—I speak of *légein* presently, but any and every word—comes to exist as word at all from being selecting and gathering of senses as senses destined *for* the world, the world in which beings likewise are given to existing in and of the world's sensibility. These beings may thereby *hear* and, perhaps, *listening*.

What *is légein*? *Légein* is from and of that which the word itself comes and to which the word belongs. The word is given to be of *what légein is*. *Légein* is being selecting, gathering, collecting, and bringing together, in word, senses. Word's senses are *all* the selected and gathered senses destined for the sensibility of the world where it, the word, announces its coming, speaking senses and, thus, sensibility that is to belong, in turn, to the world. The speaking of this word, and all words, in their sending to the world, selects, calls, and gathers human beings in the world to its (the word's) senses, bestowing upon them (human being existing), in their being-aware, these senses. Word bestows these senses to human beings in the world *as possibilities of and for existing* humanly within the sensibility of the world. Human-beings are, each and every one, being-aware in the world—being-aware of themselves, of other beings existing, and of being existing to which they belong in the world as the existing that is the world itself. In selecting, calling, and gathering together those human-beings-aware that hear or see, but do not necessarily *listen* or *look to*, the speaking of the word, this word, as any and all words, brings to human-beings-aware in the world the sensible possibilities that *are* the ways opening through the world before our feet. These ways come to meet *us* as being *already* open and laying before us that we *might* decide, in fully being-humanly-aware, to journey faring upon one. We must journey, and we can only do so upon the ways given to us in and through the world, but I are not *determined* to one or another, nor is *how* we fare sensibly in the world determined in advance—governed, yes; determined, no. The human-being-aware in the world of being selected, called, and gathered by the word not only to hear, but to listen to the word speaking forth its senses—this human-being is given these senses as gifts with and in which to be-ex-sisitngly in the world *with others*, both other human-beings in the world and other beings-existing inclusively. The bringing of senses to the sensibility of the world, and thus to us, gives us the very possibility of sensing, and sensing anew and more sensitively each day. *This* is a gift.

All human-beings in the world are selected, called, and gathered not only to hear, but to listen to words' bestowing of sense as the sensibility of the world. Yet not all human-beings in the world, however, are selected, called, and gathered together into the same coming of words speaking forth, and thus bringing forth, senses for the sensibility of the world. *All* human-beings in the world, in our very coming to exist, come to exist as selected, called forth, and gathered into the sending into the world as the human-beings-aware, as we are, of the speaking of senses

of the sensibility of the world. Yet we are not all selected, called forth, gathered into, and sent forth into existing to hear and perhaps listen, see and perhaps look for, the same words whose sense speaking once again, in the world, selectively calls our attention and gathers us into the world's sensibility. Human-beings coming to exist in the world are sent, and welcomingly selected, called, and gathered by families of words, though not all of us to the one and the same family of words speaking senses. In belonging to the gathering of a family of words, or often enough two or more families of words, we belong with and among those human-beings in the world likewise gathered of the family of words into sense of the world's sensibility.

Within each particular familiar selecting, calling, and being gathered into existing sensibly and sensitively in the world, there are many words which give sense to *all* those humans-being-aware they select, call, and gather together commonly so that these humans may, in belonging to and in this gathering, sensibly exist together in and of the sensibility of the world. *This* is the selecting, gathering, and giving of *commonsense*—the words that collectively give themselves to all human-beings gathered and abiding together in a family of senses in the world's sensibility. Families of words, themselves selected and gathered together in communion of senses for bringing these senses to the world, welcomingly but selectively gather human-beings-aware into the senses of the sensibility of the world. *All* human-beings in the world *already* abide and dwell in common with others in one or another familiar common sensing. And all human beings existing are being-humanly-aware and thus open—from the beginning and thenceforth in degrees never annulled—to the receiving of commonsense for seeing and looking, hearing and listening, feeling, smelling, and tasting *at all*, together as one family in responding to the giving of sense into the world as the world's sensibility.

Even so, within a familiar gathering of human-beings into their senses in the world, there are words that give their sense even *more* selectively than those words bringing and thus speaking common senses. Such words select, call, and gather not all, but perhaps only one, or another, or a few to hear or see the senses they speak, calling these human beings in the world to *listen to* and *look towards* the words speaking sensibility *themselves*. These words, with greater selectivity that can be not common at all, gather this one, or another, or a few human beings of a the family into the awakening of these particular, less common senses, or senses not common at all, and, thus, into awakening of these particular sensitivities toward and for the world's sensibility. The sensibility of the world is never limited to, but always and everywhere exceeds beyond any one or another gathering of selected human beings to exist sensibly in familiar, i.e. in *their*, common senses.

Human-beings given to exist in the world as we are, and as always being-humanly-aware *already*, come to stand in the world *already* open in our beginning to exist, and continually opening, in degrees, to receiving the speaking of senses that we might, as we are capable, hear, see, taste, feel, and smell *at all* the senses given to the world, and thus of the world. We come into the world already opening to receive the senses being spoken by the family of words to which we are selected, and thus to the words that selectively call us and gather us into sensible belonging together in the world. In being born into existing, *we already* belong, *as we are*, to this or that familiar welcoming, calling, and gathering together of and in words speaking senses. We come to exist aware and ready for these words'—the common words' giving senses, at least—bestowal upon us of our senses that we might exist not only in and of, but sensitively toward and thus correspondingly with the sensibility of the world.

This is what *légein* is. And, in senses, as these senses, this is what *légein* says to us. *Légein*, sending its words, selects, calls, and gathers us together, bringing us senses so that, being

selected, called, and gathered not only to hear but to listen, not only to see but to look, and so on, we are brought to our senses of and in the sensibility of the world.

The question before us is: *What is ecology?* This question calls for us not only to hear, but to listen to it as a *question*. I have only *begun* to respond to this question. I have begun to respond to this question by listening to the word's senses, gathering them unto ourselves as they have already selected, called, and gathered us to its own speaking senses. Collecting the senses I am given, I gather them to myself so that I may, from awareness, listen ever more closely, more intently and attentively, to what comes in their speaking and telling. In so listening ever so carefully, and in thus following closely the senses speaking in the sensibility of the world, I may be brought to the word speaking these senses, gathering us familiarly to it in the world. I hear and see and touch, and so on. But I may also follow these senses' speaking in their tones and tenors; look for the hues and tints of their forms, figures, and characteristics; and feel their textures, their suppleness, their firmness. Faring with this quality and attentive purpose, I am brought into the presencing of words. I take them up *sensitively* and, in our turn, order words' speaking senses so that I may, with this most unique gift in the world, give them human voice in our own speaking and writing—a capacity with which I am also gifted, as are all other humans, in existing humanly in the world. I may *subsequently*, though not necessarily and always secondarily, order and give words' speaking senses our own human voice as means to our own activities and goals in the world.

I have begun to respond only in first beginning again, re-opening ourselves, and—being openingly aware—pouring ourselves, in this manner, thinkingly and thankfully, towards the giving of the question itself. I have written, sensibly, what *Ökologie* says to us and—in sense therefrom and sensibility thereof—what *ecology* speaks to us. It speaks to us so that we may hear, and then listen receptively and attentively, to its senses and so, in this way, that we may be given—that is, be brought—to our senses.

“But,” I counter knowledgably, “did not Haeckel coin the word *Ökologie*?” No, he did not. Haeckel listened to the senses *Ökologie* gives to the world. He listened as being *called* to listen and being gathered into sensing the speaking senses of *Ökologie*. But, in his sensitivity and faithfulness, he did not merely hear, nor did he merely see the senses *Ökologie* gives to the world's sensibility. Haeckel understood that was being *called to listen*, and *called to look*, and gathered to this listening and looking—this human listening and looking in the world—Haeckel was brought before the word as the word, bring itself before, spoke senses to the world's sensibility, *giving itself* sensibly to the world. Being-humanly-aware of these senses speaking, and in attentive faith and trust, being brought before the word speaking, Haeckel could gather the word unto himself, comprehend it, and with prehending it, take it up so as to speak the word, giving his human voice to the word's senses. Haeckel, in this way, brought the *word* to the common sensibility of a family of human-beings' gathered together communally into sensing together the world's sensibility. Listen: *Ökologie*.

Contemporarily, I am commonly given to understand in advance that Haeckel, by means of his willful and ingenious act, coined, created, or invented *Ökologie* and defined its meaning as means to his end-goals—even these end-goals included the progress of scientifically knowing the world. I understand *Ökologie*, in other words, in advance, *as I am given* to understanding in advance epistemologically metaphysically, to be the efficient effect of Haeckel's compositional, definitional, and meaningful acts. This is not incorrect or false—not at all. None- and nevertheless, in being carried to hear and see, and even to listen and look, from the understandings in advance to which I am given, I remain only distant from the *word's* speaking

senses, and only more distant still from the home source of the *word's* speaking sensibly into the world's sensibility, and thus more distant again from whence the word comes speaking, and what selects and gathers senses into and as the word itself that the word may bring senses to the world.⁹⁹⁹

6.2 What is science?

Scīre. All of human beings in the world—though always with the orienting *gifts* of varying degrees of capacity, capability, and quality of dispositions and attunements—can learn to dissect the speaking of senses and, thus, the world's sensibility; all human beings given to exist in the world can, but do not necessarily, if at all, learn to dissect and sever the speaking of senses in order to separate them in order to, again, consciously and, by these means and their requisite techniques, knowingly discern and distinguish one sense from another.¹⁰⁰⁰ Yet this activity is not, and is never, *necessary*—not even for *human* beings in the world to flourish existingly. This activity, insofar as it is *scīre* at all, is at best secondary to human-being-aware in the world, secondary to human beings in the world hearing and listening, seeing and looking, touching and feeling, and so on, words' speakingly giving senses to and *as* the sensibility of the world. This activity—*scīre*—is at best secondary to humans coming to exist in the world being familiarly selected to and gather in advance into and under the safe-keeping and gently belonging of words' giving senses that I may, in our turn, give voice to these senses in my practice and, secondarily, in or for my acts. Human-beings-aware in the world, so given and thus brought to their senses, and then attending to senses' speaking, always come to *know* the world in the glory of its sensibility. Yet not all come, nor must any necessarily come at all, to know the beauty and truthfulness of the world's glory by means of the activity of *scīre*. Not all human beings in the world come, nor must any necessarily come at all, to know the giving beauty and truthfulness of the world's glory—radiant and alive in the dancing saying of senses—by means of the activity of *scīre*. None- and nevertheless, *scīre*—this activity of dissecting and severing in order to separate in order to, again, consciously discern and distinguish—*can be* a mode of coming to know the senses of words' speaking for and as the sensibility of the world. This dissecting and severing in order to separate so as to, again, discern and distinguish *is* human-being *conscious* in the world—that is, this *activity* is human-being's consciousness in and of the world. Being-humanly conscious in the world is humanly dissecting and severing the world's sensibility in order to separate in order to, again, discern and distinguish the speaking of senses given to which, as I am familiarly selected and gathered to, I come to hear and see and touch, and perhaps to listen to, look towards, and feel, etc. words' speaking the world's sensibility.

In the world, to be humanly conscious is to be humanly *cum- -sciere*.¹⁰⁰¹ In the world, to be humanly conscious is to be acting scientifically, or with science: conscience, again *cum- -sciere*.¹⁰⁰² *Cum-* speaks the same sense as *with*. Most conspicuously, *-sciere* gives a sense of *knowing*. Yet *-sciere* speaks this sense—a sense of *knowing*—of and from, and as belonging to, **skey*.¹⁰⁰³ In the sense of English, **skey* says dissect, sever, cut, and actively thereby, separate in order to distinguish.¹⁰⁰⁴ Only once human-beings in the world, gathering unto themselves not only the senses, but the *words* that bring them forth, giving them to us, are human beings in the world capable of actively being *cum- -sciere*. And only actively being *cum- -sciere*—whether given to understanding in advance epistemologically metaphysically *as* science-epistemology, or otherwise—is *science* possible *at all*. *Science* gathers us to its senses, all senses especially appropriate to and which I may take unto myself for human *acting: scīre*.¹⁰⁰⁵ *Scīre* says: *to know*

by means of dissecting, severing, cutting, and actively thereby, separating in order to distinguish consciously. *Scīre* is in essence, insofar as it is *scīre* at all, *forceful*. To know by means of dissecting, severing, cutting, and actively thereby separating in order to distinguish consciously, *is to force*. Acting consciously, and effectively thereby scientifically, I *force* that which I *will to know scientifically*. To force is to act, and vice versa identically, regardless of whether the activity is *scīre* or another.

To know, however—as what to know is, and thus, of and from which the word *to know* comes speaking senses for and into the world’s sensibility—has nothing necessarily to do with, nor depends with any necessity whatsoever, on *scīre*. The word *to know* speaks tellingly of the same (that is, of the same giving source that gathers and gives the word’s senses to speak in the world) as Old English *cnawan*, Old High German *knāen*, of ancient Greek γνω-, of Latin *gnō-*.¹⁰⁰⁶ Hearing *to know*, I am called to and gathered to listen attentively, for example, to the speaking γινώσκω (*gignōskō*).¹⁰⁰⁷ I am called, for example, to listen to the senses’ speaking of κοννέω (*konnéo*).¹⁰⁰⁸ These examples bring senses’ speaking into and as the sensibility of the world from and of the same as *to know*. Yet there are others. For example, I could follow the call of being *wise*. *Wise* speaks senses to us of and from **weyd-*, or *seeing* and, upon *seeing*, *knowing*, as does, for example, the ancient Greek οἶδᾶ (*oída*) and Germanic **witan-*.¹⁰⁰⁹ None of these words’ speaking senses say anything at all of *scīre*. None of these words’ speaking senses say anything whatsoever of activity, acts, or actions as means to know. I should note, in passing, that neither *wise* nor *to know* speak senses’ similar or of the same as the speaking senses’ of σοφῖᾶ (*sophiā*) or σοφός (*sophós*), as in, for example, *philosophy*.

It was the ancient, not coincidentally imperial, Romans who first were given to understand in advance *gnō-* to be the efficient effect of *scīre*. They were not, however, given to understand in advance that the efficient effect of *scīre* exhausted, without exception, what *gnō-* is and, therefrom and thereof, *of what* this word speaks sensibly. Nevertheless, a modality of *gnō-* was the efficient effect the category of activity that comprises *scīre*. Hence, it is only efficiently causally by means of cogitative activity, that is, by means of efficiently *cōgitāre* (*cum-* - *agere*), that a human being in the world makes, creates, constitutes, produces, or otherwise efficiently causes and, by these means, *cognōscit* (*cognōscēre*), or cognizes (*to cognize*). The act of cognizing—itsself efficiently caused by cogitating—in its turn efficiently causes as its effect, at the very least, the possibility of *cognizance* or, what is identical, *cognoscence*. A human-being in the world effectively makes and thereby obtains cognizance only by *conscious* and even, perhaps, *conscientious* means. To cognize, in its very possibility, is to know as an efficient effect of *scīre* and the plurality of constituent activities within its category of action.

In no sense whatsoever does *to know* speak of *scīre*. Even so, *scīre* is no less a means to know—and an important one, not at all to be willfully dismissed, ignored, resisted, or posed as a problem. *To know scientifically*—that is, *to will to know and thus come to know scientifically by means of dissecting, severing, cutting, and actively thereby, separating in order to distinguish consciously*—yields as its efficient, multifaceted effect a modality of knowing—one modality, clearly, among others. Unlike other modalities of knowing, however, *scīre*—insofar as it is *scīre* at all—is not knowing itself in any sense. The category of activity that *is scīre* efficiently causes the product, or effect, that *is* its corresponding modality of knowing and thus, of knowledge. *Scīre* is, in essence—that is, insofar as it is *scīre* at all—forceful and, in force, willful. *Scīre* is *willing* to know and the innumerably techniques and technologies necessary for its constituent activities, much less for the successful actualization-by-achievement of its effect: consciousness and, correspondingly, scientifically knowing. To be consciously—or to be conscious—is to

force and be forced, and for human beings in the world, to will to know and—oppositely, simultaneously, equally, and identically—to be willed to know. It is not, and cannot be, for science to know that by means of which it exists at all: human-beings in the world acting willfully *cum- -scīre*. *Science*, insofar as it is to exist at all, is an efficient effect of *cum- - scīre*. For science, then—epistemological metaphysical or otherwise—human-existing’s *cum- - scīre* is and shall remain a problem to be solved. This science’s essential, all-conditioning, and thus governing problem is: *How do I cum- -scīre?*

Honesty and truthfulness are not, and should not be conflated with, distancing, rejection, dismissal, or identification of a problem I set up before myself to fix, solve, or dissolve. For human beings in the world—that is, for human beings existing—*scīre*, always lawfully conditionally and within lawful limits appropriate to its essence—is the furthest thing from a problem. For human beings existing—always lawfully governed in advance, and thus within the conditions of practical limits—*scīre* is a most useful gift. As a gift, and always practically conditioned and thus lawfully governed of and from practice, *scīre* is, in essence, as is all activity, a means to for human beings in the world to live. As activity, *scīre* requires the ongoing labor of human beings in the world in order to actualize and, effectively thereby, achieve its scientific end-goals. In order to *scīre*, one must first learn, and learn by being disposed to, *how to scīre*—that is, the *technique scīre* requires in all its senses, however human beings in the world are given to understanding them in advance. *Scīre* requires that the human beings in the world acting along its ways of sense, act in the manner belonging to the moving of activity’s disposing and disclosing: artfully, craftily, forcefully, and thus technically. *Only* first so oriented and disposed in and for the moving of activity, and thus, perhaps, of *scīre*—*only* then, already given to these ways in understanding in advance, do I understand that the gifts of sense and of sensing words’ speaking forth senses into as the world’s sensibility is nothing but our own willful, unendingly valuable sense-making as our own linguistic coinings, definings and meaning-makings.

Whyever and however I am given in advance to understand sensibly, and most often commonsensically, what, why, and how *scīre* is: *Scīre* is always and everywhere necessarily *acting*. As acting, for humans being in the world, *scīre* is necessarily, in advance of acting, willing and, thus, willing will to will. Only thus does human being in the world *act consciously* and *conscientiously*. In this, *scīre* is given to and especially appropriate *for* human acting in the world. As *acting* and its *activity*—not and never *in itself* practice or practicality—*scīre should always and everywhere be* governed in advance of and from, and only in these senses *by*, lawful *practice*. *Scīre*—like all activity and its acts and actions—is not and can never be an end in itself. Much less again can *scīre*—like all activity and its acts and actions—be an end *of, for,* and efficiently causally *by* itself. *Scīre* is activity of and efficiently causally by human-being in the world *cum- -sciere*, i.e. being-humanly-conscious: the dissecting and severing in order to discerning in order to, again, consciously know what is givingly brought to the world as sense, for sensing the world’s sensibility during our ex-sisting, so that I (and we) may *live*. Human-being conscious in the world is possible only from and of—in the beginning all the way to the end—being given to exist in the world sensibly, fully open already, as I am, from before being born to existing, to receive the senses words give and, thus, to sense the world’s sensibility. What is essential is that I *am* and *am aware* of being, and thereof and therefrom, being human. And what is essential *here* and *now*, as much as *there* and *then*, is that I must be if I am to come to exist, and, coming to exist in the world, if I am to live.

6.3 What is philosophy?

Philosophy is expert skill, magisterial judgement, and extraordinary know-how and know-why of one or more domains of craft or art—that is, one or more domains of *tékhnē* or *ars*. A philosopher is one who is expertly skillful, magisterially judicious, and extraordinarily versed in the technical (know-how) and causal (know-why) knowledge of one or more domains of craft or art—that is, one or more domains of activity. A philosopher is uniquely knowledgeable of the technical means, belonging to a domain of crafting or artful activity, for willfully making beings ex-sist. A philosopher is a technician of the highest, most accomplished category. Unlike a banausic technician, a philosopher is not only knowledgeable of the *how* of a technical domain, but also uniquely knowledgeable of *why* one efficiently causes a thing or other being to ex-sist, generally or in a given context. Philosophy belongs to ex-sisting metaphysically. A technician—whether banausic, philosophical, or in between—is not necessarily, however, one who practices and, in practicing, unfolds the deeds of practice, or *prâgma*, into these deeds' fulfilled presencing in the world. Metaphysically and, contemporarily thereof, epistemologically metaphysically, to be is to ex-sist; likewise, to presence is to ex-sist. To ex-sist is to act. Yet a being that presences does not necessarily ex-sist, though a being-ex-sisting necessarily presences. A being that is does not necessarily presence, though a being-presencing necessarily is. A being that is does not necessarily ex-sist, either. With extraordinary lawfulness and sensitivity, Plato gave human voice to the coming of metaphysics and metaphysics' opening-revealing laying forth of the senses and sensibility of the world. As recorded in *Timaeus*, Plato understood that the world, and thus its universality and eternity, are the products of the first unmoved actively-making-move *poiētēs*—the supreme technician of ex-sisting and all beings coming to ex-sisting thereof and therein.

In thinking faithfully into the questions of *poieîn* and *pâskhein*, I am brought into essential proximity with what philosophy is. What philosophy is has come to metaphysical and, thereof, epistemological metaphysical understanding in advance through the lawful, ever-faithful thinking, both responsively and in responsibility, of—perhaps most preeminently—Plato and Aristotle. Through such lawful thinking upon the ways of essential questions, *what* philosophy *is* is sendingly-given in the opening-revealing of world *the* world metaphysically and subsequently, epistemologically metaphysically (and subsequently yet again, relativistically metaphysically): *philosophiâ* (φιλοσοφίᾱ), or *philos-* (φίλος) *-sophiâ* (σοφίᾱ).¹⁰¹⁰

By now, everyone knows what philosophy is, of course: love of wisdom, or loving wisdom, or friend of wisdom. Yet of what is this wisdom (*sophiâ*), and, thus, what is that which is befriended and loved (*philos*)?¹⁰¹¹ The wisdom of *philosophiâ* is the fulfilled knowledge and the wise capacity of judgement thereby of one who is not *merely sophós* (σοφός), but masterfully or expertly *sophós*: masterfully or expertly skillful or clever in a handicraft, craft, or art (art and craft: *tékhnē* or *téchnē* in Ancient Greek, *ars* in Latin). To be *sophós*, then, is to be masterfully or expertly skillful and clever in actively, willfully positing and actively moving in order to actualize, enact, make, produce, create, form, frame, constitute, construct, compose, etc. things or beings—that is, to make ex-sist.¹⁰¹² One who is *sophós* is one who is masterfully or expertly skillful and clever in willing, that is, in efficiently causing things or beings to be, i.e. in willfully efficiently causally making them stand up and out into being, which is to write, in making them ex-sist. One who is *sophós* is one who is skillful or clever is actualizing by achievement things or beings. One who is *sophós*, then, is capable of actualizing acts, actions, and activity—acts,

actions, and activity in order to willfully make, produce, create, constitute, construct, ground, frame, set up, posit, position, or otherwise efficiently cause.

To have the faculty for, or the capacity for, *and* the capability to skillfully, cleverly, and willfully act or enact in order to actualize handiwork, crafts, or art is to be *powerful*—it is to have the power *to act* or *to enact* and, by means of these acts and their poietic activity, to actualize the willed end-goal, that is, the product, the creation or creature, the constituted or the constitution, the construct or the construction, the frame, the piece, the composition, the structure, etc. One who is *sophós* befriends and loves, necessarily, will to will, will power, and the power to act as means to posit and move oneself or another forcefully in order to, in turn, actualize by achievement his, her, or another's willed end-goals. One who is *sophós*, then, masterfully and expertly exercises the power of willing and actualizing appropriate acts, actions, and activity as means to his, her, or another's willed end-goal. These actualizations, acts, actions, and activity are proper to, that is, what or who the *sophós* wills to actualize, enact, make, produce, create, constitute, frame, construct, *et al.* One who is *sophós* is not only one who loves handiworks, crafts, and art, but is one whose basic, sufficient knowledge of and basic, sufficient judgement in handiwork, craft, or other arts discloses and demonstrates a basic, sufficient power to skillfully, artfully, and willfully posit and skillfully, artfully, and willfully act, enact, and actualize the action and activity of efficiently causing a thing or being to ex-sist as what it is, i.e. of actualizing, enacting, making, producing, creating, constituting, constructing, or otherwise efficiently causing in order to realize by actualization the willed end-goal. The realization by actualization of a willed end-goal is the the willful realization by willful actualization of the will to will itself. One who is *sophós* is one whose knowledge and judgement belongs essentially to that which is of and from craft and art and entails one's will and power to *poieîn* (*ποιεῖν*) his, her, or another's posited end-goal: to act in order to actualize, to enact, to make, to produce, to craft, to construct, to constitute, to frame, *et al.*, i.e. to efficiently cause things and beings to be in the world, that is, to make things or beings ex-sist and, only efficiently causally thereby, as *ex-sisting*, to be *what they are*.¹⁰¹³ One who is *sophós* is necessarily one who is *active*, not *passive*. One who is *sophós* is an activist. One who is *sophós* is necessarily masterfully, expertly *active*; a masterful, expert *activist*.

A *philósophos* (*φιλόσοφος*) is not one who merely knows and judges *how* to willfully posit and move oneself or another forcefully to skillfully and cleverly actualize what or who was posited for achievement. One who merely asks *how?* and only comes, thereby, to know and be able to (have the power to) judge *how* to willfully posit and willfully actualize, enact, make, produce, create, constitute, construct, frame, *et al.* the willed end-goal—regardless of how masterfully or expertly—is and can only be merely a base, or vulgar, craftsman or artist. Such a craftsman or artist is a vulgar technician, or a banausic technician of handiworks, crafts, and arts; a banausic technician of making, producing, creating, constituting, framing, constructing, *et al.*; a banausic technician of willfully efficiently causing things and beings to ex-sist in the world.¹⁰¹⁴ A banausic technician may *love* handiwork, crafts, and arts, but is nonetheless *not* a *philósophos*. A banausic technician may have extensive, thoroughly tested, validated, and verified knowledge of *how* to willfully posit and *how* to willfully actualize, enact, make, produce, create, constitute, construct, *et al.*, i.e. of *how* to willfully posit and efficiently cause something or some being to ex-sist. Nonetheless, the banausic technician is *not* a *philósophos*. While the banausic technician—that is, the banausic craftsman, artist, handworker, experimenter, problem solver, etc.—may love craft, art, or handiwork, they do not have the faculty (or the capacity) and the capability—or, together, the *power*—to *wisely* judge from exceptional technical knowledge *what*

to willfully posit, *what* to willfully actualize, enact, make, produce, create, constitute, construct, compose, etc., and *why* to willfully posit and willfully actualize, enact, make, produce, create, constitute, construct, compose, *et al.*, *this* or *that* thing or being as appropriate to, that is, as proper to *this* or *that* situation and circumstance. Unlike a *philósophos*, the mastery and expertise of a banausic technician extends no further than, and centers upon, *how*. A banausic technician is *merely* a technician.

A *philósophos*, like the banausic technician, *is* a technician. The *philósophos*, however, is a technician of the highest, most accomplished category. The *philósophos* is a master or expert of the both the actualization by achievement of making things or being ex-sist as well as *the power to wisely judge* his, her, or another's handiwork, craft, or art (*téchnē*, *ars*). The *philósophos* is not merely masterfully or expertly skilled in and with the *techniques* of a domain of craft, handicraft, or art, though a *philósophos* is certainly, and must be, masterfully or expertly skillful in and with such techniques. The *philósophos*, however, must also be masterfully or expertly knowledgeable of now only *how*, but also of *why* generally *and* specifically in any given context. Only demonstrably masterful or expert *knowledge* and, thus, judgement of all of the *whys* pertaining to the particular domain of *how* of the technician reveals the technician to be a *philósophos* as a *philósophos*.

Metaphysics, and thereof, epistemological metaphysics and relativistic metaphysics, is the lawful, subsequential giving and opening-revealing of world as *the world philosophically*.¹⁰¹⁵ This includes, of course, contemporary science-epistemology entirely. With epistemological metaphysics and to subsequent sending-coming of relativistic metaphysics, philosophy *does* come to its end and is completed. Philosophy, however, in its end, is only yet just beginning as what it is in its fulfillment; that is, as fulfilled in its being-sent and lawful opening-revealing. Metaphysics, epistemological metaphysics, and relativistic metaphysics *are* law and lawful; they are, I cannot forget, the opening-revealing, or the disclosing, of world as *the world*, the world of sense and sensibility. Human-being-ex-sisting are given to *the world*, oriented and carried into and through the world in its understanding-in-advance. An end is *neither* a term *nor* a termination. An end, likewise, cannot be willfully encountered, overthrown, overcome, escaped from or evaded, exterminated, nihilated or annihilated, rejected, invalidated, revaluated, repositioned, redeployed, remade, reimagined, reproduced, reconstituted, reconstructed, or disposed, displaced, and forgotten, by human-being-ex-sisting or by a god or goddess ex-sisting in the world. An end can be befriended, however, and welcomed as what it is with undiminished but gentle, calm, courageous, and thoughtfully open honesty. Honesty is honesty insofar as it is without force, or forceless. Honesty, insofar as it is honesty, is practical.

The technician—whether banausic, *philosophikós*, or somewhere in between—is essentially sendingly-given to, oriented in the gathering of understanding in advance, and thus gathered in the opening-revealing of world as the world poietically, and therefrom and thereof dispositioned (in the sense of *diatíthēmi* [διὰτίθημι]) technically as a *poiētēs* of *poiēma* in the world—dispositioned, that is, in essential orienting inclination towards as well as from out of and for *téchnē* as means to *poieîn*.¹⁰¹⁶ The technician—regardless, again, of whether or not he or she is banausic, *philosophikós*, or somewhere in between—is not necessarily at all one who is either *prāktikós* or *prāgmátikós* (i.e. is neither practical nor pragmatic).¹⁰¹⁷ The technician—whether banausic, *philosophikós*, or somewhere in between—is not necessarily at all one who opens to or so much as thoughtfully considers—much less is inclined toward or drawn to open, cultivate, and share—the human faculty, the human capacity, and the human capability to *practice*, or *prássein* (πράσσειν) (also, *práttein* [πράττειν]), whereof *comes* and wherefrom he or she (a human-being

in the world) gives *prâgma* (πρᾶγμα) to the world.¹⁰¹⁸ The technician—whether banausic, *philosophikós*, or somewhere in between—is not necessarily at all one who is sendingly-given to, oriented and disposed in the opening-revealing of world as the world, and therefrom and thereof phronetically dispositioned to open, cultivate, and share the human faculty for, the human capacity for, and the human capability of and for *phronein* (φρονεῖν) and, thereof and therefrom, for *phrónēsis* (φρόνησις): to think, to heed in thinking, to think with and from one's *heart and mind* and, therefrom and thereof, to understand, to be wise, and to be prudent.¹⁰¹⁹ One who opens, cultivates, and shares the faculty for, the capacity for, and the capability for *prássein* must necessarily *first* attune oneself to, open, cultivate, and begin to share his or her human faculty for, human capacity for, and human capability for *phronein* (φρονεῖν) and, thereof and therefrom, for *phrónēsis* (φρόνησις). The essential human phronetic disposition in world as the world is the essential disposition for human-being-ex-sisting's possibility of and human-being-ex-sisting's power of—the human faculty for, the human capacity for, and the human capability for—first, *phronein*, and thereof and therefrom, *prássein* and, necessarily only thereof and therefrom, givingly-gifting the *prâgma* of *prâxis*. The technician, in other words—whether banausic, *philosophikós*, or somewhere in between—is not necessarily at all inclined to think with both heart and mind, or even, I might say, cautiously, body and soul, and *only* thereof and therefrom, to practice; the technician is not necessarily at all a thinker and, *only* thereof and therefrom, a practitioner.

The practitioner—from, of, and in his or her phronetic and, thereof and therefrom, practical faculty, capacity, and capability—*neither wills to act nor acts*. *To practice* is not, and cannot be, *to act*. *To practice* is necessarily an end in itself. *To act* is necessarily *not*, and cannot be, an end in itself. For human-being-ex-sisting, *to act* is *to will*, and *to will* is *to efficiently cause* or, what is identical, *to force*. *To practice* is not, and cannot be, *to will*. For one to practice, the will be at rest and, thus, quiet—not silenced, but quiet. To be at rest in quietude is *not* and *cannot* be willing the will to rest, or willing to silence the will, for this would neither be rest at all nor quiet at all. The will not to will is only, and can only be, willing—and willing will insidiously and, thus, harmfully and hurtfully. To will not to will is not and cannot be restful, quiet, soothing, or calming. To will not to will is not, and cannot be, loving, befriending, or being friendly, for example. To will not to will, by itself—like willing for the sake of willing will itself, autonomously and (self-) sovereignly—is not and cannot be freeing, whether of oneself or another.

The practitioner—from, of, and in his or her phronetic and practical faculty, capacity, and capability—*does not actualize, enact, make, produce, create, constitute, construct, compose, frame, form, establish, et al.*. The practitioner, that is, in *practice*, as *practicing*, does not efficiently cause *whatsoever*, whether willfully or not. The practitioner—from, of, and in his or her phronetic and practical faculty, capacity, and capability—does not force, is not force, and does not exercise force, whether force of will or force of act, which are one and the same. The practitioner, *as practitioner*, does not will to will—which is the same as willing to will to empower will in order to will to power to will further, more effectively, more efficiently, more powerfully—ever more autonomously and (self-) sovereignly.

6.4 What is epistemology?

What is *epistemology*? I shall postpone the question of *-logy*. To begin, let me follow the question: What is *episteme*? Of what does this word speak? Whence does this word speak?

What does this word tell me—however inaudibly or senseless it may seem to me today—of what I think, say, and write when I think, say, or write them? *Episteme* speaks of and from ἐπίσταμαι (epístamai).¹⁰²⁰ *Epístamai* is know-how, or knowledge of *how*: knowing how to act, to do, or distinctly, to make, to create, or to produce. If one knows how to act, to do, or to make or produce, one has the basic, necessary (but not necessarily sufficient) foundation for being capable of acting, doing, or making. This, too, is *epístamai*: to have know-how, or to have knowledge of how, that is both necessary and sufficient to be capable of acting, doing, or making and producing.¹⁰²¹ *Epístamai* is technical knowledge: knowing how to act or do, or distinctly, knowing how to make, create, or produce. One is capable of making something if one knows how it works, functions, or operates. With this know-how, if one then has the proper materials, sufficient assistance, and sufficient physical corporeal capacity, one has the power of making what he or she knows how to make. If one knows, in any general or particular case, how something works, functions, or operates, one can make, produce, or reproduce it. Likewise, with other secondary sufficiency considerations accounted for, one is capable of doing or acting if one knows how, in any general or particular case, to act or to do. Thus, one has the necessary power of doing or acting if one knows how, in any general or particular case, to act or to do.¹⁰²² As the ambiguity towards *poiēsis*, *tékhne*, and *ars* among ancient Greek, Latin, early Christian and even medieval thinkers indicates—an ambiguity that tended unmistakably throughout centuries towards especial caution, wariness, and even disdain—and as Aristotle, for example, came to understand deeply, insofar as one knows how but is ignorant of questions and responses of *what*, of *who*, and of *why* one acts, does, makes, or produces; and insofar, thereby, that one is ignorant of when, where, and most crucially, why it is appropriate to act, to do, or to make in the way proper to the world at that place and time, one merely mimics and reproduces mechanically, without knowledge, much less understanding—whether in act or deed or, distinctly, in creation, production, fabrication, and manufacture, and regardless of the possession of perfectly complete knowledge of how, know-how, or epístamai.¹⁰²³

Episteme, I have learned, speaks of and from ἐπίσταμαι (epístamai). After the time of Homer, epístamai was at times spoken and written convertibly with εἰδέναι (eidénai).¹⁰²⁴ Eidénai is a formation of oída (oĩdǎ).¹⁰²⁵ Oída is *to know*, broadly, including *to know how*, but also in the sense of, for example, to be acquainted.¹⁰²⁶ Oída comes from the Proto-Indo-European root *weyd-: to see.¹⁰²⁷ I should not be surprised, then, to learn that oída was also spoken and written interchangeably at times with εἶδω (eĩdō), whence εἶδον (eĩdon).¹⁰²⁸ Eĩdō is likewise in essential kinship with *what* ιδέα (idēā) and ιδεῖν (ideĩn).¹⁰²⁹ (I must ask myself, as a human-being-subject that I understand myself in advance to be, if I understand Plato or Aristotle; that is, if I *see*, or understand, what they *saw* when they, in questioning faithfully, spoke of idēā or theōriā.) When I learned of theōriā, above, I came to listen attentively to the speaking sense of eĩdon. I note, again, the kinship of eĩdō with θεά (théa) and ὁράω (horáō).

Am I merely going in circles, kicking up dust about nothing at all? No, I do not sense that I am.¹⁰³⁰ When I ask what epístamai is, the word's sense calls our attention once and again to *to see*, to human-being-seeing. *To see* is not an act or a deed, much less a making, creation, or production. *To see* is not *a deed* or *a doing*. *To see* is neither *to act* nor *to do*. Human-beings *are*, insofar as we are at all, *beings-seeing*. Human-being-seeing, or human-being-understanding, is in the clearing of the being of world opening-revealing as the world. Whether in the presence of light or dark, what is essential is the opening-presencing giving of is-ising, be-being. Human-being sees even if standing in a physically dark forest in which human-being, as

hard as he or she looks, can see only shadowy figures and shapes that are, perhaps, *incomprehensible*. But he or she understands and thus *sees* nonetheless.

To see, it should by now be clear, is not the mere mechanically efficient causal operation of action-reaction caused by external or internal physical-chemical stimulation of biological sensory apparatuses, themselves in turn merely physical-chemical mechanical devices, such as human-being-subject understands the eyes, i.e. the biological eyes. To see is in essence of the giving-gift of being to human-being. To see, in this sense, is to understand. To understand is of the giving-gift of being to human-being-existing in the world upon an opening-revealing way of sense. To be human-being is to be human-being-seeing. To be human-being-seeing is to be human-being-understanding. Human-beings *understand*. Human-beings are *understanding*: human-being-understanding. *To understand*, like *to see*, is not an act, much less a making or a production. Thus, we constantly speak of *to see* as *to understand*, and vice versa. To be a human-being existing in the world is to be a human-being-seeing, which is to be a human-being understanding. To be a human-being understanding is to be a human-being existing in the world upon an opening-revealing way of sense. Human-being-understanding is analogous to human-being-breathing. To understand is no more and no less a giving-gift essential to human-being existing in the world than is to breathe. Each breath is a giving-gift of being to human-being. To understand is no different. It is primordial, essential, and in advance just as human-being breathes its existing in the world. Recall what I have already learned of *theōriā*; that is, of *what* *theōriā* is. *Epístamai* in its generous, giving opening-revealing senses—far from epistemological-metaphysical sense—in close sensing and speaking kinship with *eidénai*, calls our attention and calls me before the question: What is human-being? Human-being *sees*: human-being-seeing. (Recall, this is not physical-chemical-biological epistemological metaphysical seeing, i.e. *perceiving*, *grasping*, *taking hold of*, *grasping*, each of which is an act.) The blind, too, insofar as they are human-beings, which they are, see and see as perfectly clearly and lucidly as any of human-being). Human-being understands: Human-being-understanding. Human-being breathes: human-being-breathing. These are not acts or deeds (as would be, for example, to look, to observe, to watch, to gaze, to survey, to discern, to comprehend, to apprehend, to grasp, to make out, to conceive, to perceive, etc. or, similarly, to hold one's breath, to forcefully blow out one's breath, etc.). For human-being existing in the world in and of an opening-revealing way of sense, *to understand*, and *to see* in its close kinship with *to understand*, is not *to will*; it is not an act of will or of willing, a deed of will or of willing; much less again is it a willful positing, setting up, setting upon, making, production, ordering, or creation. Perhaps now I may begin *understand*, in wonder, and thus come to genuinely see, for example, what is spoken in John 9:1-12.¹⁰³¹ For what is spoken of and exemplified in John 9:1-12 is essential to human-being existing, human-being being ushered in faith towards fulfillment, and thus human-being in the world-giving opening-revealing which unconditionally and exceptionlessly caringly gathers me and shelters me in our human-being-existing, as human-being-existing, regardless of whether one is Christian or Jewish, for example. Here such contemporary salvatory efforts to find meaning for ourselves in the world by means of freeing and thereby re-dis-covering (“finding”) the functionality and operation of moods (our moods, individual or collective) in order to observe and perceive beings as thereby shining meaningfully for us, by us, in the world of our meanings, by our meanings, are very knowledgeable, and unusually willful despite themselves, but do not yet *see* that they are *given in advance to the giving-gift of seeing*, before they act or can act, before they do or can do, before they will or can will, much less before they make, produce, or create.¹⁰³² Human-being in the world *is* human-being-understanding, *is* human-

being-seeing. This *human-being-seeing* has nothing *essentially and primordially* to do with scientific-epistemology, e.g. physics, chemistry, or biology, even as the latter belong to and are, therefore proper to, in their essence, an opening-revealing way of sense in the world for—but *not of*—human-being. This way, to which human-being-subjects belong, is epistemological metaphysics.

Yet, *epístamai* parts ways with *eidénai*, *oída*, *eidō*, *idéā*, and *theōríā* in another, and likewise essential and primordial, sense. *Epístamai* also speaks literally of and from ἐπί- (*epí-*) - ἵσθημι (*-hístēmi*). *Epí-* speaks to me of *on*, *upon*, *onto*, *over*, *against*, among others.¹⁰³³ *Hístēmi* speaks clearly of efficient causation: to make stand, to stand, to set, to set up, to cause to rise, to be set up or upright, to be placed.¹⁰³⁴ I note that the *-hístēmi* of *epístamai* speaks in the same register as the *-sistere* of *existere*. Both tell of efficient causation—the former of efficiently caused motion up or upwards, and the latter of efficiently caused motion out or outwards. ἐπί- (*epí-*) and ἵσθημι (*-hístēmi*) together, as *epístamai*, speak of efficiently causally making stand up, making stand up upon, making stand up over against, setting up upon, setting up over against, setting against, positing upon, position upon over against, and so on. To efficiently causally make to stand up over against is to *force* to stand up over against. To efficient causally make to stand up upon over against is to exercise force in forcing to stand up, upon, over and against. In *this* speaking sense of *epístamai*, *to act* recedes and *to make*, *to produce*, *to force*, *to effect*, etc. comes to prevailing predominance. In other words, *praxis* withdraws from human-being-thinking and human-being-understanding, as does the essential disposition of human-being insofar as human-being *acts*: *phrónēsis*. In this revealing-orienting sense of *epístamai*, and with it, the world-historical coming to prevail of efficient *poiesis* and its essential disposition of human-being, *techne*, *praxis* withdrawals in concealment and releases human-being from the essential disposition: *phrónēsis*.

In *epístamai* I begin to hear, then, and I may listen to primordial resonances of epistemological metaphysics and, thereof, human-being-subject and, thus, human-being-subjects—that is, of *what* and *who* human-being-subject is and of *what* and *who* human-being-subjects understand themselves, beings, and world to be in advance. But to conclude that, for example, Socrates, Plato, Aristotle, Augustine, or Aquinas understood human-being to be human-being-subject; that these thinkers and articulators of understanding, as well as and no less than other human-beings of their times and places, understood and spoke of themselves, of beings, and of world as subjects and objects, as subjective and objective, would be greatly mistaken.¹⁰³⁵ Such epistemological metaphysical understanding in advance as, for example, epistemologically known, empirical phenomena and epistemologically unknowable noumena would have seemed absurd and foreign, if not outrightly incomprehensible. Phenomenon speaks not of epistemological metaphysical or relativistic metaphysical subjects and objects, nor of empirically (i.e. epistemologically) known or knowable phenomena and a *fundamentum* of unknowable and unexperienceable noumena. Phenomenon speaks of and from φαίνόμενον (*phainómenon*). *Phainómenon* in turn calls me in understanding, as a human-being-understanding, and thus as a human-being-seeing, to φαίνω (*phainō*): what or who brings itself to light; what or who uncovers itself, bringing itself to appear; what or who shines forth in the light, luminously; what or who shines forth giving light; what or who comes to be of its own; what or who stands up or stands out *of its own*; what or who *presences* of its own. that which to human-being-understanding and comes, therefore, to human-being-seeing.¹⁰³⁶ *Phainō* tells me and calls me to come to understanding, to come to see, who and what shines luminously, whether in light or giving light.¹⁰³⁷ Light is not merely sunlight or lamp light. It is being such that what

and who is may be sent and may come to standing-presencing out and up in the world. Phainómenon calls us, then, to understand, and thus to see, what or who brings itself to presence shinningly, luminously, before us in the world, standing-presencing out here or there before us, amidst, and among us. None of this is *our*, human-being's, doing, nor requires human-being's acting, much less human-being's making or producing. None of this is or is caused by human-being, willingly or unwillingly. More emphatically: Human-being-*subject*—human-being-subject willing will to will and willing endlessly to empower itself to will itself to completed fulfillment in auto-nomous sove-reignty—is grossly foreign to the what and the who to which phainómenon calls us, as well as to the what and the who phainómenon continues to tell us today. This is so regardless of this call's nearly inaudible obligation upon us and certain uselessness to us, as I understand-in-advance belonging, as I do, to the opening-revealing sway of epistemological metaphysics and, increasingly, relativistic metaphysics.

Epístamai, too—in the revealing gathering together with upon a way of sense and the speaking together there with *eidénai*, *oída*, *eidō*, *idéā*, and *theōríā*—calls us as human-beings-understanding and, thus, human-beings-seeing to the phainómenon that is φαίνειν (*pháinein*) or φαίνεσθαι (*pháinesthai*), and—as this human-being-understanding and human-being-seeing in wonder what and who is standing-presencing luminously before, amidst, and among us in the world—to act, i.e., *to look, to observe, to attend, to hold, to listen to, to speak to and with, to concern ourselves with*, and, perhaps most importantly, *to care for* what and who shines forth standing-presencing of its own before, amidst, and among us in belonging to the same gathering-sheltering of world to which I, too, belong in essence. In speaking in this sense, *epístamai* calls us, tells us, and guides us to understand and, thus, to see its close kinship with ὑπόκειμαι (*hupókeima*): that which lies under, or underlies; that which, as lying under, *gives ground*, or revealingly-openingly *gives world*, without being *the ground* or *the world*.¹⁰³⁸

Yet, *epístamai* parts ways with what and who, of itself or of themselves, *pháinein* or *pháinesthai*; that is, with what and who shines forth luminously, of its own or of their own, as they come to stand up and out, being-presencing in the world. Here, *epístamai* gathers and orients us into sense in essential kinship with the Latin translation, and thus the Romans' understanding-in-advance, of the ancient Greek, *hupókeima: subiectus*.¹⁰³⁹ I must note the difference. *Subiectus* speaks of and from *subiciō* (or, in its infinitive, *subicere*), which in turn tells us of *sub- -iaciō*: to throw under, to hurl under, to establish under, to found, to build under, to construct under, to place or to put under.¹⁰⁴⁰ Yet, crucially, *subiciō* also, simultaneously, speaks of throwing or hurling *up from below*, of *projecting* or otherwise (efficiently) causing to shoot *upwards*.¹⁰⁴¹ In this efficiently causative sense, it orients and gathers those who speak it, read it, or listen to it similarly to *epístamai* in this latter's own forceful, efficiently causative sense. Here I may hear, if only as a fleeting note, and I may see, if only as a dim, shrinking shadow on the horizon, the world-historical stirrings of the contradicting-contradiction that is epistemological metaphysics and human-being-subject. *Subiciō (subicere)* tells us of acts that are efficiently causative. *Subicere* speaks of force efficiently, effectively forcing that which will be the efficient effect. Who or what efficiently causes, or forces, that which is, as the efficient effect, *subiectus*? *Subiectum* does. Yet, who or what is *subiectus*? *Subiectum* is also *subiectus*. For the Romans, human-beings, stones, plants, animals, water, mountains—perhaps even, though surely very distinctly, the sky, the heavens, and the beings the dwelt there and, perhaps again, governed there and from there—were each, of their own, the *subiectum* that *subicere* (the subject that subjects) and the *subiectus* of *subicere* (the subjected by being-subjected).¹⁰⁴² Here I note, again, primordial stirrings, perhaps, of the world-historical sending of epistemological

metaphysics and human-being-subject. *Epístamai* tells us, in its most literal sense, of efficient causation, of force forcing: ἐπί- (*epí-*) -ἵστημι (*-hístēmi*); or, as I have already written above: efficiently making stand up, making stand up upon, making stand up over against, setting up upon, setting up over against, setting against, positing upon, positioning upon over against, and so on. To efficiently causally make to stand up over against is to *force* to stand up over against.

This efficient making or efficient creating is *poiesis* and, as such, its essential disposing of human-beings brought into the world is that of technique, of *how* (to actualize by achievement a willed goal, for example), of *techne*. To efficiently causally make to stand up upon over against is to exercise force; it tells us of forcing to stand up, upon, over and against. With the Romans' understanding-in-advance of *hupókeima* as *subiectus*, *epístamai* could be understood-in-advance strictly and exclusively—and forgetfully—as the making stand up upon, or the forcing to stand up upon, whatever or whoever stands presencing in the world at all. *Phainómenon*, likewise, can be understood-in-advance, exhaustively and exclusively, as the efficient effect of *epístamai* and *subiciō*, as the latter two words' speak, gather, and orient us in their closely akin forceful, efficiently causal senses. Whatever and whoever is, is insofar as they stands up presencing in the world. Whatever or whoever stands presencing in the world is efficiently, forcefully made to stand up presencing in the world; whatever and whoever stands presencing in the world is efficiently hurled up from below into the world. Standing there, in the world, all that is, whatever and whoever, is insofar as they are thrown up, made to stand upon, and positioned upon over against, the *subiectum*. I write of that which, in being hurled up from below and made to stand up upon over against, stands presencing *objectus*, the *objectum* of this *obiciō* (infinitive *obicere*).¹⁰⁴³ *Obiciō* speaks revealingly, likewise, of the efficiently causal sense of *ob-* (towards, over against, opposing, opposite) *-iaciō* (to throw, to hurl). I write, that is, of the object in and of the totality of objectivity (all *phainómena* insofar as they are at all, *including* the *subiectum*, insofar as it is, whence again I may hear and, perhaps, choose to listen to what is contemporarily an epistemological metaphysical contradicting-contradiction, that of the grounding-ground of and hurling up and making stand secure all objects in the totality of objectivity).¹⁰⁴⁴ Together, the speaking of *epístamai* and *subiciō* strictly in their efficiently causal senses disposes human-being, us, in the world upon a way of sense such that demanding, willing, and endlessly striving to evaluate, examine, experiment, test, probe, explain, secure, and thereby to know with absolute certainty that which is the grounding-ground that *epístamai* and *subiciō* all efficient effects (*phainómena*); that which is the founding-foundation which *epístamai* and *subiciō* all efficient effects (*phainómena*); the fundamenting-fundament that *epístamai* and *subiciō* all efficient effects (*phainómena*)—*makes* sense of such a nearly total, ubiquitous, prevailing, and transparent, empirically (epistemologically-scientifically) impalpable kind that, rather than common sense, I must speak of understanding-in-advance to which I belong.¹⁰⁴⁵ To will as a goal, to move myself to actualize by achievement this goal, to make and thereby possess securely such epistemological knowledge receives and orients me, human-being understood-in-advance to be human-being-subjects, upon the way of sense to which I am gathered and sheltered in belonging in the world.

6.5 What is existing?

As recorded in *Timaeus*, as elsewhere, the faithful thinking, corresponding, and speaking of Plato in obligation to the call and opening-revealing way of essential questions gave—and continues no less now to give—voice to the coming, the beginning, and the orienting-opening

and holding sway of *philosophiā* as *philosophiā*; that is, of philosophy *as* philosophy. Epistemological metaphysics as well as that for which epistemological metaphysics lawfully prepares the way—that is, relativistic metaphysics—are philosophy as philosophy opens and comes toward rest as, and thus at, its end—an end that is not at all a terminus, finale, cessation, withdrawal, or conclusion.¹⁰⁴⁶ Here I will only briefly and, therefore, inadequately bring our attention to the faithful thinking-responding and speaking in obligation to the call of this opening-revealing way of which and from which *philosophiā* as *philosophiā* comes, discloses and gathers paths of sense, speaks, and governs human-beings-ex-sisting in our thinking, practicing, and acting as carried by and belonging to metaphysical and, thereof, epistemological metaphysical understandings-in-advance.

In Plato's *Timaeus*, the world is the cosmos (*kosmos* [κόσμος]), also conventionally translated as the universe.¹⁰⁴⁷ The cosmos is visible, tangible, and bodily—to be bodily is to be that which has a body.¹⁰⁴⁸ Body, and any particular body, is solid and three dimensional (i.e. extended or extending dimensionally in *and* as width, length, and depth), visible, and tangible.¹⁰⁴⁹ What or who is bodily is not and cannot be exclusively body, tangibility, or visibility (i.e. sensibility), for it does not come from nor is it essentially of that which is visible, tangible, or bodily.¹⁰⁵⁰ Likewise, the cosmos is not and cannot be exhaustively body, or tangibility, or visibility (i.e. sensibility), nor is it exhausted by body, tangibility, or visibility (sensibility). As with the cosmos, all that which—that is, all *what* and *who*—is visible and tangible in the cosmos is bodily. The cosmos and all that which is visible, tangible, and bodily in the cosmos is *sensible*—that is, is sensibly in sense, as sense, and for sense.¹⁰⁵¹

The cosmos, and what or who is in the cosmos, have been given to birth, or born, into sense, as sense and sensibility, and for sense, and are therefore sensible *and* sensing. World given to birth as *the* world, and thus cosmos given to birth as *the* cosmos, comes to be-standing-presencing in sense, as sense, and for sense as *the* world or, what is the same, as *the* cosmos: (γινόμενον [gignómenon], of γίγνομαι [gígnomai]).¹⁰⁵² World, in being given to birth, comes to be-standing-presencing sensibly—in sense, as sense, of sense, and for sense, sensibly—as *the* world, and as *the* world, as the cosmos. *The* world is born, or given birth to, and as being-born, the world is given to be-standing-presencing *sensibly*—in sense, as sense, and for sense, sensibly—as *the* world, that is, as the cosmos. World passes into being-sensible as *the* world; world *comes-to-be-standing-presencing* sensibly. *The* world is world be-coming being-sensible as *the* world, or the cosmos. Again, *the* world, as world be-coming-being-sensible, is world coming-to-be-standing-presencing sensibly—that is, in sense, as sense, for sense, sensibly. *The* world, as *the* world, stands-presencing sensibly. The world, as *the* world, is being-standing-presencing as sense, in sense, for sense, sensibly. This being-*the*-world that is world being-standing-presencing as sense, in sense, and for sense, sensibly, is *ex-sisting*: *ex- -sistere*.¹⁰⁵³

To exist is to *ex-sist*. *To ex-sist* speaks of and from *existere*. *Ex-* says out, out of, away.¹⁰⁵⁴ *-Sistere* says to stand, to cause to stand, to set up, to erect, to take a standing position, to present, to place.¹⁰⁵⁵ *To exist* is to *ex-sist*: to stand out, to stand out into or to stand out among. The world, as *the* world, *ex-sists*. What is the same: This being-*the*-world that is world being-standing-presencing as sense, in sense, for sense, sensibly, is *epí-* (ἐπί-) *-histēmi* (ἵστημι) (whence speaks *epistēmē* [ἐπιστήμη]).¹⁰⁵⁶ *Epí-* says on, upon, by.¹⁰⁵⁷ *-Histēmi* says to stand, to stand up, to make stand, to cause to stand, to set up, to place.¹⁰⁵⁸ The world, as *the* world, *epí-stātai* (ἐπίστανται); the world, as *the* world, *ex-sists*. *To exist*, I must note, is not necessarily the same as *to begin* or *to come into being*: ὑπάρχω (*hupárkhō*).¹⁰⁵⁹ Likewise, I must not mistake *to exist* with *to presence*. *To presence* speaks of *prae-* *-sum*.¹⁰⁶⁰ *Prae-* says in front of, before.¹⁰⁶¹ -

Sum says *to be*.¹⁰⁶² *To presence* is not, at least not exhaustively, *to exist*.¹⁰⁶³ What ex-sists, however, *presences standing up into* or *presences standing out into*. To *stand* *presencing*, or to *set up into* *presencing*, or to make *stand* *presencing*, or to make *stand into* *presencing*, or to make *stand as* *presencing*: these all speak of and from that which *to exist* speaks. The metaphysics and, thereof, the epistemological metaphysical of *presencing* are not necessarily the metaphysics or the epistemological metaphysics of *existing*. The metaphysics and, thereof, the epistemological metaphysics of *standing* present, or *standing* *presencing*, or *making stand* *presencing*, and so on, *are* the metaphysics and, thereof, the epistemological metaphysics of *existing*, and vice versa. *To presence* does not entail that who or what presences *also* stand, be-standing, or be made to stand. *To presence* does not entail that who or what presences *also exists*. Who or what *exists* necessarily presences as *standing-presencing*.

Being is not necessarily existing. *To be* is not necessarily *to exist*. *Existing* is, however, and must *be* insofar as existing *is* existing at all. *Existing* is *is-ing*, and thus *being*; or, at least, *existing* is (to be) of and from *is-ing*, is (to be) of and from *being*. *To exist*, likewise, is *to be*, or, at least, to be of and from the being of *to be*. What or who must first *be* if what or who is to *stand* or *to be made to stand*, or *to ex-sist* or *made to ex-sist*. That which—i.e. what or who—is not even so much as *is not* does not and cannot *stand*, *be made to stand*, *be set up*, etc.

That which εἶμι (eimi) does not necessarily, if at all, ἵστημι (hístēmi)! That which εἶμι (eimi) is not necessarily, if at all, ἵστημι (hístēmi)! That which *is* is not necessarily *standing* or *made to stand*. That which *is* does not necessarily, if at all, *stand*. That which *stands*, however, already *is*, as *ising* must be if being, or ising, is to stand at all as an *it* is, much less an *it* exists.

Eimi is *to be*. Εἶναι (eínai) is the present infinitive of *eimi*, *to be*. Thus, for example: *to tí ên eínai* (τὸ τί ἦν εἶναι).¹⁰⁶⁴ For Aristotle, *eínai* was *a* being among beings, *a* being being what *it* is among *beings* being what *they* are. For Aristotle, *eínai* was *a* being, and this being was an *it*. For Aristotle, *eínai* is already understood metaphysically to be only insofar as *it*—this or that being—is *hístēmi*: *stands out*, *stands up*, *stands upon* or *on*. Similarly to *eínai*, ὄν (ón) is the present participle of *eimi*, *to be*. That which *stands* must already *be*. That which *is* does not necessarily *stand*, if that which *is* stands at all. That which *ex-sists* must already *be*. That which *is* does not necessarily *ex-sist*, if that which *is*, or if being-is-is-being stands at all. Being-is-is-being is *tautologíā* (ταυτολογία). *Tautologíā*—being-is-is-being—is not an *it* or an *itself*; nor is being-is-is-being a *here* or a *there*, or a *then*, a *now*, or a *to come*. These are *dimensions* of *standing-presencing itself* and, thus, of all that *stands-presencing*; that is, of *ex-sisting* and all that *ex-sists*. Standing out into clearing of the sphere-ing, that is, of *tautologíā*, however, is not the sphere-ing in the spherical circling of being-is-is-being. Standing out, or existing, is not *tautologíā*. Standing out, or existing, however, is only insofar as it, as an *it* at all, is given to exist by (though not causally), of, and from *tautologíā* to stand out into the opening-open of the *tautologíā*, and thus to standing-presencing *here* and *there*, *then*, *now*, and a finite *to come*.

Οὐσίā (ousiā) speaks of and from *eimi*. Οὔσα (oúsa) speaks singularly of ὄν (ón). -ῖā (-iā) names ὄν in its coming to standing-presencing, as it comes to stand-presencing, or in its *being-coming* to stand-presencing, to *ex-sist*: *ousiā*. *Ousiā* is being-coming to *stand-presencing*, or *being-giving to being-coming to stand-presencing*, to *ex-sisting*. This or that *ousiā* is this or that being-ex-sisting, *here* or *there* and *then*, *now*, and a finite *to come*. *Ousiā* is *where* and *when* meta-physics begins; that is to say, *ousiā* is *where* and *when* meta-physics is being-giving to thinking through the call of human-beings-ex-sisting to heed in thinking essential questions as these questions come to stand-presencing *themselves* before us. *Ousiā*—as the naming of the being-coming to standing-presencing, that is, to being-ex-sisting—names the grounding-ground

of *hístēmi* itself (*being-standing*) and all the unique, particular *hístēmi* that come to standing-presencing *here* and *there, then, now*, and for a finite *to come*. *Ousíā*, however, is not and is not exhausted by *hístēmi* itself or all the unique, particular beings-standing-presencing themselves that are given to be-come to standing-presencing, i.e. to ex-sisting in the world—that is, *here* and *there, then, now*, and for a finite *to come*.

If *ousíā* is not, and cannot be *hístēmi*, then *ousíā* is and can only be υπό- (*ypó-*) -στημι (*-hístēmi*): υπό-στημι (*ypó-hístēmi*). That which is υπό-στημι, and thus that which is *ousíā*, is that which ὑπόκειμαι (*hupókeimai*). What is *under* standing itself is not the *standing itself*. What is under is-being under what and who stands-presencing, as well as the standing-presencing itself. That which is under all standing itself and, thus, any particular standing-presencing, is not an *it*, and thus not an *itself*. That which is under is-being under *sendingly giving* being to being-coming to standing-presencing, or what is the same, to being-coming to being-ex-sisting. *Ousíā, ypó-hístēmi, hupókeimai* are and thus say and speak namingly the same.

Human-being-ex-sisting *hears* but must learn to *listen*; *sees* but must learn to *look* what is being said and, thus, givingly opened. Only then can we, human-beings-ex-sisting, give human voice to what speakingly gives to speaking and sayingly gives to saying—not only to be heard or seen, but to be listened to and looked at practically, thinkingly, and thus attentively and intentionally with and in awareness—or rather, with and in and as being-humanly-ex-sisting-aware, the way of being-human in the world.

Ypó-hístēmi is not, and cannot be, ἐπί- (*épi-*) -hístēmi (*ístēmi*). *Ousíā* and *ypó-hístēmi* are identical, and thus one. This is to say, they are the one *is-coming* that is coming to standing-presencing, though not the standing-presencing itself nor any particular being-standing-presencing, that is, being-ex-sisting. *Ousíā* is *ypó-hístēmi*, and vice versa. *Ousíā* does not equal *ypó-hístēmi*, nor vice versa. *Ousíā = ypó-hístēmi* is not *ousíā* is *ypó-hístēmi*. *Ousíā = ypó-hístēmi* is a qualifying of *ousíā* is *ypó-hístēmi* that arises from the mistaken understanding of *ousíā* or *ypó-hístēmi* as one or another being-standing-presencing, or being-ex-sisting, here or there, then, now, or for a finite *to come*. I might write that *ousíā = ypó-hístēmi* is lawfully given to metaphysical and, thereof, epistemological metaphysical understanding in advance. *A is A* is not *A = A*. If *A* is to equal *A* (*A = A*), *A* already is. *To equal* qualifies and conditions, or limits, *A* in *A*'s ex-sisting. *A equals A* is, thus, cor-rectly a property of *A*, and thus of *A is A*. But *A = A* is not, and cannot be, and does not exhaust, *A is A*. *Identity* is only metaphysically *to equal*: *A = A*. For being-is-is-being, and for *ousíā* is *ypó-hístēmi*, and vice versa, identity is the same, and what or who is the same is identical. To be the same, or to be identical, is not to be equal. To be equal only follows, and can only follow, though never necessarily, being-is-is-being and the being-giving-to-standing-presencing that is *ousíā* or *ypó-hístēmi*. Equality is, and can only be, a property of that which *already* is being-ex-sisting; that is, a property of that which already has come to being-ex-sisting and already is standing-presencing in the world. Logic—as I am lawfully given metaphysically and, thereof, epistemologically metaphysically, and thus entirely technically, to sensibly understand in advance what logic *is*—logic only *reasons* and *reckons* with *to equal* and *to be unequal*, or *A = A*. Epistemologically metaphysically, the reasoning and reckoning of *A = A* has already evaluated and valued *A*—whatever or whoever *A is*—as a value standing by for functional deployment. The *problem of how* to solve and functionally explain the unconceivable mystery behind this equating opens the way lawfully, or metaphysically, to metaphysical epistemology, or simply and commonsensically, epistemology.

Ousíā is *ypó-hístēmi*, and vice versa. *Ousíā* speaks namingly, and only thus does *ousíā* name the same as *substance*; *ousíā* is *substantia*. What does *substantia* say? What does

substantia speak *namingly*? *Substantia* speaks of that which is *under* standing itself. *Substantia* is neither standing-presencing itself nor any particular standing-presencing. *Substantia* is what is under *standing-presencing itself* and all particular *standings-in-presence*. *Sub-* says *under*. - *Stantia* speaks of *stō* (*stāre*): *to stand, to stand up, to stand upright, to remain standing*. What is *substantia* is not what or who *stands* itself, but rather is that which is *under* the standing itself. I have written the same of *Ousiā*, *ypó-hístēmi*, and *hupókeimai*.

That which is *substantia* is *not* matter. Matter, any and all matter, is not and cannot be substance or substantive: *substantia*. Matter is, and can only be, *suprastantia*: supstance, supstantive. Matter, as matter, *ex-sists*. Matter, as matter, stands presencingly. Matter, as matter, is *ex-sisting*. Matter, as matter, is standing-presencing. Matter is that which comes to be standing presencing as what is standing presencing. Matter is that which is given of, from, and by (though never actively, i.e. causally) the source: *māter*. That which is *māter* bears and gives to birth *māteria*. *Māter* bears and gives to being-standing-presencing, that is, to *ex-sisting* that which, in *ex-sisting*, is *māteria*. *Māter* is *substantia*. *Māteria*—borne and given to being-*ex-sisting*, that is, to being-standing-presencing—is *suprastantia*. *Māter* is but is not *ex-sisting*. *Māter* is *substantia*, under that which *māter* bears and to which *māter* gives to birth up into *standing-presencing*. *Māteria* is that which is born and, given to birth into the world, given to standing-presencing, or *ex-sisting*. *Māteria* *ex-sists*. *Māteria* is *standing-presencing*. *Māteria* stands-presencing in the world. *Māteria*: it is an *it*, universally and eternally, here and there, then, now, and for a finite *to come*.

I have written that the cosmos, and what or who is in the cosmos, have been given to birth, or born, into sense, as sense and sensibility, and for sense, and are therefore sensible *and* sensing. World given to birth as *the* world, and thus cosmos given to birth as *the* cosmos, comes to be-standing-presencing in sense, as sense, and for sense as *the* world or, what is the same, as *the* cosmos: (γινόμενον [gignómenon], of γίγνομαι [gígnomai]).¹⁰⁶⁵ World, in being given to birth, comes to be-standing-presencing sensibly—in sense, as sense, of sense, and for sense, sensibly—as *the* world, and as *the* world, as the cosmos. *The* world is born, or given birth to, and as being-born, the world is given to be-standing-presencing *sensibly*—in sense, as sense, and for sense, sensibly—as *the* world, that is, as the cosmos. World passes into being-sensible as *the* world; world *comes-to-be-standing-presencing* sensibly. The world is the same as the cosmos, and vice versa.

As with the cosmos itself, I may write similarly for all what and who are in the cosmos: All that—all *what* and *who*—which is visible and tangible in the cosmos is bodily.¹⁰⁶⁶ All that which is visible, tangible, and bodily is *sensible*—that is, is in sense, as sense, and for sense, sensibly.¹⁰⁶⁷ All what and who that are in the cosmos have been given to be in the cosmos in sense, as sense, to sense, and for sense, and are therefore sensible-in-the-world and, thus, sensibly-in-the-world, i.e. sensibly-in-the-cosmos. As being-sensible-in-the-cosmos, they are sensibly in the cosmos. All what and who that are sensibly in the cosmos were given to birth, or born (γινόμενον [gignómenon], of γίγνομαι) into being-in-the-cosmos-sensibly.¹⁰⁶⁸ That is, what and who are in the cosmos were given birth to—or, in other words, they were given to birth into sensibly being-in-the-cosmos. To be given birth to, or to be given to birth, is to be given to be born, or more simply, to be born.¹⁰⁶⁹ To be born into sensibly-being-in-the-cosmos is to be given to sensibly-be-in-the-cosmos, that is, to be given to sensibly-*being*-in-the-cosmos. All what- and who-are-in-the-cosmos first *come-to-standing-presencing* sensibly in the cosmos. The giving to birth and the the being-standing-presencing that is sensibly-in-the-cosmos is a *gift* that is being-giving. As with the cosmos to which and, thus, into which all what and who in the

cosmos are given-to-be sensibly—i.e. given-to-be in sense, as sense, to sense, and for sense—all what and who, in being given to birth, come to be-standing-presencing sensibly in the cosmos as all what and all who are both sensible and sensibly in the cosmos. They (including, however, *we*) are born, or given birth to, and as being-born, they (including *we*) are given to be-standing-presencing *sensibly* in the world, i.e. in the cosmos. All what- and who are in the cosmos first must be given to birth and thus *come* to the *standing-presencing* of sensibly being in the cosmos as what they (*we*) *are* as *standing-presencing in the cosmos*.

As being-given to the world, or what is the same, as being-given to birth, what is coming is *be-coming* beings being-sensibly in the cosmos. Again, as they (including *we*) stand-presencing sensibly in the cosmos, they (including *we*) *are in the cosmos sensibly*. As beings being-in-the-cosmos sensibly, or beings-standing-presencing sensibly in the world, they (including *we*) are *ex-sisting: ex- -sistere*.¹⁰⁷⁰ All what and who that are beings-standing-presencing sensibly in the cosmos *ex-sist*. I may write the same as follows: All what and who that are beings-standing-presencing as sense, in sense, to sense, and for sense, sensibly, are *epí- (ἐπί-) -hístēmi* (ἴστημι) (whence speaks epistēmē [ἐπιστήμη]).¹⁰⁷¹ As all what and who come-to-be sensibly and, therefrom, are beings-standing-presencing sensibly in the world, these beings *épi-stāntai* (ἐπίστανται).

Of the cosmos: The cosmos is being-giving to being-ex-sisting, i.e. to coming to standing presencing, to coming to ex-sist. *To be given birth to is to be born to being* as being-given-to-birth and therefrom born into being-sensible-as-the-cosmos. To be given to being-born, or to be given birth to, is to cross over into being sensible, to come to standing-presencing as standing-presencing, to pass over into being sensible, to pass through the threshold of sensibility into being-sensible-as-the-cosmos, to journey over the threshold of sensibility into being-sensible-as-the-cosmos and, thus, to accomplish sensibly-coming-to-be, sensibly-coming-to-being, or—what is the same—be-coming-sensible. *Passing* into sensibility *as* what sense and sensibility is *coming* into sensibility as what sense and sensibility are in the opening-clearing being (givingly) given. I write of the cosmos' given-to-birth into being-sensible. This being-sensibly γίγνομαι (*gígnomai*) is, thus, a *prássein* (or *práttein*)(πράσσειν).¹⁰⁷²

I may write the same for all what and who that are beings being-sensibly-in-the-cosmos: To be given birth to—that is, to be born to being sensibly as being-given-to-birth into being-sensible-in-the-cosmos or, as the same, sensibly-being-*in-the-cosmos*—is to cross over into being sensible; to pass over into being sensible; to pass through the threshold of the cosmos and, thus, through the threshold of sense and sensibility into being sensible *in* the cosmos; to journey over the threshold of the cosmos and, thus, over the threshold of sense and sensibility, into being sensible and, therefrom, accomplishing sensibly-coming-to-being, sensibly-coming-to-be, or becoming-sensible *in the cosmos*. To be given and, therefrom, born to be-coming-sensible-in-the-cosmos, is the same as being given to be being-sensibly in the cosmos. As with the cosmos, this being-sensibly γίγνομαι (*gígnomai*) of all what and who that, therefrom, come-to-be sensibly and, thus, are-sensibly-in-the-cosmos is a *prássein* (or *práttein*)(πράσσειν).¹⁰⁷³

To give—to give *genuinely*, and as *genuine*, to give essentially, truthfully, and lawfully—is to give of and from oneself to another without either *ultimate* or *end* concern for the subsequently ensuing consequences *for oneself*. *To give*, then, is not and cannot be *to act*. *To give* is not and cannot be *poiesis* efficiently caused and carried out, or realized, by *poiētés*. *To give* at all, as *giving*, is *to give* in its genuine and thus essential, truthful sense. The most genuine gift, the highest gift, the most excellent gift, the gift given in the most genuine sense of *to give*, is *to faithfully, lovingly, truthfully, and lawfully give oneself to* without ultimate or end regard and

without ultimate or end concern for the subsequently ensuing consequences *for oneself*. While such giving and its gift may be holy, *to give* most genuinely is not in essence a *sacrifice*, for the giving of oneself is itself not willing or of the will, not action or activity, not force, and not caused, efficiently or otherwise. While it may be holy and sacred, *to give* is not *to sacrifice*, as in *I, you, he, she, it, we, or they* (all of which are sensible beings-in-the-cosmos) *sacrifice: sacrificāre*, speaking of *sacer- -ficus (of facere): I, you, he, she, it, we, or they make holy, produce holy, efficiently cause (to be) holy*.¹⁰⁷⁴

Genuine speaks of and from *gignere*, the Latin cognate of *gígnomai*, both of which speak to us from Proto-Indo European **genhi-*: *to be born or to be given to birth and, therefrom, to be born*.¹⁰⁷⁵ That which bears (though that which bears is not necessarily a what or a who, that is, not necessarily *a* being, a he, a she, an it, or a they) *and* that which is borne are both: *given to birth*. The former is given *to bear* the giving-gift until the giving-gift is given to birth, or born, to and into being-standing-presencing as what or who it is sensibly in the cosmos; the latter, the gift itself, is also given, first to the bearer *to be borne* with faith, love, concern, truth, and law, and, therefrom, *to be born* to be the being-standing-presencing that it is sensibly in the cosmos.¹⁰⁷⁶ For human-being, the faithful and lawful responsibilities of those human-beings that are together given to bear the giving-gift of another human-being—a human-being itself given to birth sensibly into the world—are given to and borne by both the female and the male human-beings, that is, by both the father and the mother. Each, however, the father and the mother, practically receives, bears, and responds, and in so doing *gives*, in ways and manners that are, at times, similar or the same. Yet there are divergences and essential differences in responsibility. The female's responsibility as mother to bear the giving-gift *itself*, as given to her care and concern as a mother, and to carry it within and nourish it of her own body, giving herself—sometimes entirely and against her will into death—to the human-being given to come to be in the cosmos: this is a humanly incomparable giving-gift of the female, that is, of the mother, an incomparable *prassein*. It is not, nor can it be, a *mere* act, or a feat of will power, or a mere succession of causes, efficient or otherwise, or a mere evolutionary human technical achievement and, thereof, the human production of a human product. The giving and the given-gift themselves are not, nor can they be, a *poieîn*, of *poieîn*, from *poieîn*, for *poieîn*, or causally by *poieîn*. They are not, nor can they be, the result of a mother's (and also, though differently, of a father's) willful, active, and forceful—that is, efficiently causative—conception and laboring towards a goal as means to actualize-by-achievement this goal—the goal, in this case, of reproducing and efficiently causatively thereby having a human child. To understand being-giving-to-birth in advance as such—e.g. to understand it physio-chemically, biologically, sociologically, or anthropologically, that is, scientifically-epistemologically metaphysically—is conventional and commonsensically understood-in-advance but never- and nonetheless ultimately arrogant, belittling, irreverent, and thankless. The mother's *praxis* is all the more incomparable and exceptional if she gives herself to the gift of the human-being given to come-to-be-sensibly-in-the-world, if she gives herself genuinely, without will to will, without action and activity, without force, without causing. This giving, her giving (and, though very differently, the father's giving, too), if understood and undertaken in the genuine sense of *to give* that is necessarily without will or will power to will; without acting, action, or activity; without force; and without causation—this giving, then, is and is of, with, and from her (or his) human-being-sensibly-in-the-world movements and motions (*kínēsis* [κίνησις], *not* to be mistakenly understood in advance as *cause*, much less as *efficient cause*, i.e. as *act*, or the effect of action, i.e., of efficient causation) and her (or his) rest in still, quiet, and completed fulfillment (*télos*

[τέλος], *not* to be mistakenly understood in advance as *cause* or *act*, much less final or end-goal cause, or the effect of causation).

What are this *kínēsis* and *télos* for human-being sensibly-being-in-world? *Kínēsis*, or the *kínēsis* of which I write presently, and *télos* are neither active nor passive; they are neither agential or by an agent nor passive or upon a patient. An agent is an agent—that is, an agent is agential and thereby an agent at all—necessarily only insofar as the agent *acts*, causes *action*, and thus causes *activity*. *Agent*, as with *to act*, speaks to us essentially of, from, and for *agere*. Such ultimately and essentially efficiently causal distinctions—*poieîn* and *páskhein*, *poiētikē* and *pathētikós*, *poiēsis* and *páthē* or *páthos*, *agere* and *patior*, active and passive, agent and patient—are inessential and, at best, secondary and peripheral to what I think and write here.¹⁰⁷⁷ *Kínēsis*, or the *kínēsis* of which I write presently, and *télos* are love and, thereof, human love, human friendship, human faith, human concern, human attentiveness and intent, and human lawful and truthful thinking-in-responsibility through the struggles and joys of such receiving and giving to birth a human-being given to be-coming-sensible in-the-world. As the *kínēsis* of which I write presently and *télos* are love and, thereof, human love, human friendship, human faith, human concern, human attentiveness and intent, and human lawful and truthful thinking-in-responsibility, they are, likewise and no less essentially, *of, from, by* (though never causally), and *for* love and, thereof, human love; friendship and freedom, thereof, human friendship and freedom; human faith; human concern; human attention, attentiveness, and intent; law and truth, and, thereof and therefrom and therefor, and human lawful and truthful thinking-in-responsibility upon the way opened by the call of essential questions. They are, in other words, for *giving*. The practice (or *praxis*) of giving, in its genuine human sense, a human-being-to-birth is, in excellence, an end in and of itself. Such *giving* is a *prassein* that is among the highest of human-being's practices of being-human-sensibly-in-the-world, of humanly living-in-the-world, of humanly ex-sisting-in-the-world, with, among, and *for* each other. There is no, nor can there be, any abstracting or being-abstracted here, scientific-epistemological or otherwise.¹⁰⁷⁸

I recall that the necessarily *proper* (belonging to) and *prior* disposition of and for *prássein* is *phronein*. *Phronein*, again, is to think, or to take heed in thinking, to think with one's heart and mind; and, of and from these: to understand, to be wise, and to be prudent.¹⁰⁷⁹ *Phronein* is of and from *phrēn* (φρήν).¹⁰⁸⁰ *Phrēn* is the faculty and capacity for *phronein*: heart, mind, soul, spirit, and even sense; the seat of the heart, of the mind, of the soul or spirit.¹⁰⁸¹ *Phrēn* is given, i.e. is gifted, to, and thus is in, but is not *of* or *from* the cosmos. Likewise, *phrēn* is given to (i.e. gifted to), and thus is in human-being ex-sisting-sensibly in the world, but is not *of* or *from* or caused *by* human-ex-sisting-sensibly in the world. Human-being ex-sisting-sensibly is *of* and *with phrēn*. In a way, human-being ex-sisting-sensibly in the world is given to *phrēn*, as *phrēn* is given to and for human-being ex-sisting-sensibly in the world, ex-sisting in sense faithfully, and ex-sisting in sense responsibly and responsively to the lawful call of essential questions. It is only in this way—human-being ex-sisting-sensibly-in-the-cosmos given to *phrēn*—that I find *phrēn* to be proper to (to belong to) human-ex-sisting-sensibly in the cosmos, i.e. in the world.

I must not only hear, but *listen in thinking* to the closeness of that which *phronein* speaks with the speaking of *noeîn* (νοεῖν). *Noeîn* is to think, to be thoughtful, to be mindful, to receive or to take in mindfully or thoughtfully, to direct one's thinking or one's mind toward that to be thought or considered; to selectively bring together, gather, or collect into the light of thinking, of mind, of heart, and, thereby, to understand (*inter- -legō*, whence speaks intelligence).¹⁰⁸² *Nóos* is the faculty and capacity for *noeîn*: mind, heart, intellect, direction in thinking, direction

in *inter- -legō*.¹⁰⁸³ *Nóos*, like *phrén*, is given, i.e. is gifted to, and thus is in, but is not *of* or *from* the cosmos. Likewise, *nóos* is given to (i.e. gifted to), and thus is in human-being ex-sisting-sensibly in the world, but is not *of* or *from* or caused *by* human-ex-sisting-sensibly in the world. Human-being ex-sisting-sensibly is *of* and *with* *nóos*. In a way, human-being-ex-sisting-sensibly in the world is given to *nóos*, as *nóos* is given to and for human-being-ex-sisting-sensibly in the world, ex-sisting in sense faithfully, and ex-sisting in sense (in the world) responsibly and responsively to the lawful call of essential questions. It is only in this way—human-being ex-sisting-sensibly in the cosmos given to *nóos*—that I find *nóos* to be proper to (to belong to) human-ex-sisting-sensibly in the cosmos, i.e. in the world.

Nóos, I recall from *Timaeus*, is the faculty and capacity given to human-being ex-sisting-in-the-world for *noeîn*.¹⁰⁸⁴ *Phrén*, with *nóos*, is the gift given continually to human-being ex-sisting-sensibly the world of the faculty and the capacity for *phronein*.¹⁰⁸⁵ Plato came to understand, though perhaps only fleetingly, their essential togetherness.¹⁰⁸⁶

For human-being ex-sisting-sensibly-in-the-world, *noeîn* and *phronein* are *the* essential movements, or *kínēsis* (κίνησις), of human-being sendingly given (or gifted) to birth into worldly sense and sensible-ex-sisting in the cosmos (i.e. in the world) and to death as de-sisting from worldly sense and sensibly-ex-sisting in the cosmos. For human-being, and thus for human-being ex-sisting-sensibly-in-the-cosmos, what is essential is that I *be*, not that I *live* (or ex-sist livingly). The latter is, and as and in being, is sendingly given, or gifted, to the latter. As the essential movements of human-being ex-sisting-sensibly-in-the-cosmos, *noeîn* and *phronein* are not, and cannot be, *to act*, acts, action, or activity; *noeîn* and *phronein* are not, and cannot be, *poieîn* and *páskhein*; *noeîn* and *phronein* are not, therefore, and cannot be, *to cause*, cause, causation, or effect, nor *to affect*, affect, affection, or affectation, regardless of whether such causes are ultimately and essentially efficient or not. Therefore, *noeîn* and *phronein* are not, and cannot be, force or force forcing, much less of the faculty and capacity—or *power*—*to force*, *to be force*, or *to be forced*. If *noeîn* and *phronein* are not, and cannot be, force, force forcing, *to force*, *to be force*, or *to be force*, *noeîn* and *phronein* are not, and cannot be, will, will to will, will to power to will, or will willing itself to power to will itself further, endlessly, autonomously, (self-) sovereignly without end. Since the seminal, faithful, and lawfully responsible and responsive thinking and writing of Plato and Aristotle, *noeîn* and *phronein* have withdrawn from the willful grasping and forceful commandeering-in-order-to actualize-by-achievement of philosophy and that *is* philosophy. Modern and contemporary science-epistemology does not, and cannot, fathom—much less evaluate, examine, experiment upon, calculate, validate, certify, and scientifically-epistemologically explain—*noeîn* and *phronein*. *Noeîn* and *phronein* are the two essential movement, or kinetics (the *kínēsis*), gifted to human-being ex-sisting-sensibly in the cosmos (i.e. in the world).]). *Noeîn* and *phronein* are the kinetics of loving and befriending, and thus of love and friendship. As gifted to human-being ex-sisting-sensibly in the cosmos, human-ex-sisting-sensibly is always already *with* and *toward* *noeîn* and *phronein*. *Noeîn* and *phronein* are, first and foremost, the kinetics—that is, the movement or motion—of love itself loving, most simply yet primordially and essentially (*agápē* [ἄγάπη]). Love-loving of is-being, and of all being therefrom and thereof, of love-loving from being, towards being, for being, and by (though not and never causally), primordially, ultimately, and essentially, or *agápē*, *noeîn* and *phronein* rest and return to be-being, motion comes to its end, its completion, its perfection—essential motion, in other words, or *noeîn* and *phronein*, arrives home and, fulfilled, *is* truthful rest in unconditional and exceptionless belonging, essentially and peacefully. *Noeîn* and *phronein* are the kinetics of lawfully and responsively in

discipline lovingly opening-to-receive the gift of one's-human-being being given in and by (though not causally) love into the opening-to-standing-presencing of birth, of birth, that is, into sense and sensibility of one's human-being as ex-sisting-sensibly in the world (*agápē*; *philautous* [φιλαυτος] or *philautia* [φιλαυτία], or will-less lovingly self-befriending, will-less self-loving self-friendship) as well as the birth of human-beings coming to ex-sist-sensibly and ex-sisting-presently-sensibly in the world (*storgē* [στοργή] or *philīā* [φιλία]). *Noeîn* and *phronein* are the kinetics of lovingly receiving and opening to the occidenting threshold of ex-sistence, and thus of sense, sensibility, and life, that is dying and, thus, death (*agápē*; *philautia*; *storgē*; *philīā*). *Noeîn* and *phronein* are the kinetics of lovingly welcoming and safe-keeping who and what are given to birth, are borne, and come to beingly-ex-sists in the world, in the cosmos (*agápē*; *storgē*); likewise, they are the kinetics of lovingly governing and guiding in lawful and responsible discipline and safe-keeping human-being ex-sisting-sensibly in the world (*agápē*; *storgē*). *Noeîn* and *phronein* are the kinetics of lovingly, and thus lawfully and responsibly, letting-be without leaving-be or willing-to-be, whether one's child, one's friend, or one's spouse (*agápē*; and respectively, *storgē*; *philīā*; and together with *philīā*, *érōs* [ἔρωσ]). *Noeîn* and *phronein* are the kinetics of being-befriending from and of loving and, thereby (though not causally) of being-friend in open-presencing-with, lawfully, and responsibly toward another human-being ex-sisting-sensibly in the world (*agápē*; *philīā*). *Nóos* and *phrén* are, as I have written, the essential faculties and capacities—that is, the essential powers (*dúnamis* [δύναμις], or dynamics)—of human-being ex-sisting-sensibly in the cosmos (i.e. in the world).

Nóos and *phrén* are the primordial and essential dynamics—gifted in the continual, unconditional, and exceptionless giving to human-being sendinly given to the world—for the *noeîn* and *phronein* of and by (though not causally) human-being coming-to-be-ex-sistingly and, therefrom, ex-sisting-sensibly in the world.

When human-being ex-sisting-sensibly in the world *does* genuinely and essentially for love and friendship, *in* love and friendship, *from* love and friendship, *by* love and friendship, human-being ex-sisting-sensibly in the world *practices*: *prássein*. *Noeîn* and *phronein*—the kinetics of loving, befriending, and being-friend, and thus of human love and friendship—practically orient and dispose human-being ex-sisting-sensibly in the world. *Prássein*, or to *practice*, is the kinetics of humanly doing for, in, from out of, and by the love and friendship of human-being ex-sisting in the world.

Human-being given to birth into sense and sensibility, i.e. human-being given to birth into the cosmos and, subsequently, to ex-sist-sensibly in the world, is human-being given to ex-sisting-sensibly, to standing-presencing-sensibly, i.e. to sense, sensibility, and sensitivity: visibility, tangibility, audibility, and olfaction as well as to look, to touch and to feel, to listen to, and to smell attentively. There is no thing or being in the cosmos, including the cosmos, that is ab-abstract or ab-abstracted from—and thereby alien to, separate from, alienated from, or separated from—being given to ex-sisting-sensibly. To ex-sist-sensibly is to ex-sist-bodily. What is given to birth into and thus what is given to ex-sist in the cosmos is given into sense and sensibility. That which ex-sists sensibly in sense stands-presencing bodily. There is no ab-straction between what is essential to human-being being-gifted into ex-sisting-sensibly and human-being ex-sisting-sensibly in the world.¹⁰⁸⁷ There is no possibility for ab-straction of *noeîn*, *phronein*, and *prássein* from human-being being-gifted into and, subsequently, ex-sisting-sensibly-bodily in the world. It is only human-being-subject and “human-being-subject” that understands-in-advance, carried into and through the world as openingly-revealed in the lawful sway of epistemological metaphysics and relativistic metaphysics, the chasm of ab-straction between what is essential of

and for human-being ex-sisting-sensibly in the cosmos (i.e. in the world) and human-being ex-sisting-sensibly-bodily in the world. The former and the latter are, simply and only, the one and the same.

Here, I may come—if I am brought in thinking along the way openly revealed by (though not causally) essential questions, toward essential questions—to sense the understanding-in-advance to which I have belonged in sense and sensibility, and, therefrom, to quietly, respectfully, lovingly, and will-lessly let it be as and what it is, *for*:

Nóos and *phrḗn*, as the gift to human-being ex-sisting-sensibly of the dynamics for *noeîn* and *phronein*, and thereof, therefrom, and thereby, for *prássein*, *nóos* and *phrḗn*, and thus *praxis*, are not even so much as opposed to force, to the power to force, to the will-power to force, to forceful strength, forceful ability, forceful skill (*technē*), forceful and forced change, forceful and forced (i.e. causing and caused, efficiently or otherwise) motion and movement (e.g. action, acts, or activity such as perception, conception, comprehending, positing, valuation, evaluation, validation, certification, scientific-epistemological explanation).

Modern and contemporary science-epistemology is, and *as* modern and contemporary science-epistemology, can *only* be—in the fullest sense the word—oblivious to *noeîn* and *phronein*, to their dynamics, and thus to what is essential to and from human-being gifted to birth and ex-sisting-sensibly in the cosmos (i.e. in the world) and, indeed, oblivious to what is essential to the cosmos itself as it is given continually, unconditionally, and exceptionlessly, as gift, to birth and to ex-sists-sensibly as the cosmos, i.e. as the world that gathers and shelters human-being given to birth into ex-sistence, into standing-presencing-bodily, into and upon a lawfully revealed way of sense through world as *the* world.

Modern and contemporary science-epistemology is, and *as* modern and contemporary science-epistemology, can *only* be—in the fullest sense the word—oblivious to truthful love and, thus, to truthful friendship. For all epistemological metaphysics and relativistic metaphysics—and thus for all science-epistemology, necessarily, exhaustively, essentially, and ultimately—what is and all that can be or become, whatsoever, absolutely, is force. Insofar as there is is-being at all, it is the making, the product, the yield of force forcing; insofar as there is world as *the* world at all—such as the scientific-epistemological universe (i.e. what is commonly spoken of as the universe)—world is the efficient effect, the product, the construct, the constitution, the formation, the aggregation, *et al.*, of force forcing and being forced. What is, is force, force forcing, and force-“being”-forced. Function and value, valuation, and evaluation (which includes all scientifically-epistemologically valuative and evaluative calculation, whether quantitative, qualitative, or otherwise) are themselves, and are at all only, functions and values of force forcing in order *to act* more forcefully, more efficiently, more effectively, more willfully. Function and value are, endlessly without end, means to perpetually, willfully positing and actualizing-by-achievement further goals. Function, value, *to value*, and *to evaluate* is force, force-forcing and force-“being”-forced, and thereof, therefrom, therefore, and thereby (*causally*, and only *causally*), will willing to will itself further, endlessly. *This is to act*, and *to act* in order to endlessly without end empower will *to act* autonomously and sovereignly. This, I understand-in-advance, is freedom: the choice *to act*, the choice of *why* to act, and the choice of *how* to act, auto-nomously and (self-) sove-reignly. In each and all cases of freedom so understood, all choices are our choices, willfully posited as choices and decided upon in empowered autonomy and (self-) sovereignty. In the perpetual, total, and absolute efficiently effective motion, movement, and putting into motion (or total mobilization) of relativity (including, of course, but by no means limited to formal scientific-epistemological relativity, whether as given voice to

through Einstein or [later] Wittgenstein, for example), even the willfully sovereign, willfully autonomous choice to act is merely, if at all, “the choice” “to act.” If what is is force, and force forcing and being forced by force; and essentially, originally, primordially, absolutely, totally, and ultimately thereof, therefrom, therefore, and efficiently causally thereby, will willing to will endlessly further and will willing to act with endlessly greater empowerment, efficiency, and effectivity, acting effectively as empowered acts, actions, and activity: then is-being-being-is and is-being-love-loving, or simply, being-love-loving and *to love*, and thus befriending, being-friend, and friendship not merely impossible—they are not even so much as *is not*.

6.6 What is to sense as a human-being-ex-sisting in the world?

An essential question claimed Augustine: Are the beings in the world—through which Augustine looks to and, in so looking, is able to see God’s invisible truth—*of* God or *by* God? Are these beings in the world *of* God’s practical (of *prâxis*) acts or acting (*not*, therefore, of *actions* or *activity* as I understand these in advance today) and thus *ends in themselves* as *of* God’s act or acting, that is, of God’s work, which is and can only be an end in itself? Or, are these beings in the world *by* God’s willful and efficiently causal creating, or making, or producing (by his *actions* and *activity* as I understand these in advance today) and thus the means to God’s end-goal, or themselves goals utilizable and useful as strategical or random means towards another willed end-goal or evolutionary development? Are these worldly *creatures* and *things* by God’s efficiently causal poietic labor? As such, these beings would not be, and could not be, ends in themselves, but would necessarily be, and would remain insofar as they are, means to one willfully posited end-goal or another—that is, as products of God’s efficient causation, they would be and remain means of *God’s will*, and thus of *God’s will to will itself further*.

R. S. Pine-Coffin translates Augustine’s sentence as follows: “Then, at last, *I caught sight of your invisible nature, as it is known through your creatures.*”¹⁰⁸⁸ God, and God’s truth as God and thus truth as truth, cannot be seen: *invisible*. That which can be seen is visible. To be visible is to be seeable, and vice versa. What is to see? *To see* speaks in five general senses.

First, *to see* is merely to sense with the eyes. For human-being-living in the world, as perhaps with other sentient beings in the world, *to see* in this first sense is neither *to act* nor *an act*. Nor is *to see* in this first sense caused. Human-being-living in the world is a sentient being: human-being-sensing. Insofar as human-being-living is in the world, human-being-living is sensing. Human-being-living in the world is human-being-seeing. *To see* in this first sense is not *passive*. *Passivity* is the opposite of *activity*, and thus in essence of the same as *activity*, *action*, and *to act*. *To be passive* is the opposite of *to act*. *To see*, in this first sense, is to be-sensing. Again, insofar as a sentient being is, a sentient being is being-sensing. A sentient being with eyes, insofar as this being is, is being-seeing. In this sense, human-being-living senses world as *the world* which has been openingly-revealed by law. Human-being-living is gathered and oriented in the world in advance upon a way of sense in and through the world. Human-being-living is human-being-seeing in the world. I recall that *to see* as this bare *to sense with the eyes* is not at all the same as *to perceive* or *perception*, which speaks of *to act with intent* and, perhaps uniquely for human-being-living, with *willful* intent: *per- -cappio*.¹⁰⁸⁹

For human-being-living in the world, it is this sense of *to see* that corresponds with *to understand-in-advance*. Human-being is given to an understanding-in-advance that gathers, shelters, and orients human-being-living in the world. Human-being-living in the world belongs

to this understanding-in-advance, and not vice versa. Human-being senses, or sees, *the* world as world is openingly-revealed by the law as *the* world—as *what*, and *why*, and *how* the world is as it is at all. Insofar as human-being is in the world, human-being-living sees in advance in this sense. Human-being does not need *to act*, *to do*, *to make*, *produce*, or *to realize* any other act, action, or activity *to see* in this basic sense. In this sense, human-being, in being given to the world as human-being-living, *is given to seeing (or sensing)* in world as seeing sensibly in *the* world. Nothing in particular has to been seen at all, much less looked at, as human-being-living sees in this first sense—and human-being-living is always already, as human-being-existing in the world, seeing in this sense. Human-being, in this first sense, does not have to be made to see or brought to see—human-being-existing (or living) in the world is human-being-seeing.

The second broad sense of *to see* speaks in the sense of *to look*. *To look* requires *to see* in the first sense. Yet *to see* in the sense of *to look* requires turning to face, meeting (*not* encountering or countering), and attending—however briefly—to what or who one meets. *To see* is this second sense, as *to look*, is not unique to human-being-living in the world, but is common among many sentient beings. Yet for human-being-living in the world, *to see* in this second sense could be either *practical* or *poietic*. If the human-being-living turns toward, meets, and attends for the sake of *this* meeting and *this* attending, as well as for *who* or *what* is met and attended to, then *to look* is of *praxis*, and is thus practical. If practical, *to see* in the sense of *to look* is not an action, reaction, interaction, or intra-action at all. If *to look* is *an act*, and therefore causative and a means some end-goal, explicit or implicit, *to look* is of *poiesis*. If of *poiesis*, *to look* is an action, reaction, interaction, or intra-action. *To see* in this second sense, then, is *to see* in the first sense and, then, to gather one's awareness and attention together and to focus these in meeting that which *has* or *is coming to presence before one*, and perhaps *for one*, and draws one's awareness, attention, and (in the case of human-being-living, at least) intention to it. The worldly uniqueness of human-being-living's remarkable capacity *to judge* is born with (though not entirely, if at all, *of* or *from*), then follows and develops with this second and subsequent senses of human-being-living's *to see* (as well as *to hear*, *et al.*).

The third broad sense of *to see* requires both the first and the second senses. In this third sense, *to see* is not only *to look*, whether practical or poietic. *To see* in this third sense is *to take into one's sustained concern* and *to hold in one's care*. *To see* in this third sense is commend what or who is seen to one's own concern, care, keeping, or guardianship. *To see* in this third sense, whether *practical* or *poietic*, is a sense of *to see* unique to human-being-living in the world. As with the second sense of *to see*, if human-being-living sees in the second and third sense as an end in itself, for the sake of the seeing or for what or who is seen, *to see* is practical. If human-being-living sees as a means to some end-goal, whether explicit or implicit, *to see* in this third sense *poietic*. As *poietic*, *to see* in this third sense is an act, an action, and activity. This third sense speaks when we say, for example, *I will see to it that x*. Or, *see that x* (e.g. *is cared for, is safe, is protected, is asleep, is warm, is not hungry, is finished, is done, is delivered, is made, is taken care of, is produced, is enacted, is constructed, is created, etc.*). These examples mix *practical* and *poietic* instances of *to see* in this third sense. Again, *to see* in this third sense requires *to see* (i) as basic, indiscriminate sensing of a sentient being and (ii) as heeding, meeting, and attending to—i.e. looking to or looking at—with awareness. If human-being-living sees in these first two senses, human-being-living can, and as human-being-living *constantly* does see in this third sense: *to take into one's care, to hold in one's concern, or to respond to, to take responsibility for in corresponding with what or who is seen*.

In the fourth broad sense, *to see* requires the first, second, and third senses, but goes beyond them. *To see* in the fourth sense, like the third, is unique to human-being-living in the world. *To see* in this sense requires the human-being-living to *decide*, with awareness, to undertake or to fulfill *the seeing*. In this fourth sense, *to see* is *prâxis*. It is not, and cannot be, *poiesis*. It is not, and cannot be, *to act*, an act, an action, a reaction, or activity. The fourth sense of *to see* is *to lovingly, faithfully, and lawfully, in friendship, behold and, in beholding, to understand*. This understanding is not a mere measure, evaluation, certification, or validation of accuracy. Nor is it a pre-requisite or criterium of correctness or of what is, therefore, to be judged true or false. *To see*, as *to understand lovingly, faithfully, and lawfully, in friendship*, is not and cannot be a means to some end-goal, explicit or implicit. *To see* in the sense of *to understand* requires truthfully corresponding with, in obligation, the lawful receiving of what or who is truthfully given or truthfully gives. This *to see* is genuine to this truthful corresponding and lawful receiving. It receives the *gift* of what or who shows itself to be seen, and in turn beholds what shows itself in presence before the seer. It lovingly, faithfully, and lawfully, in friendly meeting, *beholds* this what or who. Yet, *to see* in this fourth sense is more. One *sees* in this sense and this *seeing* is, in and of itself, sufficient, abounding-abundance, giving. Again, *to see* in this sense belongs, in essence, and is thus proper to *prâxis*. *To see* in this fourth sense is, exhaustively and exclusively, an end in and of itself, for the sake of *who* or *what* is seen. *To see*, then, is to give oneself in love, faith, friendship to who or what the see beholds. *To see* in this fourth sense is neither *for* itself or causally *by* itself. *To see* in this sense, human-being must be practically gathered, oriented, sheltered, and disposed in world as *the* world and, of *prâxis*, to abide faithfully and lawfully in and as *phrônēsis*, its essential disposition in beginning and end. *To see* in this fourth sense is both, simultaneously, *to behold most lawfully* in safe keeping and friendship and *to be held* in the presence of that which presences. *To see* in this sense is not to will or to be willed. *To see* in this fourth sense cannot be willed. *To see* in this fourth sense cannot be willful. *To see* in this fourth sense is not *by, of, or for* the will, much less *upon over against* the will. *To see* as *to understand* both requires and necessitates the full awareness, the full attention, the intention, the courage (of the heart, thinkingly), and the faithful trust of human-being *to practice* in such a way that the practice is an end in itself, where the end unexceptionally and unconditionally, lawfully and lovingly gathers, holds, shelters, protects, guides, and governs the practice itself, as well as what or who is seen, as well again as and the human-being-living that practices, from beginning to end.

Finally, *to see* speaks in a fifth broad sense of *to comprehend, to grasp, to conceive, to conceptualize, to apprehend, to lay hold of, to catch, and even to explain*. As with the fourth sense, the first, second, and third senses of *to see* are required for this fifth sense to be possible. *To see* in this fifth sense likewise requires the awareness, concern, care, attention, and intention of the human-being-living who sees. Human-being-living, with awareness, attention, and intention, must decide achieve the seeing of this fifth sense. *To see* in the fifth sense, like the third and the fourth, is unique to human-being-living in the world. In this fifth sense, *to see* is *poiesis*. It is not, and cannot be, *prâxis*. *To see* in this sense is an act, action, or activity. *To see* in this fifth sense is a means to some end-goal, explicit or implicit, even if this is just to comprehend or conceive further. *To see* in this sense is a cause or is caused. This sense of *to see* can be utilized as a measure, an evaluation, a certification, or a validation of accuracy. It can be a pre-requisite or criterium of correctness or of what is, therefore, to be judged true or false. *To see* in this fifth sense can involve valuation, evaluation, experimentation, examination, certification, validation, and verification. In any case, *to see* in this fifth sense is a means to

some further end-goal. As such, *to see* in this fifth sense is willful. With the achievement and, thereby, the actualization of the end-goal, the will to will is likewise achieved and actualized. The will is empowered to will itself again, further.

As with *to see*, *to hear* speaks to us in five senses, each parallel to those senses of *to see*. The third, fourth, and fifth senses of *to hear* are unique to human-being-living in the world. The third sense of *to hear* can be either *practical* or *poietic*. The fourth sense of *to hear* requires the first, second, and third senses for its possibility. The fourth sense is and can only be *practical*, of *prâxis*. *To hear*, as a practice, is not an act, action, reaction, interaction, intra-action, or activity. *To hear* is an end in itself, and can be for the sake of what or who is heard. In the fifth sense, *to hear* likewise requires the first, second, and third senses the word speaks. In this sense, *to hear* is *poietic*, belonging to *poiesis*. *To hear* in this fifth sense is a means to some further end-goal, explicit or implicit. *To hear* in this sense is an act, an action, a reaction, an interaction, an intra-action, and activity. *To hear* in this sense is caused and, therefore, a cause.

Let us turn once more to the question: What does R. S. Pine-Coffin understand Augustine to have written? He writes: “Then, at last, *I caught sight of your invisible nature, as it is known through your creatures.*” *To catch sight* is *to conceive*, *to grasp*, *to conceptualize*, *to comprehend*, *to apprehend*, *to seize*. *To catch sight of* requires the act of *to catch*, and *to grasp*, *to seize*. Augustine *acts* and, in so acting, *seizes* God’s invisible nature, however fleetingly. What does Augustine seize? Augustine seizes God’s *nature*, not God’s truth. As a nature, God is a being—perhaps the highest being, the *summum ens*, but a being nonetheless. Lastly, God’s nature is known through God’s creatures. If God’s nature is knowable through his creatures, God’s nature is to create. The being God is the creator. God is the efficient creator of all creatures. God’s nature, then, is efficiently causative. God, the being, is the efficient cause of his creatures. God acts, then, and God *is* to act. A a being, this is God’s nature. The being that is God is the cause of all other beings. Hence, these beings are God’s creatures. God, then, is the efficient *causa prima*. God is *actus purus* and *actus primus*. As *actus purus* and *actus primus*, God is efficient *causa prima* and *primum movens*. If the being God, the creator, is the first cause of creation and, thereby, all of God’s creatures, then God is the primordial, original efficient cause. If God is efficient cause, then God is force. The being God is force forcing. God’s acts, as acts, are God’s will willing. God is *the* will to will. Will to will is will to power to will. God is *the* will to power to will. Yet, this entails that God is primordial, original *lack*. The being God is, in God’s self (recall, God is a being, so God is a self), is insufficient. God is primordial, original *insufficiency*. All of God’s creatures, then, are lacking and are, in and of themselves, insufficient. God and God’s creation is not and cannot be an end in itself. God and God’s creation is, and can only be, an means to posit, will, and actualize by achievement end-goals.

It follows that God is force forcing. It follows that to be and the very possibility of being is to be force forcing. All that was, is, and will be, and can be, is force forcing. Love, much less than a mere impossibility, is not even so much as *is not: nihil*. God is not, and cannot be love. God does not, and cannot love. God is not, and cannot be one. God is not and cannot be unity. (God can, however, efficiently causally *unify*: efficiently causally, i.e. force, i.e. make individual creatures stand together.) God is not, and cannot be forgiving. God is not, and cannot be merciful. God is force forcing and, necessarily, being forced. God is will willing to will further, more powerfully. God is, and can only be, a perpetual means to end-goals of which God God’s self is a perpetual means to be constantly overcome by God’s self in order to will and, thereby, to act.

To catch sight of God, as Augustine does in Pine-Coffin's understanding, is merely a reaction, and thus an efficient effect of God's primordial creative efficient creation. Augustine, as a creature of God, likewise is merely an efficient effect of God's creation. As such, Augustine is, and can only be, a means to an end-goal: God's endless unending end-goals. Both God God's self and all of God's creatures, including Augustine, are efficient means to God's will to will, and thus to God's endless unending end-goal. This is God's teleology and, efficiently causally thereby, the teleology of God's creatures—including Augustine and human beings.

It is from R. S. Pine-Coffin's translation of Augustine's *Confessions* that two preeminent scholars quote at length *in order to exemplify and evidence* their arguments for what theory is. Their goal is to delegitimize and turn readers away from theory and the preeminence of the theoretical in our concepts of human-being in favor of the existential embodied phenomena of the lived experience of human-being-existing (i.e. living) in the world.¹⁰⁹⁰ Let us listen, at some length:

Paul does not try, like John and later theologians, to appropriate philosophical concepts in order to articulate Jesus' message. Theologians like St. Augustine and St. Thomas Aquinas do their best to explain Jesus' teachings by using Greek concepts. But, as we shall see, the Greek concepts only get in the way. [...] We must now follow the way in which the emphasis on inner experience rather than overt action combines with Greek philosophy... [...] For more than a thousand years [Christian thinkers] tried valiantly to grasp the Judeo-Christian *religious experience* using a variety of Greek *philosophical concepts*. This turns out to have been a bad idea. ¶ This mismatch should have been obvious. [...] The Greek discovery of detached, disembodied access to timeless, universal truth contradicts the Hebrew commitment to [...] God. One side [Greek] sees as essential our ability to think; the other [Hebrew] our sense of the sacred. For the monotheistic inheritors of this conflicted tradition, it was very natural to try to bring its two most fundamental ways of life together. [...] This mood [of agape love which Jesus exemplified] could not be captured in universal principles that one can discern by philosophical contemplations. [This mood, or way of being attuned to what is important] is precisely the part of Christianity that resists conceptualization in Greek philosophical terms. ¶ But that did not stop St. Augustine. Augustine was the first important Christian to interpret Christianity using the categories of Greek philosophy. And yet. At the same time Augustine is craving the sensuous, embodied presence of God, he cannot resist the Platonic pull to the abstract, disembodied, and theoretical account of the universe...Augustine pulls off this marvelous trick by treating sensuous, bodily experiences entirely in terms of inner states they bring about.¹⁰⁹¹

What is theory? Theory is Platonic. As Platonic, theory is what I understand Plato to have understood when he spoke of theory. Theory is abstract. Theory is disembodied. Theory comes to us from Greek philosophy—perhaps most saliently, from Plato and Aristotle. Theory, then, is what I understand Plato and Aristotle to have understood when they spoke or wrote of theory. Kelly and Dreyfus understand-in-advance Plato and Aristotle to have been philosophers. What is philosopher? The authors do not tell us, but I can infer to some extent. Philosophy is conceptual. Philosophers deal with concepts. These concepts “get in the way” of human-being-living-in-the-world's bodily experience, such as, for example, religious experience. Concepts are used by philosophers for explanation. In other words, concepts are a means with which

philosophers explain. Philosophy, then, is explaining by means of philosophical concepts. Concepts are philosopher's means to the goal of explanations. Concepts are tools, instruments utilized in order to explain. Explanations are made or produced or constituted using these tools. Philosophical explanations, then, are products of philosophers' making and crafting with their tools, concepts. Philosophers are craftsmen and women. Philosophers are skilled in using their tools, concepts, in order to produce explanations. These explanations are, therefore, *conceptual*: they are built by philosophers out of concepts. What, then, are concepts? Concepts are both *the tools* and *the explanation*. Concepts are both the means and the end-goal: a conceptual explanation, that is, an explanation made with *and* made out of *concepts*. A philosophical explanation, then, like a concept, is a means to further goals. A philosophical explanation is a tool, an instrument for achieving and actualizing further—for example—philosophical concepts and explanations. Philosophy is craft. Philosophy is art. Philosophers are skilled craftsmen and women. Philosophers are skilled artists. Philosophers craft both their tools and the products, or explanations, which they make with these tools. These products, explanations, are themselves comprised of tools and are themselves merely tools and instruments to posit and achieve further goals, such as further concepts and explanations. Theory, then, is not a *discovery* of Plato and other ancient Greek philosophers. Theory is *their invention, their novel creation, their novel product, their novel construct*. Theory is the efficient effect of their activities; that is, of their *poiesis*. Theory is their novel, efficiently effective and essentially technical means to willfully posit and achieve further goals.

But I understand philosophers to be thinkers and reasoners. What, then, might the authors understand *to think* and *to reason* to be? *To think* and *to reason* would be fashion concepts, or tools. Then, with these tools, to fashion explanations. These explanations are produced by tools and are comprised of tools, or concepts. These explanations, in turn, are tools for further conceptualizing, conceiving, and explaining. *To think* and *to reason* are to fashion, to make, to produce, to craft, to make present, to bring forth concepts and explanations, to bring out concepts and explanations, to apply and utilize concepts and explanations in order to fashion, produce, and then apply and utilize once more concepts and explanations.

All of this activity *is* activity. All of this activity is *efficiently* causal. Thus, for example, “for the monotheistic [Christian and Jewish] inheritors of this conflicted tradition, it was very natural to try to bring its two most fundamental ways of life together.” In this case, thinkers, that is, philosophers, efficiently causally *unify*: they make, they efficiently cause, two to stand together as one. This one is not, and cannot be, a unity. This one is an efficiently caused *unification*. This unification is, then, an efficient effect of the cause and, likewise, its own efficient cause. Philosophers force two to stand together as one in order to achieve and thereby to efficiently actualize some further goal or goals—even if this goal is to conceive, grasp, explain, and thereby effectively disseminate Jesus's teachings.

6.7 What is human-being-subject?

A human-being-subject is a human-being-existing given lawfully to come to exist in the world in belonging to the opening way of sense and sensibility of epistemological metaphysics and epistemological metaphysical understandings in advance. Epistemologically metaphysically, human-being-existing understands itself, and all human-beings-existing absolutely, to one or another be human-being-subject. Subjectivity names that which is of the human-being-subject. Subjectivity includes human-being-subject's consciousness (understood-in-advance, simply, as

consciousness, exhaustively and exclusively), human-being-subject's experience (understood-in-advance, simply, as experience), and the subjective and objective phenomenological structures and processes thereof or thereby. Objectivity is that which of the object. The object is object at all, and thus objectivity is objectivity at all, upon over against the subject-grounding-ground. The object is object, and objectivity is objectivity, and thus world is the world of subjects and objects, only insofar as objects and the totality of objectivity are efficiently caused to be and thus are grounded upon over against human-being-subject. Epistemologically metaphysically, consciousness is human-being-subject's consciousness of itself as human-being-subject, and thereby, efficiently consequently, consciousness of objects and of objectivity. Human-being-subject (i.e., the subject-grounding-ground), and thus subjectivity, is *me cogito sum*, or *cogito me cogitare*, or *ego cogito sum*. *Cogito me cogitare, et al.*, in turn, is and is possible as, not only "I will," but "I will that I will this," where *this* is, before *all* else, "willing this will to will further." *Me cogito sum*, or *ego cogito sum*, is *volo me velle* (willing I will myself, or I will myself willing), or *me velle sum* (I will myself [I] am), or *me velle esse* (I will myself to be), or *ego volo sum* (I will [I] am).¹⁰⁹² *I* is will, and will is will at all only insofar as it first will's will to will. *I am* is will willing to will. Human-being-subject is will willing itself to will: *Volo me velle, ergo cogito me cogitare, ergo ego sum*. Human-being-subject is *both, identically* and therefore simultaneously, and thus impossibly and contradictorily, efficient *causa sui* and efficient *causa prima* and *primum movens*. *Causa sui*: Will willing efficiently wills itself *as will* to will itself willing to will, etc. *Causa prima* and *primum movens*: *Ego cogito*, or the cogitation (*ego*) cogitating (*sum*), in origin efficiently *puts in motion, moves, throws, drives, impels, or conducts* out and up upon and over against itself all—*what* and *who*—that is known and can be known: objects and the totality of objectivity upon its grounding-ground: the human-being-subject in the to-be-laboriously-achieved totality of subjectivity.¹⁰⁹³ (Here I come into essential proximity with *what* epistemological metaphysical, or scientific-epistemological, research *is*.) *What* and *who* is known or can be known is *what* or *who* exists or can exist at all. Human-being-subject, as *volo me velle, ergo cogito me cogitare, ergo ego sum*, is the grounding-ground. The grounding-ground of *what* or *who*? The grounding-ground of *I am* and of what and who I can know. What and who exists is what I know exists. What or who can or could exist is what I can or could know to exist. *Volo me velle, ergo cogito me cogitare, ergo ego sum*: This is what Descartes was capable of articulating, with extraordinary sensitivity, regardless of whether he fully understood or was fully aware of what he wrote when he wrote *ego cogito, ergo sum*. He sensed acutely the revealing, coming-to-prevail sway of epistemological metaphysics and its gathering and orienting understanding-in-advance of human-beings as human-being-subjects.¹⁰⁹⁴

Human-being-subject is will willing itself to willfully empower itself to will further. Human-being-subject must simultaneously and endlessly willfully ground itself and secure itself as the ground. Human-being-subject, insofar as human-being-subject is to exist at all, *must* labor, ceaselessly and endlessly, toward this infinitely recurring, endlessly re-posed end-goal, the subject-grounding-ground. By means of this labor, human-being-subject will, in the future, actualize-by-achievement its completed self as fully conscious subject in masterfully fulfilled subjectivity, which includes the complete ordered-to-order order of the totality of objects in objectivity. As I shall come to understand, the willful achievement of this end-goal, towards which all epistemological metaphysical progress aims, is human-being-subject's heaven and self-sovereign, autonomous, self-empowered salvation. Epistemological metaphysical progress is necessary. Without such progress, human-being-subject does not, and cannot exist. Epistemologically metaphysically, to be is to exist. Human-being-subject's destiny is to will to

empower itself to will in endless, progressive self-overcoming. The willed end-goal is fulfillment of subjectivity, that is, the total securing of the grounding-ground and—in gapless epistemological knowledge—all that is upon over against the grounding-ground: objects in the totality of objectivity. Human-being-subject's fate, therefore, is labor: to labor efficiently, unceasingly, and endlessly—with untold epistemological metaphysical productivity, innovation, solutions, and progress—from one goal to the next. *To labor*, and in labor, *to make, to produce, to construct, to create, to formulate*, etc. precludes *to act*. *Praxis* and its essential disposition, *phrónēsis*, are and can be only insofar as they are, in essence, in origin, and as means to the endless end-goal of human-being-subject, efficient *poiesis* and the techniques of will empowering itself to will, thereby making and re-making, producing and reproducing itself in constant self-overcoming. The grounding-ground, as the efficient grounding of what and who exists or could exist, as the grounding of ground, and as the ground itself, requires incessant, unceasing, endless labor. *Phrónēsis*, insofar as it is at all, is efficiently of and as a means to, *technē*. For human-being-subject, *phrónēsis* is, at most, and *can only be*, an efficiently consequent epiphenomenon, I could say, of the essential disposition of efficient *poiesis*—that is, of *technē*. Human-being as *animal laborans* (with life among the highest values) follows.¹⁰⁹⁵ *Animal laborans* is human-being-subject laboring endlessly as the subject-grounding-ground. Human-being-subjects are laborers and human resources—willing and willingly, but laborers and resources nonetheless. I am evaluable and valuable values, whether inherent value or not. The human-being-subject is, and necessarily must be if it is to exist at all, simultaneously and identically its own object, irremediably upon over against itself. Here again I meet the contradicting-contradiction of epistemological metaphysics. Retirement, for example, as I speak or write of it today—and regardless of whether self-, state-, or otherwise financed—is only one particular, constituent goal for the progress of human-being-subject, one such constituent goal among countless. As another example, freedom from labor—whether by means of technological devices, artificial intelligences, or machines; by means of revolutionary societal, governmental, or political economic fixes; by means of modern or contemporary employment or enslavement of others, be these evaluably human or non-human; and so on—is merely another such constituent goal to be achieved. Such goals are only ever, in essence, means. They are, in their syncretic observable variety, willfully posited end-goals as means for the constantly, endless, and willfully limitless progress toward the achieved completion of human-being-subject's autonomy, sovereignty, and, thereby, self-empowered and self-empowering self-salvation. Human-being-subject's self-salvation entails, obviously and necessarily, the salvation of the objective world.

Me cogito sum, or *ego cogito sum* is, at all, only possible as *volo me velle*, or *me velle sum*, or *me velle esse*, or *ego volo sum*. Each of these is epistemologically metaphysically the same. *Me velle cogito* (I will myself [I] think, or I will myself thinking) is, and can only be, subsequent to and efficiently consequent from *volo me velle*.¹⁰⁹⁶ *Me cogito sum* is, and can only be, subsequent to and efficiently consequent from *me velle esse* (I will myself to be) or *ego volo (ergo) sum* (I will [therefore] I am). Human-being-subject is, again, the subject-grounding-ground, and vice versa. Human-being-subject is and can be only insofar as, efficiently putting itself into efficiently causative motion, it efficiently causes itself—that is, forces itself as force itself—to rise from out of itself while identically, simultaneously providing itself the ground (i.e. grounding) upon which to exist and being this ground of itself in subjectivity as the subject, as the grounding-ground of objectivity, and as the object of itself. Realism and anti-realism, rationalism and empiricism, materialism and idealism, in any of their nearly innumerable forms and gradations, follow epistemologically—which is to write, essentially.

Human-being-subject is, and can only be, insofar as human-being-subject labors in the endlessly progressive labor of epistemological distrust and modern critical skepticism, including distrust of itself and its existence as the grounding-ground of itself, the subject, and of the totality of the objective in its full objectivity. (Once again, I come into essential proximity with what epistemological metaphysical, that is, scientific-epistemological research *is* and *produces*—*not does*, of *to do* as *act*.) The human-being-subject begins from the annihilation all trust and of all faith, of all essential and unconditional belonging and its possibility, of all community and its possibility, of all dwelling in the world and its possibility, and most essentially of all world whatsoever—except for that which the subject-grounding-ground efficiently puts into motion, sets up, evaluates, certifies, validates, and thereby verifies upon and over against itself. Human-being-subject begins from *nihil*. Yet human-being-subject is not *nihil*, nor wills *nihil*, for human-being-subject *wills* itself, wills the totality of objectivity, and wills the truth as *the* truth itself, that is, the perfect ordered-to-order order of correctness, of true over against false.¹⁰⁹⁷ *All* else is, insofar as it is or can be at all, subsequent to and efficiently consequent from the willing to will that is the grounding-ground subject-human-being. As such, all that is, insofar as it is or can be at all, is represented by and upon the subject-grounding-ground—the totality of the objective and the totality of the subjective must be represented to the subject, by the subject, for the subject, upon over against the subject-grounding-ground. I, subject, efficiently set up not only all objects as objects, all objectivity in the totality of the objective, but most essentially I order the ordering-to-order of the objective upon the subjective in the progressive, endless mastery of crystalline epistemological logic. I will to fill all gaps in our epistemological knowledge—this is knowledge of ourselves as the subjected object of ourselves as well as of the totality of objectivity, including, for example, human research subjects. In other words: I will to power to will. Science-epistemology, as what it is, born of epistemologically metaphysics and sensible only upon this lawful path of revelation and opening of world as *the* world, is efficiently effected by the human-being-subject of both the subjective and the objective. Science-epistemology is unthinkable—much less *conceivable* (*con-* -*capere*) and *comprehensible* (*con-* -*prehendō*)—and utterly senseless except as technique in perpetual service to *volo me velle, ego volo sum*—*ergo, cogito me cogitare, ergo ego sum*. Science-epistemology is utterly senseless, that is, except as technical and methodological means to the willfully posited goal of human-being-subject willfully fulfilling itself as its endless end-goal, completely autonomous, entirely sovereign (including self-sovereignty, obviously). This is a fulfilling whose elusive fulfillment requires endless, progressively aggregative labor of efficiently causing and creating, of efficient poiesis, or as I write and say regularly: efficiently, effectively constructing, producing, making, crafting, rendering, formulating, forging, constituting, co-constituting, inventing (e.g. inventing and crafting tools such as epistemological-scientific theories), etc. It is from the primordial, most profound, astoundingly impious (*in-* -*pius*, including emphatically to other human-beings), and absolutely isolating distrust out of which both the necessity and the possibility of epistemology and, thus, of epistemological metaphysical science comes, born of the subject-grounding-ground upon the epistemological metaphysical way of sense as technique at the will of, for the will of human-being-subject: *ego volo sum, ergo ego cogito sum, ergo ego sum*.

Human-being-subject is the grounding-ground. The grounding-ground is given, as a gift, to itself in advance as what and who it is. It is given, as a giving-gift, in essential belonging to the way of sense, the way of revealing and opening of world, the gathering into and sheltering home of world as *the* world openingly-revealed and sensibly laid out (lawfully) before and around human-being by and as epistemological metaphysics. Human-being, and all human-

beings, are caringly brought to and given over to stand in the clearing of being in which world is and can be. World is not *worlds*. All worlds, as *worlds*—all *this* world, *that* world, *their* world, *my* world, or *the* world—are, and can only be, of world. World is not Platonic form or type as understood metaphysically, of which worlds are imperfect reflections or derived differentiations. There is no distance of any sort. I may write, then: The world is of human-beings-subjects. It is *the* world of human-being-subjects. I must attend with utmost care, listening closely, to this *of*. Human-being-subject not only agonistically and skeptically rejects, but is unexceptionally incapable of understanding and fully recognizing, much less acknowledging with pious gratitude, the giving-gift that it is and is from, given as itself to itself—though *not* by of for itself—as what and who it is and can be. Were human-being-subject to do so *fully*, with intent awareness—to *do* as *to act*, not as *to make*, *to cause*, or *to achieve*—human-being-subject would come to its end. *To act* is not necessarily *to will*, or at least is not necessarily *to will* autonomously or sovereignly, though human-being-subject does not and cannot understand this. Epistemologically metaphysically, will to will further reigns as will exhaustively and exclusively. (Relativistically metaphysically, will to will comes to fulness as will to power to will, and will to power to will comes to reign revealingly as will exhaustively and exclusively.) Thus, for human-being-subject, this *of* is unexceptionally and exhaustively understood-in-advance as *of itself*, *by itself*, *for itself*, *in perpetual service to itself and*, *thus, its willed end-goals*. Epistemologically metaphysically, this *of* does not, and cannot, speak of human-being-subject *belonging to*, *proper to*, *given to*, *caringly carried into*, *called forth into*, or *in obligation to* the world and, thus, that from which and of which world is opening-opened and revealing-revealed as the world.

Human-being-subject, as the epistemological metaphysical grounding-ground, is the grounding-ground, exhaustively and exclusively, of what and who—including human-being-subject itself—is and can be in the revealed world, whether in possibility, potentiality, or actuality. The subject-grounding-ground is the subject efficiently willing itself to will to power to will. The subject-grounding-ground is willing itself, itself willing to will further. The human-being-subject, whether individual or collective, evaluates itself, its sovereignty, and its autonomy by measure of empowerment and disempowerment. To empower is to self-empower. Auto-empowerment requires autonomy, and vice versa. For human-being-subject, disempowerment is to be disempowered. To be disempowered is, primordially, in essence, and in end-goal, anathema to human-being-subject. Indeed, disempowerment is an existential threat to human-being-subject, to be overcome at all costs. Epistemologically metaphysically, power is exhaustively and exclusively the measure of the capacity or the faculty to exercise force. Force exercising itself, i.e. forcing, is efficiently effective. Epistemologically metaphysically, power is exhaustively and exclusively the measure of the capacity or the faculty to effectively exercise force. Epistemologically metaphysically, to exercise force is the same as the power to autonomously and sovereignly posit a goal for oneself and move oneself productively and laboriously to efficiently cause this goal to be fulfilled, i.e. to actualize the goal by achievement. This is the same as to will, epistemologically metaphysically understood: the will to will further, and thus will to power to will. Epistemologically metaphysically, power is the measure of the effectivity of force forcing, i.e. of efficiently causing effects. To efficiently cause—whether from inside or outside, whether as action, reaction, interaction, intra-action, or relation—is to force, and vice versa.

If the human-being-subject is to be at all, the human-being-subject not only requires, but *is* and *must be* perpetually, endlessly willfully willing the progressive actualization-by-achievement of itself, by itself, upon itself, for itself, in self-consciousness of one's own

subjective human being as endless means to the end-goal of empowered self-overcoming of itself. Human-being-subject efficiently, incessantly puts itself into total mobilization: the incessant and incessantly productive, efficiently creative activity of action-reaction, interaction, intra-action, relation, inter- and intra-relation, and so on. *Action* is efficient *poiesis*. Action is forcing and being forced. The subjective self-overcoming of human-being-subject itself, by itself, for itself, as itself both the means and endless end-goals, is only perpetual means to further willful overcoming of the self-conscious subject by itself. Progress is towards the end-goal of the completed subject as such: total self-empowerment, total (self-) sovereignty, total autonomy, whether individual, collective, or both. All end is and can only be the perpetuum mobile of end-goals to be achieved, overcome, and posited anew. The end is the goal of constant, endlessly progressive subjective self-overcoming, achieved in and by equally endless labor. This entails, necessarily, masterfully ordering to order, and thereby evaluating, certifying, validating, and thereby verifying human-being-subject's self by and upon over against itself, i.e. the grounding-ground *as* the grounding-ground. To be, then, is to be totally, perpetually (subjectively self-) mobilized and at war: to be is to will to power to will human-being-subject's incessant and endless self-overcoming.

To be epistemologically metaphysically is *to exist*. To exist, at all, in possibility, potentiality, or actuality, is to be perpetually efficiently mobilized, correctly, by, for, and upon over against the subject-grounding-ground, including the human-being-subject grounding-ground made to stand objectively upon over against itself in constant self-valuation, self-evaluation, self-certification, self-validation, and thereby, self-verification as being at all: *volo me velle; ergo, cogito me cogitare; ergo ego sum*. Human-being-subject both, identically and simultaneously, totally mobilizes itself as total mobilization, and *is* totally mobilized as the efficient effect of efficiently causal total mobilization. This contradicting-contradiction is *not* epistemologically metaphysically contradictory. It *is*, in its varied ways of presencing contradictorily, epistemological metaphysics and human-being-subject. Epistemologically metaphysically, *all* else follows subsequently and efficiently consequently.

To be human-being-subject, the subject-grounding-ground, is to perpetually *cogitate* (*cum- -agere*, or *cum- -agitō*, of proto-Italic *agō*) and *convince* (*cum- -vincere*).¹⁰⁹⁸ Human-being-subject efficiently mobilizes itself for perpetual war of willing to power to will. Willing to power to will is willing to empower to will. Willing to empower to will is, necessarily, willing to willful, constant self-overcoming. Human-being-subject's endless, incessant, and laborious constant overcoming in order to will to empower itself to will further is waring endlessly, incessantly, and laboriously upon over against itself, as itself. This is total mobilization: the human-being-subject, as the subject-grounding-ground, is itself totally efficiently forced (or efficiently caused) and, identically and simultaneously, totally efficiently forces (efficiently causes, creates, or makes) itself and, therefore necessarily, the objective in the totality of its objectivity, as means to actualize-by-achievement the end-goal of masterfully achieving the complete autonomy and (self-) sovereignty of its subjectivity and, necessarily, epistemologically ordering-to-order correctly the totality of objectivity—valuated, evaluated, certified, validated, and thereby re-presented in verified existence (actual, potential, or possible—to be is to exist) upon over against human-being-subject. As the perpetual efficiently causative motion of incessant willing, cogitating, and convincing, the human-being-subject is efficient force forcing itself, driving itself progressively yet unendingly, and thus perpetually into efficient motion, into the endlessly efficient and productive activity of efficient causation: *cum agere, cum vincere*.

Human-being-subject is, thus, *ego (cum) agitō sum* and *ego (cum) vincō sum*.¹⁰⁹⁹ This is the same as *volo me velle; ergo, cogito me cogitare; ergo ego sum*.

All subjectivity, all subjective experience, all subjective lived experience, and all objective experience of human-being-subject's objectified affects, dispositions, feelings, intuitions, reasons, intentions, desires, and emotions are necessarily subsequent to and efficiently consequent upon human-being-subject's subjective total *cum- agitō, cum- - vincere*. To be, then, for example, is to exist, and to exist is to be *the* struggle for existence. To exist subjectivity is to be totally mobilized *and* totally mobilizing for ever-evolving war: *the* struggle for existence. To exist objectively is to be totally mobilized for ever-evolving total war: *the* struggle for existence.¹¹⁰⁰ The struggle for existence is, for human-being-subject, the will to live *in order to* will further. To live is to will to empower oneself to will further, and thereby, and only thereby, to actualize-by-achievement the epistemological metaphysical life (I commonly write and say, for example, "biological" or "ecological" life) necessary to live another day as human-being-subject existing in the world. Epistemological metaphysical will to will further, and thus human-being-subject, is *both*, identically and simultaneously, efficiently totally mobilized and the efficient totally mobilizing total mobilizer. Epistemologically metaphysically, to will is to efficiently, incessantly, laboriously, and endlessly mobilize the will (i.e. oneself, or the human-being-subject) to will further, more powerfully, more efficiently, and more effectively with ever greater autonomy and sovereignty (including, of course, subjective self-sovereignty).

For human-being-subject, the will to live is the will to will further, and thus is the will to effectively empower the will power to will. Epistemologically metaphysically, for living beings to be-living, i.e. to live, is to exist. Those human-being-subjects who have written or spoken, whether famously or not, of living beings' being (i.e. existing) only insofar as they struggle for existence, as they *are* this struggle for existence, and as they are—necessarily identically and simultaneously—the products of this struggle for existence, write or speak merely commonsensically. They write or speak commonsensically however monumental a scientific-epistemological contribution their writing or saying so may have been to epistemological metaphysical or relativistic metaphysical science-epistemology. The more monumental and enduring their scientific-epistemological contribution, the more epistemologically (or relativistically) metaphysically commonsensical it must be—the more directly and sensitively articulated from out of the essence of the understanding to which these articulators are (as am I with them) given and carried in advance as human-being-subjects in the world. Such human-being-subjects, with extraordinary sensitivity and metaphysical reason, achieved articulating more clearly and (epistemo-) logically than most any human-being-subject hitherto the latent commonsense of epistemological (or relativistic) metaphysics. Once articulated with such sensitive human brilliance, what the write or say progressively achieves the obviousness of its overwhelming (which is *not* to write *instant*, or *spontaneous*, or even *complete* or *total*) epistemological (or relativistic) metaphysical sensibility. It comes to be evermore explicitly and overwhelmingly sensical in its overarching sway. It comes to be convincingly obvious to most everyone—i.e. to every human-being-subject—from and as given by the understanding in advance that carries human-being-subject into and through world *as* human-being-subject in *the* world.

6.8 What is truth?

This is a sacred question that is incomprehensible and disorienting to my human-being-existing sensitives, of which I am unendingly thankful, but which I can only sense are limited and finite beyond my capacity to sense or understand. But I do begin to respond. I begin by responding to the question: What does truth epistemologically metaphysically reveal truth to be? What does human-being-subject understand truth to be?

Truth is not an “it” or an “itself.” Truth is not *a* being. I can only write of truth as truth, not as “it” or “itself.” Truth claims human-being, calling human-being to thinkingly respond to the essential questions truth sends before us. Truth of epistemological metaphysics is the lawful unconcealing, destining, and giving by its sending of epistemological metaphysics to openingly reveal world as the world, lawfully laying out in world, as the world, its gathering and sheltering epistemological metaphysical paths of sense.¹¹⁰¹ Truth, as unconcealing, destining, and giving truth, gives truth in sending truth epistemologically metaphysically. Truth so given is epistemological metaphysics itself. Truth as truth unconceals truth epistemologically metaphysically is, then, human-being-subject itself. Truth unconceals, destinies, and gives truth epistemologically metaphysically as human-being-subject and thus as the epistemological metaphysical contradicting-contradiction. Truth is the epistemological-metaphysical grounding-ground. Truth unconcealing, destining, and givingly sending itself epistemologically metaphysically is the epistemological metaphysical grounding-ground: human-being-subject. To be clear: as truth unconceals truth, destinies truth, and sends truth to world epistemologically metaphysically, *truth is truth*. Epistemologically metaphysically, truth is *not* “truth,” much less truths or “truths.” What is true—that is, what is epistemo-logically correct—is not merely “true.” It *is* true. It is *the* truth—the verified correct being-ex-sisted efficiently causally by human-being-subject, already re-presented certainly upon over against human-being-subject, by means of human-being-subject’s valuation, evaluation, certification, validation, and epistemological ordering-to-order. Epistemologically metaphysically given, human-being-subject is not “human-being-subject.” Epistemologically metaphysically, the world is not “the world.” Language is not “language,” or language-games (always necessarily “language games”), or a biologically evolved linguistic toolbox or agonistically strategic army of metaphors. Epistemological metaphysical God is not “God.” An epistemological metaphysical object is not an “object.” And so on. Truth—as truth unconceals, destinies, and givingly sends truth epistemologically metaphysically—is *as* epistemological metaphysics, *as* human-being-subject, as, therefore, being the subjective grounding-ground that objectifies itself upon over against itself, the grounding-ground technically dispositioned in advance, as the efficiently causative force-full maker, producer, creator and thus discloser of the verified object in the totality of objectivity (efficient *poiesis*).

But why is truth unconcealing truth *as* epistemological metaphysics? Truth—in giving truth to world and thereby opening-revealing world as *the* world simultaneously withdraws from disclosure into concealment. Truth keeps truth conceals from *its* own discloser to beings as well as from disclosure by beings. In truth giving, opening, and revealing world as the world openingly-revealed epistemologically metaphysically, truth discloses, orients and disposes human-being as human-being-subject. Human-being-subject is the efficiently causally disclosing being-grounding-ground of the totality of objectivity and, thereby, of subjectivity, the technician of efficient *poiesis*. Nevertheless, truth, in giving truth to world as the world, truth conceals truth, hiding truth’s essence. As truthful giving and lawful opening-revealing of world

as the world, and as the giving, disclosing, and orienting of human-being in the opened-revealed world as human-being-subject, epistemological metaphysics is simultaneously *both* the *ψευδος* (*pseudos*) of truth, as truth concealing truth while given and showing truthfully epistemologically metaphysically; *and* whence truth gives, destinies, sends, opens, and reveals. But as such truth is in no way *false*.¹¹⁰² In other words, he epistemologically metaphysically truthful revealing-opening of world as *the* world of, by, and for human-being-subject, upon over against human-being-subject, simultaneously conceals *what* truth is and from whence truth comes in truth's giving truth openingly to world as *the* world gathering and sheltering human-being upon lawfully laid ways of sense.¹¹⁰³ Truth gives truth, as truth, but in giving, sending, and thereby showing truth, truth also conceals truth, not fully disclosing the essence of truth. Yet, the epistemologically metaphysically true world is not *false*. It is not an *error*. Human-being-subject is neither false nor an error. Human-being-subject only, stumbles, totters, and perhaps—felling itself—falls down, and thereby passes into falsity as false, insofar as human-being-subject arrogantly, will-fully, and definitively encounters only itself, ceasing finally to heed as useless to itself, to its goals, to its productivity, to its efficiency, its to efficacy, to its knowledge, to its freedom, and to its progress—much less to humanly *act*, i.e. to listen to and to look at—the questions that claim human-being and call human-being-subject forth thinkingly into and always caringly, lovingly upon their opening-revealing ways. Yes, human-being-subject is true, i.e. is human-being-subject. Human-being-subject slides into falsity insofar as human-being-subject unceasingly, endlessly nullifies itself willingly, forcefully, powerfully, in constant laborious and highly productive self-overcoming: *nihil*—“human-being-subject.” Human-being-subject wills to power to will the efficient causative surmounting, overthrowing, and thereby overcoming of truth's concealing of truth as truth simultaneously gives truth to world. Human-being-subject wills to force truth to disclose, to unconceal truth subserviently, obediently, totally and absolutely, in order for human-being-subject to will-fully empower itself further as master in absolute autonomy and absolute sovereignty, that is, as law itself—no longer merely epistemological metaphysical law.

Epistemological metaphysical science-epistemology is the *technē* for this laborious, violent, warring, essentially force-full commanding, surmounting and overcoming, and by these means objectifying by further methodical means of valuation, evaluation, certification, validation, correcting and thereby epistemo-logically verifying (epistemo-logically ordering human-being-subject's correctly-corrected re-presentations-to-order). In constantly overcoming and overseeing itself, human-being-subject must labor endlessly unendingly to constantly overcome and oversee *all* being-objects in the totality of objectivity, including human-being-subject itself upon over against itself. Human-being-subject's force-full, will-full surmounting (including of human-being-subject itself objectively) necessarily entails, then, the incessant willing to power and securing of the power to oversee: epistemologically metaphysically *explaining*. This will-full, force-full, efficiently effective overseeing is epistemological metaphysical explanation. To epistemologically metaphysically, and thereof, to scientifically-epistemologically explain is to efficiently causally flatten out before human-being-subject's eyes, to forcefully (efficiently causally) make dis-cover to human-being-subject's epistemo-logical *ratio*. Epistemological metaphysical, and thereof scientific-epistemological explanation is to willfully and forcefully lay open, to willfully and forcefully expose to human-being-subject's epistemo-logical judgement and reckoning; it is to force out onto a plane before human-being-subject's oversight, for scrutiny, examination, and evaluation under epistemo-logical *ratio*, subjugated to human-being-subject's evaluative and utilitarian judgement; it is to make lay flat

out before for human-being-subject's overseeing examination and evaluation, forcefully exposed to human-being-subject's calculative and computing *ratio* and epistemo-logical judgement as valuation, evaluation, certification, validation, correction, and thereby verification. To epistemologically explain is human-being-subject efficiently causing, or making, the object be re-presented objectively, forcing the object to ex-sist as object at all verified in the totality of objectivity. Epistemological metaphysical explanation is mastering and overseeing all objects, as objects, in the totality of objectivity, *including* human-being-subject efficiently causally setting itself up upon over against itself. Ex-planation of the totality of objectivity, including human-being-subject objectifying itself upon over against itself, is human-being-subject's endless end-goal. Absolutely *no* knowledge gaps can remain. Human-being-subject will laboriously progress until epistemo-logical knowledge is made complete. The will power to surmount, to overthrow, to stand and make stand validly, and thereby to overcome entails the will power to oversee. Not incidentally, I speak of *to oversee* also as *to dominate*, *to have mastered*, and therefore as the ability, or the power, to command di-rectly, *to di-rect*.¹¹⁰⁴ To direct: *dis- regere*, to efficiently causatively, i.e. to forcefully put what is asunder straight, what is in pieces aright, what is apart into line; to rectify what is in pieces; to forcefully set what is not, not correct, etc. into line, right, into a right line, aright, straight.¹¹⁰⁵ Epistemological metaphysical scientists-epistemologists di-rectly, forcefully press into service (regardless of whether this is with or without the object's, or what is the same, the study subject's, consent) who or what they research. The stakes are will-full epistemological metaphysical ex-sistence and human-being-subject's freedom. The stakes are human-being-subject's self-salvation and its effective salvation thereby of the objective, epistemologically-metaphysically scientific-epistemological world. Human-being-subject di-rects the cor-rection of what and who is to be ex-sisted as verified objectively, and thus of what and who is to epistemo-logically verifiably ex-sist at all, whatsoever. Epistemologically metaphysically, scientists-epistemologists are faithful technicians. (This is not to write that what scientists-epistemologists forcefully dis-cover is epistemologically metaphysically, and thus certifiably, validly, and verifiably false or erroneous. Not at all.) The *technē* of efficient *poiesis*, belonging to epistemological metaphysics and human-being-subject as means (including but not limited at all to scientific methods or technologies), includes efficiently causative and thereby efficiently effective, and thus essentially forceful (force forcing, force exercising itself) explanation, invention, innovation, intervention, creation, formulation, origination, finalization, enumeration, manipulation, experimentation, examination, modification, interpretation, representation, theorization, argumentation, regulation, edification, education, nullification, annihilation, and so on well beyond these Latin derivatives. The feverish, endlessly unending yet unprecedentedly productive activity of scientists-epistemologists is in essence, in beginning and endless end-goal, from and of—i.e. essentially belonging to, proper to—what human-being-subject understands-in-advance *action* to be. Action is action insofar as action's activity is efficiently causal, efficiently productive. Whether or not this is *to act* at all is, as I have already written, essentially questionable. I come near once more to *praxis* epistemologically metaphysically understood-in-advance to be, exhaustively and exclusively, efficient *poiesis*. Epistemological metaphysical scientists-epistemologists are human-being-subjects' efficiently effectively, and always progressively more productively and efficaciously, forcing the will-full grounding-ground to will yet greater efficiently effective power in order to will itself further; i.e., willing will to empower itself to will further, always toward the end-goal, an end-goal that is a perpetual means to willfully posit and strive to subsequent goal. The endless unending end-goal is actualizing-by-efficiently-achieving (or

making, producing, etc.) absolute autonomy and absolute sovereignty; i.e. efficiently causing to exist epistemological metaphysical freedom, human-being-subject's freedom as freedom is understood-in-advance.

Even so, the epistemologically metaphysically true world *is* true. Human-being-subject need have no doubt about *this*. Scientifically-epistemologically discovered, directed, and thereby verified objects, or facts, are *true*, or *correct*; they are *true* as understood oppositely from epistemologically metaphysically *false*. The world epistemologically metaphysically being openingly-revealed is not yet the fable of the “true world.” The “true world” is world as increasingly given to human-being contemporarily in the coming, lawful opening-revealing of world as the world by and as relativistic metaphysics.¹¹⁰⁶

Epistemological metaphysically given, truth is will power to will. Epistemologically metaphysically, human-being-subject to know is to have the power to explain, and to have the power to explain is make the truth known objectively. Epistemologically metaphysically, and thus scientifically-epistemologically, knowledge is power. Epistemologically metaphysically, *to know is to will to power to will* in order to will endlessly unendingly further. As everyone today knows: Knowledge is power. And power is knowledge. To know is to will to know, and to will to know is to will to power to explain. To will to power to explain is to will to power to oversee, to master, to dominate, to make objective, to exist the object. To will to power to explain is to will to power to will human-being-subject to every greater power, to every greater freedom, to the self-achieved completion of absolute autonomy and absolutely (self-) sovereignty. Total epistemological metaphysical freedom is total epistemological metaphysical explanation. Knowing is empowering, knowledge is power, and *to know is to empower will power*, and vice versa, again, in each case. Willing the end-goal of empowerment is willing will to will and is, likewise, willing will to know. Willing will to know is willing will to explain. Human-being-subject explains the truth. To know is to know the truth, or to have knowledge of the truth, partial or complete. Human-being-subject values, evaluates, certifies, validates, corrects and verifies power-knowledge by its efficient effectiveness, i.e. power-knowledge's efficient capacity to efficiently mobilize and be efficiently mobilized in service to the end-goals human-being-subject, whether individual or collective, willfully posits for actualization-by-achievement. The ultimate, necessary end-goal is, of course, as I must repeat, the willingly willful self-fulfillment by forcefully forced self-completion of the total subjectivity of the human-being-subject, its self-mastery and total ordered-to-order epistemological order. Mastery, total mobilizing-mobilization, total empowering-empowerment, pure epistemological logic, and total knowing-knowledge efficiently make the truth and—oppositely, simultaneously, equally, and universally indistinguishably—are the truth: truth itself endlessly unendingly actualized-by-achievement *as* progressively achieving human-being-subject, willfully *by, of, and for* the human-being-subject upon over against itself. Epistemologically metaphysically, science-epistemology is the technique to this endlessly unending end-goal.

Epistemologically metaphysically, truth is the grounding-ground. Yet I have written that human-being-subject is the grounding-ground, and vice versa. Indeed. Epistemologically metaphysically, truth is the human-being-subject. Truth is truth at all, as true, insofar as it is grounded upon over against human-being-subject, efficiently causally *by, of, and for* human-being-subject. Human-being-subject is—oppositely, simultaneously, equally, and universally indistinguishably—the ground of truth and the grounding of truth; that is, the efficient *prima causa* and thus *primum movens* of truth and the efficient *causa sui* of truth. For human-being-subject, then, *truth is*, and necessarily must be, as truth itself. For human-being-subject, truth is

not relative. For human-being-subject, and all human-being-subjects, there are no *truths*, much less “truths.” There are, of course, epistemologically metaphysically constituent and corresponding trues and falses, corrects and incorrects. The former, the trues and the corrects, lead progressively, in epistemological coherence or correspondence, to total *truth itself*, filling in, as I all know and speak, gaps in the frame of the enframed re-presented picture that *is* the epistemological metaphysical objective and the totality of objectivity, including human-being-subject upon over against itself. Gaps in knowledge are gaps in power, and gaps in power are gaps in will power to will to power to will endlessly unendingly further, to truth, to knowledge, to the efficiently causal completion of human-being-subject in total epistemological metaphysical freedom. The falses and incorrectnesses, then—forcefully dis-covered by means of ongoing scientific-epistemological evaluation, examination, experimentation, testing, and critique, mark and measure disempowerment and the progress remaining to be made as and by human-being-subject itself—human-being-subject willfully willing itself to effectively overcome its goals towards the end-goal of complete autonomy and sovereignty, in total knowledge-power-truth, in and as the efficient unification of the subjective-objective in ordered-to-order epistemological order. This will be, upon human-being-subject’s actualization-by-achievement of its end-goal, the attainment and fulfillment of truth itself, as truth itself in the fulfilled purity of subjective and objective epistemo-logical order.

Understood in advance upon the opening laying ground of epistemological metaphysics: Truth is to be epistemo-logically true. To be epistemo-logically true is to be correct. Truth is the totality of correctnesses, the totality of epistemo-logically corrects, the totality of the ordered-to-order epistemo-logical order, including both the totality of subjectivity and the totality of objectivity efficiently causatively by, of, for, and upon over against human-being-subject. Correctness is correct if can be made to epistemologically correspond or cohere valuably, evaluably, certifiably, validly, and thereby verifiably to epistemo-logical objective order—that is, to the universal efficiently causally, i.e. willfully ordered-to-order order that is epistemological logic. The grounding-ground of epistemological order, the efficient forceful orderer-to-order and—oppositely, simultaneously, equally, and universally indistinguishably—the efficiently, forcefully ordered-to-order order by, of, and for itself, upon over against itself, is human-being-subject. What and who is epistemologically metaphysically, and thereof, scientifically-epistemologically ex-plainable. What and who human-being-subject ex-plains is epistmo-logically knowable and thereby true. What and who human-being-subject ex-plains human-being-subject ex-sists as being-object verifiably at all. What and who is correct is that which is made secure in certainty of ex-sisting objectively (including human-being-subject subjectivity upon over against itself) and thereby conforms unexceptionally to the pure and straight order of absolute epistemological logic. This order, once actualized-by-achievement, will be correctness itself in totality. The correct, or correctness itself in totality, is truth itself made complete. To be true is to be correctly epistemo-logically ordered by, of, and for human-being-subject, whether this correctness is the truthful measure and ultimate criterium of epistemological coherence or of epistemological correspondence, and regardless of whether this coherence or correspondence is understood in advance to be empirical or rational, material or ideal, real or anti-real, epistemologically-scientifically confirmed or disconfirmed, epistemologically-scientifically falsified or not, or any combination in degrees thereof.

To be epistemologically metaphysically true is to be epistemo-logically made cor-rect.¹¹⁰⁷ What is it for human-being-subject to correct; or, what is the same, to efficiently causally correct; of again what is the same, epistem-logically make correct. To be epistemo-logically

correct is to be epistemo-logically put right: *cum- -regō*.¹¹⁰⁸ For human-being-subject, to be true is to be efficiently ordered, that is, to be willed, to be forced masterfully to stand straight and right, to be made to stand straightly, to be put or posited in line, such that all epistemological valuation, evaluation, certification, and validation is absolutely unshakeable, conforming to and lineated into the crystalline, masterful order of epistemological logic, and thereby verified as true. To be true is to be verifiably correct—aligned in perfect, masterfully, unshakably certain straight epistemo-logical order. That which is and can ex-sist, whatsoever, is only insofar as it stands (*not* proves) true as posited, regardless of whether this epistemological positing and standing is achieved deductively or inductively by means of epistemologically evidencing, evaluating, calculating, certifying, and validating probability values. To stand true as objective verified is to stand *validly*. To be true, then, and thus to be epistemologically metaphysically possible, potential, or actual as being-ex-sisted at all, is to be grounded by, of, for, and upon over against human-being-subject. That which is, is ex-sisted as valuated, evaluated, certified, validated, and secured, or verified, with epistemological certainty—including, most essentially and primordially, human-being-subject itself efficiently casually grounding itself upon itself, as itself the grounding-ground.

Truth as correctness is true, and thus is truth at all, only insofar as that which is true is epistemo-logically cor-rected, regardless of whether this is correctness as evaluated, certified, and validated epistemological correspondence or as evaluated, certified, and validated epistemological coherence. What is *correct*, and thus what is *true*, must be made straight or right, in the sense of putting into line or making into a line. *Technē*, of efficient *poiesis*, is essential to epistemological metaphysical truth, for truth is the grounding-ground, both efficiently causally making itself as itself (grounding) and—oppositely, simultaneously, equally, and universally indistinguishably—efficiently causally made upon itself, by itself, for itself, as truth at all (grounded). But *to make correct* requires *force* and its exercise. What is *correct*, and thus what is *true*, must be forcefully and, what is the same, efficiently causally conducted—by human-being-subject, by means of human-being-subject’s unceasing labor—to straightness or rightness; directed to straightness or rightness; controlled in the sense of aligned, lineated, delineated, or defined; made to stand in a straight line; forced into line; put straight, stood straight, or made straight. What is *cor-rect* must be constantly, incessantly, forcefully oversee, and thus surmounted, overcome, and mastered once and again, endlessly unendingly. The end-goal of efficient, effective *mastery* is essential, both of the *techne* of efficient *poiesis* and to the product, or the efficient effect of human-being-subject’s will power: truth itself. Likewise, *force* and *power* are essential—force and force’s exercise are the original and primordial *causa prima*, *causa movens*, and *causa sui*: force forcing and forcing itself, or efficient cause causing and efficiently causing itself in ongoing, expanding, infinitely progressive efficient causation. Human-being-subject is force exercising itself efficiently and being efficiently forced: the efficient *causa prima* (and *primum movens*) is the efficient *causa sui*, and vice versa. Human-being-subject—ex-sisting itself upon over against itself, by itself, of itself, for itself; human-being-subject the grounding-ground, is force itself empowering itself to force further, more efficiently, more efficaciously. Knowledge is making, mastering, and thereby ex-plaining the objective as objective. Knowledge is knowing, and thus ex-plaining-overseeing the epistemo-logically ordered-to-order order of the totality of correctness and, thus, of the unification of the objective upon over against the completed and thereby fulfilled subjective.

Human-being-subject efficiently makes, produces, creates, etc. what is true by means of the valuative and evaluative methods, rules, and techniques culminating in effective certification,

validation, and thereby verification as epistemologically correct. The evaluative methods, procedures, rules, and techniques, with their corresponding tools and technologies—i.e. the means—culminating in certification, validation, and verification belong primordially and in essence to epistemological metaphysical science-epistemology. Epistemological metaphysical science-epistemology is the *techne* of human-being-subject willing itself to will to empower itself to will further, and thus entails the laborious, endlessly progressive, efficient making, or producing, or efficiently creating, etc., the correct in totality that this demands. It entails the progressive, astounding productive yet endless unending labor of epistemological metaphysical and, thereof, scientific-epistemological explaining. The forceful, endlessly unending activity of epistemological metaphysical science is scientific-epistemological research. Scientific-epistemological research is endlessly unending efficient *poiesis*. The *poiētēs* (ποιητής) is the human-being-subject-scientist-epistemologist; the *poiēma* (ποίημα) is the scientific-epistemological knowledge-power produced; i.e. the efficient effect.¹¹⁰⁹ Yet—oppositely, simultaneously, equally, and universally indistinguishable—the efficient cause, i.e. the *poiētēs* or the epistemological metaphysical scientist-epistemologist, is the efficient effect, the product of its own making, its own willful surmounting-overcoming-securing-overseeing, its own explaining and thereby progressively knowing itself objectively, truly, and thus truthfully. Human-being-subject is the grounding-ground. Science-epistemology is the technique of human-being-subject efficiently, forcefully grounding itself as the ground itself and—oppositely, simultaneously, equally, and universally indistinguishably—being forcefully grounded, i.e. being efficiently casually grounded by, of, and for itself as being-object upon over against human-being-subject, i.e. being-ex-sisted upon over against itself by, for, and of itself.

6.9 The question before us: *What is ecology?*

The question before us is: *What is ecology?* This question calls for us not only to hear, but to listen to it as a *question*. I have only *begun* to respond to this question. I have begun to respond to this question by listening to the word's senses, gathering them unto ourselves as they have already selected, called, and gathered us to its own speaking senses. Collecting the senses I am given, I gather them to myself so that I may, from awareness, discern and distinguish them and, in my turn, order them and give them human voice in my own speaking and writing as well as, though not necessarily and always secondarily, for my own activities and goals. I have begun to respond only in first beginning again, re-opening ourselves, and—being openingly aware—pouring ourselves, in this manner, thoughtfully and thankfully, towards the giving of the question itself. I have written, sensibly, what *Ökologie* says to us and—in sense therefrom and sensibility thereof—what *ecology* speaks to us. It speaks to us so that we may hear, and then listen receptively and attentively, to its senses and so, in this way, that we may be given—that is, be brought—to our senses.

“But,” I counter knowledgably, “did not Haeckel coin the word *Ökologie*?” No, he did not. Haeckel listened to the senses *Ökologie* gives to the world. He listened as being *called* to listen and being gathered into sensing the speaking senses of *Ökologie*. But, in his sensitivity and faithfulness, he did not merely hear, nor did he merely see the senses *Ökologie* gives to the world's sensibility. Haeckel understood that was being *called to listen*, and *called to look*, and gathered to this listening and looking—this human listening and looking in the world—Haeckel was brought before the word as the word, bring itself before, spoke senses to the world's sensibility, *giving itself* sensibly to the world. Being-humanly-aware of these senses speaking,

and in attentive faith and trust, being brought before the word speaking, Haeckel could gather the word unto himself, comprehend it, and with prehending it, take it up so as to speak the word, giving his human voice to the word's senses. Haeckel, in this way, brought the *word* to the common sensibility of a family of human-beings' gathered together communally into sensing together the world's sensibility. Listen: *Ökologie*. Contemporarily, I commonly understand all of this in advance, *as I am given* to understanding in advance epistemologically metaphysically, as the efficient effect of Haeckel's definitional and meaningful act. This is not incorrect or false—not at all. None- and nevertheless, in being carried to hear and see, and even to listen and look, from the understandings in advance to which I am given, I remain only distant from the *word's* speaking senses, and only more distant still from the home source of the *word's* speaking sensibly into the world's sensibility, and thus more distant again from whence the word comes speaking, and what selects and gathers senses into and as the word itself that the word may bring senses to the world.¹¹¹⁰

6.10 What is ecology?

Now I may say what ecology is. This—what ecology is—is what its word, *ecology*, speaks sensibly of and speaks sensibly from. To say what ecology is, is only always to begin to say responsibly what ecology is. But I am called to begin, and in beginning, to correspond not only to the question, but to that to which the question guides me in thinking, opening the way before us. What, then, is ecology?

Ecology is being selecting, being gathering together in the abiding shelter of belonging, or home, of all beings givingly sent to be existingly in the world, in the world with and among each other, and even *for* each other in open and friendly responsibility; and, here and now, as well as there and then, for these beings existing in the world to open once and again to the selective call and the selecting-gathering, to receive once and again, and to follow responsively once and again words' speaking senses into the beauty, the truth, and the goodness that is the awing, wondrous gift of the sensibility of the existing world: home. Human-beings in the world, in particular, are not merely called to hear and perhaps listen, see and perhaps look towards, but to *travel* faithfully and trusting to receive the gift of the word itself, of words themselves, as these gather us into belonging familiarly together in commonly sensing, in cultivating and coordinating together, in common friendship and love and belonging—as these shelter us, so to do we shelter each other—and, subsequently giving our human voices in familiar communion to the words' speaking senses which, always already before us, coming to meet us along our ways, *are* giving and disclosing, as the *words* do, the sensibility of the world. *This is eco-logy*.

Insofar as ecology is to study the world existing and our being-existingly at home in the world, abiding in the belonging gathering with and among those—human or otherwise—we are called to befriend, ecology opens itself to the study of *all* beings existing in the world given senses and, therewith, brought to sense the sensibility of the world. Each family or group of beings may study the world as they are given to and gathered into it existingly. Human beings in the world, unlike any other, are given not only to study, but to *speak* sensibly and sensitively, faithfully and truthfully, the senses of the world. But this is not all. We are called—we are *all* called, as human-beings given to exist in the world—to open ourselves in our being-humanly-aware to not only the senses spoken as the sensibility of the world, but *to the words themselves* whose speaking senses open the sensibility of the world of all beings with which and among

which we exist. *We* are given words that we might *speak*, with them, the beauty, truth, and goodness of their own gifts of belonging, sensibility, and sensitivity in, for, and towards the sensibility of our world and those around us here and now, as well as there and then.

6.11 What are the ecological food webs of the Eel River?

This is the question to which I give my voice as this question, coming before my, opens and initially orients this dissertation. The moving of thinking is essentially of the moving of practicing—different and distinct from the moving of acting and its activity. I honor and revere with thankfulness the moving of thinking in slowing, settling, and thus coming to rest so that I may, with all I am, as I am, listen and respond once again and again to the call of questions in giving myself, faithfully and trustingly, to the questions—or as I have written above, in pouring myself thinkingly and thankfully toward the sending source of the questions themselves. I rest. Though I rest, I may still *listen*. For these questions remain open, calling me to respond.

Notes

Chapter 1

¹ Riskin, *The Restless Clock: A History of the Centuries-Long Argument over What Makes Living Things Tick*; Koyré, *From the Closed World to the Infinite Universe*; Westfall, *The Construction of Modern Science: Mechanisms and Mechanics*; Harman, *Energy, Force, and Matter: The Conceptual Development of Nineteenth-Century Physics*; Freudenthal, *Atom and Individual in the Age of Newton: On the Genesis of the Mechanistic World View*; Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution*; Hesse, *Forces and Fields: The Concept of Action at a Distance in the History of Physics*; Boudri, *What Was Mechanical About Mechanics: The Concept of Force Between Metaphysics and Mechanics from Newton to Lagrange*; Jammer, *Concepts of Force*; Dijksterhuis, “IV. The Evolution of Classical Science”; Canguilhem, *Knowledge of Life*; Belgrad, *The Culture of Feedback: Ecological Thinking in Seventies America*; Kingsland, *Modeling Nature: Episodes in the History of Population Ecology*; Cooper, *The Science of the Struggle for Existence: On the Foundations of Ecology*; Hacking, *The Emergence of Probability: A Philosophical Study of Early Ideas About Probability Induction and Statistical Inference*; Godfrey-Smith, *Philosophy of Biology*; Mayr, *Authority, Liberty & Automatic Machinery in Early Modern Europe*; Stanley-Jones and Stanley-Jones, *The Kybernetics of Natural Systems: A Study in Patterns of Control*; Gruber, *Darwin on Man: A Psychological Study of Scientific Creativity*; Richardson, *Feedback Thought: Social Science and Systems Theory*; Belgrad, *The Culture of Feedback: Ecological Thinking in Seventies America*; Gigerenzer et al., “The Probabilistic Revolution in Physics”; Boas, “The Establishment of the Mechanical Philosophy”; Craver and Tabery, “Mechanisms in Science”; Machamer, Darden, and Craver, “Thinking about Mechanisms”; Craver, “Role Functions, Mechanisms, and Hierarchy”; Darden, “Thinking Again about Biological Mechanisms”; Glennan, “Mechanisms and the Nature of Causation”; Nicholson, “The Concept of Mechanism in Biology”; François, “Systemics and cybernetics in a historical perspective”; Aspray, “The Scientific Conceptualization of Information”; Pouvreau and Drack, “On the History of Ludwig von Bertalanffy’s ‘General Systemology’, and on Its Relationship to Cybernetics”; Allen, “Mechanism, Vitalism and Organicism in Late Nineteenth and Twentieth-Century Biology”; Mayr, “Maxwell and the Origins of Cybernetics”; Keller, “Organisms, Machines, and Thunderstorms,” February 1, 2009; Keller, “Organisms, Machines, and Thunderstorms,” February 1, 2008; Keller, “Ecosystems, Organisms, and Machines”; Pancaldi, “Darwin’s Technology of Life”; Schweber, “The Origin of the ‘Origin’ Revisited”; Sagoff, “The Plaza and the Pendulum”; Sagoff, “Are There General Causal Forces in Ecology?”; Sagoff, “Theoretical Ecology Has Never Been Etiological”; Donhauser, “Theoretical Ecology as Etiological from the Start”; Donhauser, “Differentiating and Defusing Theoretical Ecology’s Criticisms”; Bryant, “Whole System, Whole Earth”; Ulanowicz, “Life after Newton”; Ulanowicz, “Information Theory in Ecology”; Ulanowicz, “The Central Role of Information Theory in Ecology”; Ulanowicz, “The Organic in Ecology”; Simberloff, “A Succession of Paradigms in Ecology: Essentialism to Materialism and Probabilism”; Herrando-Pérez et al., “Density Dependence”; Wolda, “The Equilibrium Concept and Density Dependence Tests What Does It All Mean?”; Wu and Loucks, “From Balance of Nature to Hierarchical Patch Dynamics”; Hixon, Pacala, and Sandin, “Population Regulation”; Grimm and Wissel, “Babel, or the Ecological Stability Discussions”; Hardin, “The Competitive Exclusion Principle”; Egerton, “Changing Concepts of the Balance of Nature”; Worster, “The Ecology of Order and Chaos”; Taylor and Blum, “Ecosystem as Circuits.”

² For example, see May, “11. Levels of Organization in Ecology”; Allen and Hoekstra, *Toward a Unified Ecology*; Reiners and Lockwood, *Philosophical Foundations for the Practices of Ecology*; McIntosh, *The Background of Ecology: Concept and Theory*.

³ Inkpen, “Are Humans Disturbing Conditions in Ecology?”; Sagoff, “On the Definition of Ecology.”

⁴ Wittgenstein famously wrote of the *activity* that, as he understood, a *Lebensform* is. See Ludwig Wittgenstein, *Philosophical Investigations*, trans. G. E. M. Anscombe, 3rd ed. (New York: MacMillan Publishing Co., Inc., 1958), p. 11e.

⁵ My understandings at the time, summarized tersely in the three prior paragraphs, were influenced prominently by my readings of Michel Foucault’s work, some secondary literature on his work, and several publications in similar veins, in particular: Foucault, *The Order of Things: An Archaeology of the Human Sciences*; Foucault, *Discipline and Punish: The Birth of the Prison*; Foucault, *The History of Sexuality: An Introduction*; Foucault, *Security, Territory, Population: Lectures at the Collège de France 1977-1978*; Foucault, *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*; Foucault, “The Subject and Power”; Foucault, “Nietzsche, Genealogy, History”; Dreyfus and Rabinow, *Michel Foucault: Beyond Structuralism and Hermeneutics*; Rabinow, *French Modern*:

Norms and Forms of the Social Environment; Hacking, “Biopower and the Avalanche of Printed Numbers”; Hacking, *The Emergence of Probability: A Philosophical Study of Early Ideas About Probability Induction and Statistical Inference*; Hacking, *The Taming of Chance*; Hacking, “Making Up People”; Legg, “Foucault’s Population Geographies: Classifications, Biopolitics and Governmental Spaces”; Lemke, Casper, and Moore, *Biopolitics*; Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*; Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*; Rose, “The Politics of Life Itself”; Braun, “Producing Vertical Territory: Geology and Governmentality in Late Victorian Canada”; Braun, “THE 2013 ANTIPODE RGS-IBG LECTURE New Materialisms and Neoliberal Natures”; Murphy, *The Economization of Life*; Myers, *Rendering Life Molecular: Models, Modelers, and Excitably Matter*; Walker and Cooper, “Genealogies of Resilience: From Systems Ecology to the Political Economy of Crisis Adaptation.”

⁶ Foucault, *Discipline and Punish: The Birth of the Prison.*, 227; Foucault, “Nietzsche, Genealogy, History”; Rabinow and Rose, “Introduction: Foucault Today”; Haraway, “A Game of Cat’s Cradle”; Haraway, “Situated Knowledges.”

⁷ Ecological Society of America, “About: The Ecological Society of America.”

⁸ Ecological Society of America, “What Is Ecology?”

⁹ Ecological Society of America.

¹⁰ Moore, “The Scope of Ecology,” 3.

¹¹ Moore, 4.

¹² Taylor, “What Is Ecology and What Good Is It?”

¹³ Taylor, 333.

¹⁴ Taylor, 334.

¹⁵ Taylor, 334, 345.

¹⁶ Taylor, 336.

¹⁷ Taylor, 336–40.

¹⁸ Taylor, 337.

¹⁹ Taylor, 337.

²⁰ Taylor, 334, 343.

²¹ Taylor, 345.

²² Taylor, 334, 335, 342.

²³ Allee et al., *Principles of Animal Ecology*, 1.

²⁴ Allee et al., 1.

²⁵ Dice, “What Is Ecology?”

²⁶ Dice, 346.

²⁷ Dice, 346.

²⁸ Dice, 346.

²⁹ Dice, 346.

³⁰ Park, “An Ecologist’s View,” 4.

³¹ Paine, “Address of the Past President,” 257.

³² Paine, 257.

³³ Paine, 257.

³⁴ Power, “Aug 23: Introduction, Overview and Approaches to Ecology.”

³⁵ Power.

³⁶ Andrewartha and Birch, *The Distribution and Abundance of Animals*, chap. 2.

³⁷ Andrewartha and Birch, 17.

³⁸ Andrewartha and Birch, 26.

³⁹ Andrewartha and Birch, 15.

⁴⁰ Andrewartha and Birch, 26.

⁴¹ Andrewartha and Birch, 26.

⁴² Ruhi, Albert Ruhi on the ecology of the rivers of coastal northern California.

⁴³ Ruhi.

⁴⁴ Odum, *Fundamentals of Ecology*; Cherrett, *Ecological Concepts: The Contribution of Ecology to an Understanding of the Natural World*; Pianka, *Evolutionary Ecology*; Cain, Bowman, and Hacker, *Ecology*; Urry et al., *Campbell Biology*.

⁴⁵ Ruhi, Albert Ruhi on the ecology of the rivers of coastal northern California.

⁴⁶ Kelson, Interview with Suzanne Kelson.

⁴⁷ Moidu, Interview with Hana Moidu.

- ⁴⁸ Mayr, “Cause and Effect in Biology.”
- ⁴⁹ Mayr, 1502.
- ⁵⁰ Mayr, 1502.
- ⁵¹ Mayr, 1502.
- ⁵² Mayr, 1502.
- ⁵³ Mayr, 1502.
- ⁵⁴ Mayr, 1504.
- ⁵⁵ Mayr, 1504.
- ⁵⁶ Mayr, 1504.
- ⁵⁷ Mayr, 1504.
- ⁵⁸ Mayr never asks forthrightly and sincerely what *causation* is. He has answered this question already, however, for everything and entity about which he writes. For example, for Mayr, causation is what “causation” is defined to be—for example, causation is what “causation” is defined to be in logic, or physics, or chemistry, or biology. *Regardless* of what causation is, however—a definition of “causation”—causation is “believed to contain three elements,” which he proceeds to list. See Mayr, 1501.
- ⁵⁹ Halliday, Resnick, and Walker, *Fundamentals of Physics*; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007; Rennie and Law, “Work.”
- ⁶⁰ Halliday, Resnick, and Walker, *Fundamentals of Physics*; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007; Rennie and Law, “Work.”
- ⁶¹ Lack, *The Regulation of Animal Numbers*, 5.
- ⁶² Darwin, *The Origin of Species*, 79, 81, 80, 89.
- ⁶³ Darwin, 77.
- ⁶⁴ John C. Baker, “The Evolution of Breeding Seasons,” in *Evolution: Essays on Aspects of Evolutionary Biology Presented to Professor E. S. Goodrich on His Seventieth Birthday*, ed. G. R. de Beer (Oxford, U.K.: Oxford University Press, 1938), 161–77.
- ⁶⁵ Baker, 170.
- ⁶⁶ Oxford University Press, “Agent, n.1 and Adj.”; Oxford University Press, “Act, v.”; Klein, “Agent, Adj. and n.”; Klein, “Act, n.”; Skeat, “Agent”; Skeat, “Act.”
- ⁶⁷ Wilson, *The Meaning of Human Existence*, 15.
- ⁶⁸ Wilson, 61.
- ⁶⁹ Wilson, 28, 62–63.
- ⁷⁰ Edward O. Wilson, *Consilience: The Unity of Knowledge* (New York: Vintage Books, 1998), 15.
- ⁷¹ Boltzmann, “ON THE METHODS OF THEORETICAL PHYSICS,” 204.
- ⁷² Fontana and Frey, “The Interview: From Structured Questions to Negotiated Text.”
- ⁷³ Weiss, *Learning from Strangers: The Art and Method of Qualitative Interview Studies*, 65.
- ⁷⁴ Weiss, *Learning from Strangers: The Art and Method of Qualitative Interview Studies*.
- ⁷⁵ Weiss, chap. 4.
- ⁷⁶ Weiss, 151–52.
- ⁷⁷ Ragin and Amoroso, *Constructing Social Research: The Unity and Diversity of Method*; Weiss, *Learning from Strangers: The Art and Method of Qualitative Interview Studies*.
- ⁷⁸ Ragin and Amoroso, *Constructing Social Research: The Unity and Diversity of Method*, 34–35, 46–48.
- ⁷⁹ Oxford University Press, “Method, n.”; Klein, “Method, n.”; Skeat, “Method.”
- ⁸⁰ Liddell and Scott, “Μετά,” 1889; Liddell and Scott, “Μετά,” 1940; Autenrieth, “Μετά”; Slater, “Μετά”; Beekes, “Μέτα, Μετά.”
- ⁸¹ Liddell and Scott, “Ὀδός,” 1940; Liddell and Scott, “Ὀδός,” 1889; Autenrieth, “Ὀδός, Οὐδός”; Slater, “Ὀδός”; Beekes, “Ὀδός.”
- ⁸² Beekes, “Ὀδός.”
- ⁸³ Oxford University Press, “Proceed, v.”; Klein, “Proceed, Intr. v.”; Skeat, “Proceed”; Lewis, “Prō-Cēdo”; Lewis and Short, “Prō-Cēdo”; Oxford University Press, “Prōcēdō.”
- ⁸⁴ Oxford University Press, “Cēdō”; De Vaan, “Cēdō, -Ere”; Lewis, “Cēdō”; Lewis and Short, “Cēdo”; Oxford University Press, “Prō-”; De Vaan, “Prō.”
- ⁸⁵ Such an understanding in advance is not, and indeed cannot be acted upon or against or reacted to or against, such as being: solved; resolved; fixed; optimized; overcome; overthrown; rejected; opposed; disproved; deconstructed and reconstructed; framed; defined; termed and terminated; defined; circumscribed and delineated; pinned down;

subjected or objected; corrected; evaluated; valued; validated; resisted; subdued; combated; undermined; unsettled; escaped from or stepped out of; substituted, traded in, or otherwise exchanged for another; acted upon or against; reacted to or against; fought with; gotten past; or disposed of. Human beings in the world *can* pursue any or all of these, but insofar as we do so, we understand in advance as we have been given to understand in advance. This is lawful, and does not need to be fixed. Law, and the understandings in advance of, from, and always belonging to law, are not of, from, or by human beings in the world. We belong to lawful understanding in advance, and we are lawfully given to its gentle hold and guidance in sense and sensibility as we fare along our ways in the world. Insofar as we come to exist, we are so destined. But law does not determine us. Lawful understandings in advance, likewise, do not and cannot determine us. To determine is *to act*. Law does not act, even as it gives us the possibility of acting in the world if and, if so, when, where, and as we judge necessary *and*, above all, governed by law—i.e. lawful. To destiny, however, is to give. To give is not an act, action, or the activity these comprise. Law gives. Law gives understanding in advance but is not nearly exhausted by the understandings in advance with which it gathers, shelters, orients, and carries us into and through world as *the* world of sense and sensibility.

Chapter 2

⁸⁶ Keter, “The Effects of Historic Land-Use Activities on the Streams and Aquatic Resources of the North Fork of the Eel River”; Keter, “Environmental and Cultural History of the Eel River Basin.”

⁸⁷ Vaughn, “A California Principality: Humboldt and Its Redwoods”; Carranco and Labbe, *Logging the Redwoods*.

⁸⁸ Biddle, John, Lieut. Col., U.S. Army Corps of Engineers, “Survey of Inland Waterway Between Humboldt Bay and Eel River, California.”; Vaughn, “A California Principality: Humboldt and Its Redwoods.”

⁸⁹ Keter, “The Effects of Historic Land-Use Activities on the Streams and Aquatic Resources of the North Fork of the Eel River.”

⁹⁰ Keter; Keter, “Environmental and Cultural History of the Eel River Basin.”

⁹¹ Keter, “The Effects of Historic Land-Use Activities on the Streams and Aquatic Resources of the North Fork of the Eel River.”

⁹² Keter, 7.

⁹³ Sims, “Going Nowhere: Has the Northwestern Pacific Railroad Reached the End of the Line?”

⁹⁴ Shapovalov and Vestal, “Report on the 1938 Eel River Survey, Conducted by the Division of Fish and Game”; Keter, “Environmental and Cultural History of the Eel River Basin”; Keter, “The Effects of Historic Land-Use Activities on the Streams and Aquatic Resources of the North Fork of the Eel River.”

⁹⁵ Travis, “Flow River Flow: The Eel River and Its Environs.”

⁹⁶ U.S. Army. Corps of Engineers, “Eel River, Calif. Letter from the Secretary of War, Transmitting... a Letter from the Chief of Engineers, United States Army, Dated August 17, 1933, Submitting a Report, Together with Accompanying Papers and Illustrations, Containing a General Plan for the Improvement... January 3, 1934.”; Travis, “Flow River Flow: The Eel River and Its Environs”; California Department of Water Resources, “Land and Water Use in Eel River Hydrographic Unit.”

⁹⁷ By 1905 at the very latest, Van Arsdale knew that the Eel River at the proposed dam site was 475 feet higher in elevation than the floor of Potter Valley, and could therefore plan a gravity-fed power house. Van Arsdale’s knowledge indicates that by the turn of the 20th century, at latest, portions of the Eel River Basin had already been surveyed and topologically mapped, likely by either the State of California or U.S. federal agents.

⁹⁸ Potter Valley Irrigation District, “History of Potter Valley Project.”

⁹⁹ Potter Valley Irrigation District.

¹⁰⁰ Simon, *The River Stops Here: Saving Round Valley, A Pivotal Chapter in California’s Water Wars*.

¹⁰¹ U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River.”

¹⁰² Biddle, John, Lieut. Col., U.S. Army Corps of Engineers, “Survey of Inland Waterway Between Humboldt Bay and Eel River, California.”

¹⁰³ Rees and U.S. Army Corps of Engineers, “Eel River, Cal. Letter from the Secretary of War, Transmitting, with a Letter from the Chief of Engineers, Report on Preliminary Examination of Eel River, Cal. February 28, 1917.”

¹⁰⁴ U.S. Army. Corps of Engineers, “Eel River, Calif. Letter from the Secretary of War, Transmitting... a Letter from the Chief of Engineers, United States Army, Dated August 17, 1933, Submitting a Report, Together with Accompanying Papers and Illustrations, Containing a General Plan for the Improvement... January 3, 1934.”

¹⁰⁵ U.S. Army. Corps of Engineers, “Eel River, Calif. Letter from the Secretary of War, Transmitting... a Letter from the Chief of Engineers, United States Army, Dated August 17, 1933, Submitting a Report, Together with Accompanying Papers and Illustrations, Containing a General Plan for the Improvement... January 3, 1934,” 9-10.

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- ¹⁰⁶ U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River.”
- ¹⁰⁷ U.S. Army Corps of Engineers, San Francisco District.
- ¹⁰⁸ U.S. Army Corps of Engineers, San Francisco District.
- ¹⁰⁹ Simon, *The River Stops Here: Saving Round Valley, A Pivotal Chapter in California’s Water Wars*.
- ¹¹⁰ United States Bureau of Reclamation, “About the Central Valley Project.”
- ¹¹¹ United States Bureau of Reclamation, “The Bureau of Reclamation: A Very Brief History.”
- ¹¹² United States Bureau of Reclamation, “Welcome to the Projects and Facilities Database. Reclamation’s Portal for Information on Dams, Powerplants and Projects.”
- ¹¹³ United States Bureau of Reclamation, “About the Central Valley Project.”
- ¹¹⁴ United States Department of the Interior, Pacific Southwest Field Committee, “Natural Resources of Northwestern California: Preliminary Report,” 1, 19–20.
- ¹¹⁵ State of California Department of Fish and Game, “The Effects of Middle Fork Eel River Development on Wildlife Resources”; Travis, “Flow River Flow: The Eel River and Its Environs.”
- ¹¹⁶ United States Department of the Interior, Bureau of Reclamation, “United Western Investigation Interim Report on Reconnaissance - California Section.”
- ¹¹⁷ United States Department of the Interior, Bureau of Reclamation, 1.
- ¹¹⁸ United States Department of the Interior, Pacific Southwest Field Committee, “Natural Resources of Northwestern California: Preliminary Report.”
- ¹¹⁹ United States Department of the Interior, Pacific Southwest Field Committee, 1.
- ¹²⁰ United States Department of the Interior, Pacific Southwest Field Committee, “Natural Resources of Northwestern California: Preliminary Report.”
- ¹²¹ United States Department of the Interior, Pacific Southwest Field Committee, 1.
- ¹²² For a sense of the continuity of sensibility, understanding, activity (including reasoning), and their corresponding techniques, see, for example, Foucault, *Discipline and Punish*, pp. 43, 145–46; 187–88, among many other examples in this book and Foucault’s others. James Scott, influenced by Foucault’s work, also speaks of legibility. See, for example, Scott, *Seeing Like a State*, p. 2. Foucault, *Discipline and Punish: The Birth of the Prison*; Foucault, *Security, Territory, Population: Lectures at the Collège de France 1977–1978*; Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*.
- ¹²³ Kohler, *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology*.
- ¹²⁴ California Department of Water Resources, “Views and Recommendations of State of California on Proposed Report of the Chief of Engineers, U.S. Army on Eel River, California, with Reference to Sandy Prairie Area Near Fortuna.”
- ¹²⁵ State of California Department of Water Resources, “Bulletin No. 3 - The California Water Plan.”
- ¹²⁶ State of California Department of Water Resources; U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River.”
- ¹²⁷ California Department of Water Resources, “Preview of Bulletin No. 136. North Coastal Area Investigation.”
- ¹²⁸ California Department of Water Resources, 2.
- ¹²⁹ California Department of Water Resources, 3.
- ¹³⁰ U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River,” 79.
- ¹³¹ Pyle, Stuart T. Acting chairman, Work Group No. 2, California State-Federal Interagency Group, “Interagency Planning Coordination on the Upper Eel River Development.”
- ¹³² Pyle, Stuart T. Acting chairman, Work Group No. 2, California State-Federal Interagency Group, 3.
- ¹³³ United States Army Corps of Engineers et al., “Joint U.S.-California Water Development Planning. California State-Federal Interagency Group,” 3; U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River,” 4.
- ¹³⁴ California Department of Water Resources, “Land and Water Use in Eel River Hydrographic Unit,” A-4.
- ¹³⁵ California Department of Water Resources, A-4.
- ¹³⁶ California Department of Water Resources, A-4.
- ¹³⁷ California Department of Water Resources, A-4, A-5.
- ¹³⁸ California Department of Water Resources, 77.
- ¹³⁹ California Department of Water Resources, 79.
- ¹⁴⁰ California Department of Water Resources, “Flood! December 1964 - January 1965”; *The Eel River: Friend and Foe*.

-
- ¹⁴¹ U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River,” 19.
- ¹⁴² California Department of Water Resources, “Flood! December 1964 - January 1965.”
- ¹⁴³ California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation.”
- ¹⁴⁴ California Department of Water Resources; California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation. Appendix A: Watershed Management in the Eel River Basin”; California Department of Parks and Recreation and California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation. Appendix B: Recreation”; California Department of Fish and Game and California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation - Appendix C: Fish and Wildlife”; California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation. Appendix E: Engineering Geology,” August 1965; California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation. Appendix E: Engineering Geology,” August 1965; California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation. A Summary of the Public Hearing Comments and Changes to the Preliminary Edition Dated September 1964.”; California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation. Alternative Plans For Development.”
- ¹⁴⁵ California Department of Fish and Game and California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation - Appendix C: Fish and Wildlife,” 3.
- ¹⁴⁶ California Department of Fish and Game and California Department of Water Resources, 3.
- ¹⁴⁷ California Department of Fish and Game and California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation - Appendix C: Fish and Wildlife.”
- ¹⁴⁸ Kaiser Engineers, “Task Force Report on Upper Eel River Routing Studies - Final Edition”; Simon, *The River Stops Here: Saving Round Valley, A Pivotal Chapter in California’ Water Wars*.
- ¹⁴⁹ United States Army Corps of Engineers et al., “Joint U.S.-California Water Development Planning. California State-Federal Interagency Group,” 3.
- ¹⁵⁰ United States Army Corps of Engineers et al., “Joint U.S.-California Water Development Planning. California State-Federal Interagency Group.”; Simon, *The River Stops Here: Saving Round Valley, A Pivotal Chapter in California’ Water Wars*.
- ¹⁵¹ California Department of Fish and Game and California Department of Water Resources, “Bulletin No. 136. North Coastal Area Investigation - Appendix C: Fish and Wildlife.”
- ¹⁵² California Department of Fish and Game and California Department of Water Resources, 9.
- ¹⁵³ California Department of Fish and Game and California Department of Water Resources, 10.
- ¹⁵⁴ California Department of Fish and Game and California Department of Water Resources, 12.
- ¹⁵⁵ California Department of Fish and Game and California Department of Water Resources, 17.
- ¹⁵⁶ California Department of Fish and Game and California Department of Water Resources, 17.
- ¹⁵⁷ California Department of Fish and Game and California Department of Water Resources, 22.
- ¹⁵⁸ California Department of Fish and Game and California Department of Water Resources, 25.
- ¹⁵⁹ California Department of Fish and Game and California Department of Water Resources, 17.
- ¹⁶⁰ Kingsland, *The Evolution of American Ecology, 1890-2000*, 98.
- ¹⁶¹ Baker et al., “Redwood Ecology Project - Annual Report,” 1960.
- ¹⁶² Baker et al.; Baker et al., “Redwood Ecology Project - Annual Report,” 1961; Baker et al., “Redwood Ecology Project - Annual Report,” 1962; Baker et al., “Redwood Ecology Project - Annual Report,” 1964; Stone, “Redwood Ecology Project - Annual Report,” 1966; Stone, “Redwood Ecology Project - Annual Report,” 1967.
- ¹⁶³ Baker et al., “Redwood Ecology Project - Annual Report,” 1964, 1.
- ¹⁶⁴ Baker et al., 1.
- ¹⁶⁵ Baker et al., 2.
- ¹⁶⁶ Baker et al., 2.
- ¹⁶⁷ Baker et al., 2.
- ¹⁶⁸ Baker et al., 2.
- ¹⁶⁹ Baker et al., “Redwood Ecology Project - Annual Report,” 1960, 4.
- ¹⁷⁰ Baker et al., 4.
- ¹⁷¹ Baker et al., 4.
- ¹⁷² Baker et al., “Redwood Ecology Project - Annual Report,” 1961, 6.
- ¹⁷³ Baker et al., “Redwood Ecology Project - Annual Report,” 1960, 6.
- ¹⁷⁴ Baker et al., 7.
- ¹⁷⁵ Baker et al., 8.
- ¹⁷⁶ Baker et al., 9.

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- ¹⁷⁷ Baker et al., 12.
- ¹⁷⁸ Baker et al., 12.
- ¹⁷⁹ Baker et al., 12.
- ¹⁸⁰ Baker et al., “Redwood Ecology Project - Annual Report,” 1961, 21.
- ¹⁸¹ Baker et al., 20.
- ¹⁸² Baker et al., 20.
- ¹⁸³ California Department of Water Resources, “Branscomb Project Investigation.”
- ¹⁸⁴ California Department of Water Resources, 1.
- ¹⁸⁵ California Department of Water Resources, “Branscomb Project Investigation.”
- ¹⁸⁶ U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River.” The report is nevertheless dated April 1968. See Simon, *The River Stops Here*, p. 179, and State of California Department of Fish and Game, “The Effects of Middle Fork Eel River Development on Wildlife Resources.”
- ¹⁸⁷ Taylor, “Technocratic Optimism, H. T. Odum, and the Partial Transformation of Ecological Metaphor after World War II.”
- ¹⁸⁸ Worster, *Nature’s Economy: A History of Ecological Ideas*; McIntosh, *The Background of Ecology: Concept and Theory*; Oates, *Earth Rising: Ecological Belief in an Age of Science*; Merchant, *Radical Ecology: The Search for a Livable World*; Hagen, *An Entangled Bank*; Golley, *A History of the Ecosystem Concept in Ecology: More than the Sum of Its Parts*; Bryant, “Whole System, Whole Earth”; Boeking, *Ecologists and Environmental Politics*; Belgrad, *The Culture of Feedback: Ecological Thinking in Seventies America*.
- ¹⁸⁹ U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River.”
- ¹⁹⁰ California Department of Water Resources, “North Coastal Area Investigation: South Fork Eel River Study,” iv, 1.
- ¹⁹¹ California Department of Water Resources, ii.
- ¹⁹² Becking, “The Ecology of the Coastal Redwood Forests of Northern California and the Impact of the 1964 Flood Upon Redwood Vegetation.”
- ¹⁹³ California Department of Water Resources, “North Coastal Area Investigation: South Fork Eel River Study,” 124.
- ¹⁹⁴ California Department of Water Resources et al., “Eel and Mad River Basins Master Plan: Paln of Study.”
- ¹⁹⁵ California Department of Water Resources et al., 1.
- ¹⁹⁶ California Department of Water Resources et al., iii.
- ¹⁹⁷ California Department of Water Resources et al., 3–4.
- ¹⁹⁸ California Department of Water Resources et al., 7.
- ¹⁹⁹ California Department of Water Resources et al., “Eel and Mad River Basins Master Plan: Paln of Study.”
- ²⁰⁰ California Department of Water Resources et al., 3.
- ²⁰¹ California Department of Water Resources et al., 3; Foucault, *Security, Territory, Population: Lectures at the Collège de France 1977-1978*; Foucault, *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*; Lemke, Casper, and Moore, *Biopolitics*.
- ²⁰² California Department of Water Resources, “Upper Eel River Development - Investigation of Alternative Conveyance Routes.”
- ²⁰³ California Department of Water Resources, 16.
- ²⁰⁴ California Department of Water Resources, “Upper Eel River Development - Alternative Plans.”
- ²⁰⁵ Dukleth, “Progress Report on Additional Studies of Eel River Basin Development Alternatives.”
- ²⁰⁶ Kaiser Engineers, “Task Force Report on Upper Eel River Routing Studies - Final Edition.”
- ²⁰⁷ Kaiser Engineers, n.p.
- ²⁰⁸ Kaiser Engineers, V–3.
- ²⁰⁹ Kaiser Engineers, V–17.
- ²¹⁰ Kaiser Engineers, V–2.
- ²¹¹ Kaiser Engineers, V–15.
- ²¹² Kaiser Engineers, V–15.
- ²¹³ Kaiser Engineers, V–15.
- ²¹⁴ State of California Department of Fish and Game, “The Effects of Middle Fork Eel River Development on Wildlife Resources.”
- ²¹⁵ State of California Department of Fish and Game, iv.
- ²¹⁶ State of California Department of Fish and Game, iii.

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- ²¹⁷ State of California Department of Fish and Game, iii; Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California.”
- ²¹⁸ Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California,” 3.
- ²¹⁹ Arend, 1.
- ²²⁰ See for example California Department of Water Resources, “Flood! December 1964 - January 1965”; U.S. Army Corps of Engineers, San Francisco District, “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River”; *The Eel River: Friend and Foe*.
- ²²¹ Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California,” 1.
- ²²² Reisner, *Cadillac Desert*.
- ²²³ Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California,” 10.
- ²²⁴ State of California Department of Fish and Game, “The Effects of Middle Fork Eel River Development on Wildlife Resources,” 6.
- ²²⁵ Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California,” 11.
- ²²⁶ Arend, 11.
- ²²⁷ Arend, 11.
- ²²⁸ Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California.”
- ²²⁹ Arend, 11.
- ²³⁰ Arend, 11.
- ²³¹ Arend, 13.
- ²³² Arend, 12–13.
- ²³³ Arend, 13.
- ²³⁴ Arend, 13.
- ²³⁵ In their “Comments on Consultant’s Report,” the CDFG qualifies this as “a reasonably accurate approximation of the black-tailed deer population...at the time of the survey.” See p. 8.
- ²³⁶ Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California,” 34.
- ²³⁷ Arend, 53.
- ²³⁸ Arend, 53.
- ²³⁹ Arend, 22.
- ²⁴⁰ Arend, 22.
- ²⁴¹ Arend, 22.
- ²⁴² Arend, 24.
- ²⁴³ Jensen, “A System of Classifying Vegetation in California”; Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California,” 24.
- ²⁴⁴ Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California,” 18.
- ²⁴⁵ Galili and Tseitlin, “Newton’s First Law.”
- ²⁴⁶ Heidegger, “Modern Science, Metaphysics, and Mathematics.”
- ²⁴⁷ Arend, “The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California,” 18–20.
- ²⁴⁸ Arend, 21.
- ²⁴⁹ Arend, 21.
- ²⁵⁰ Arend, 34.
- ²⁵¹ Arend, 34.
- ²⁵² Arend, 34.
- ²⁵³ Arend, 35.
- ²⁵⁴ Arend, 34.
- ²⁵⁵ Arend, 53.
- ²⁵⁶ Federal Power Commission, “Evaluation Report - Water Resources Appraisal for Hydroelectric Licensing - Potter Valley Project - Project No. 77 - Owned by Pacific Gas and Electric Company - Eel and Russian River Basins, California.”
- ²⁵⁷ United States Fish and Wildlife Service et al., “Eel River, California.”
- ²⁵⁸ Federal Power Commission, “Evaluation Report - Water Resources Appraisal for Hydroelectric Licensing - Potter Valley Project - Project No. 77 - Owned by Pacific Gas and Electric Company - Eel and Russian River Basins, California,” 53.
- ²⁵⁹ United States Bureau of Reclamation, “English Ridge Unit - Eel River Division - North Coast Project - California: Feasibility Report.”
- ²⁶⁰ United States Bureau of Reclamation, 1, 2, 7.

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- ²⁶¹ United States Bureau of Reclamation, 1.
- ²⁶² United States Bureau of Reclamation, v, 2–3.
- ²⁶³ United States Bureau of Reclamation, 115.
- ²⁶⁴ United States Congress, National Environmental Policy Act of 1969.
- ²⁶⁵ United States Bureau of Reclamation, “English Ridge Unit - Eel River Division - North Coast Project - California: Feasibility Report,” 115–32.
- ²⁶⁶ United States Bureau of Reclamation, “English Ridge Unit - Eel River Division - North Coast Project - California: Feasibility Report.”
- ²⁶⁷ Heidegger, “The Question Concerning Technology.”
- ²⁶⁸ United States Bureau of Reclamation, “English Ridge Unit - Eel River Division - North Coast Project - California: Feasibility Report.”
- ²⁶⁹ Federal Water Pollution Control Administration, “English Ridge Project - Water Quality Control Study.”
- ²⁷⁰ United States Bureau of Sport Fisheries and Wildlife, “North Coast Project - Eel River Division - English Ridge Unit - California: Report of the Bureau of Sport Fisheries and Wildlife.”
- ²⁷¹ United States Bureau of Sport Fisheries and Wildlife, 1.
- ²⁷² United States Bureau of Sport Fisheries and Wildlife, 1.
- ²⁷³ United States Bureau of Sport Fisheries and Wildlife, 4.
- ²⁷⁴ United States Bureau of Sport Fisheries and Wildlife, 8.
- ²⁷⁵ Federal Water Pollution Control Administration, “English Ridge Project - Water Quality Control Study.”
- ²⁷⁶ Federal Water Pollution Control Administration, 1.
- ²⁷⁷ Federal Water Pollution Control Administration, 17.
- ²⁷⁸ Federal Water Pollution Control Administration, 18.
- ²⁷⁹ Federal Water Pollution Control Administration, 18.
- ²⁸⁰ Federal Water Pollution Control Administration, 18.
- ²⁸¹ Federal Water Pollution Control Administration, 17.
- ²⁸² United States Bureau of Reclamation, “Eel River Division - Ultimate Phase - North Coast Project, California.”
- ²⁸³ United States Bureau of Reclamation, 29.
- ²⁸⁴ United States Bureau of Reclamation, 32.
- ²⁸⁵ United States Bureau of Reclamation, “Eel River Division - Ultimate Phase - North Coast Project, California.”
- ²⁸⁶ United States Bureau of Reclamation, ii.
- ²⁸⁷ United States Bureau of Reclamation, ii, 2.
- ²⁸⁸ Simon, *The River Stops Here: Saving Round Valley, A Pivotal Chapter in California's Water Wars*.
- ²⁸⁹ Wilson, “Citizens Environmental Advisory Committee - Sacramento, California - To: Robert J. Pafford, Jr., Regional Director, United States Department of the Interior, Bureau of Reclamation - Subject: Comments on the Eel River Ultimate Phase, Eel River Division, North Coast Project, California, Status Report, June 1972,” August 10, 1972, 1.
- ²⁹⁰ Wilson, 6.
- ²⁹¹ State of California Department of Fish and Game, “Natural Resources of the Eel River Delta.”
- ²⁹² State of California Department of Fish and Game, 4.
- ²⁹³ State of California Department of Fish and Game, 4.
- ²⁹⁴ State of California Department of Fish and Game, 4.
- ²⁹⁵ State of California Department of Fish and Game, 84.
- ²⁹⁶ State of California Department of Fish and Game, 51, 56.
- ²⁹⁷ State of California Department of Fish and Game, 52.
- ²⁹⁸ State of California Department of Fish and Game, 62.
- ²⁹⁹ State of California Department of Fish and Game, 85.
- ³⁰⁰ State of California Department of Fish and Game, 6, 33–56.
- ³⁰¹ State of California Department of Fish and Game, 86.
- ³⁰² State of California Department of Fish and Game, 86.
- ³⁰³ State of California Department of Fish and Game, 33, 55.
- ³⁰⁴ State of California Department of Fish and Game, 9.
- ³⁰⁵ State of California Department of Fish and Game, 57.
- ³⁰⁶ State of California Department of Fish and Game, 53.
- ³⁰⁷ State of California Department of Fish and Game, 58.
- ³⁰⁸ State of California Department of Fish and Game, 58.
- ³⁰⁹ State of California Department of Fish and Game, 58.

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- ³¹⁰ State of California Department of Fish and Game, 58.
- ³¹¹ State of California Department of Fish and Game, 58.
- ³¹² California Department of Water Resources, “Eel River Basin Environmental Studies - 1974 Progress Report.”
- ³¹³ California State Legislature, California Wild and Scenic Rivers Act.
- ³¹⁴ State of California Department of Fish and Game, “Natural Resources of the Eel River Delta,” i, 2.
- ³¹⁵ California Department of Water Resources, “Eel River Basin Environmental Studies - 1974 Progress Report,” i.
- ³¹⁶ California Department of Water Resources, 4.
- ³¹⁷ California Department of Water Resources, 5.
- ³¹⁸ California Department of Water Resources, 6.
- ³¹⁹ California Department of Water Resources, 5.
- ³²⁰ California Department of Water Resources, 49.
- ³²¹ California Department of Water Resources, 51.
- ³²² California Department of Water Resources, 51.
- ³²³ California Department of Water Resources, 55.
- ³²⁴ California Department of Water Resources, 5.
- ³²⁵ California Department of Water Resources, 5, 60.
- ³²⁶ California Department of Water Resources, 63.
- ³²⁷ California Department of Water Resources, 55.
- ³²⁸ California Department of Water Resources, 56.
- ³²⁹ California Department of Water Resources, 56.
- ³³⁰ California Department of Water Resources, 56.
- ³³¹ California Department of Water Resources, 56.
- ³³² California Department of Water Resources, 57.
- ³³³ California Department of Water Resources, 57.
- ³³⁴ California Department of Water Resources, 57.
- ³³⁵ MacArthur, “On the Relative Abundance of Bird Species”; Kingsland, *Modeling Nature: Episodes in the History of Population Ecology*.
- ³³⁶ MacArthur, “Note on Mrs. Pielou’s Comments.”
- ³³⁷ California Department of Water Resources, “Eel-Russian River Streamflow Augmentation Studies.”
- ³³⁸ United States Army Corps of Engineers, San Francisco District, “Eel River Basin Resource Analysis.”
- ³³⁹ Johnson, “The Land-Use History of the Coast Range Preserve, Mendocino County, California”; “Reserve History | Angelo Coast Range Reserve.”
- ³⁴⁰ Johnson, “The Land-Use History of the Coast Range Preserve, Mendocino County, California,” 204–5.
- ³⁴¹ Richards, “Pilot Calibration of the Elder Creek Watershed,” 8; “Reserve History | Angelo Coast Range Reserve.”
- ³⁴² Johnson, “The Land-Use History of the Coast Range Preserve, Mendocino County, California,” 203–4; “Reserve History | Angelo Coast Range Reserve.”
- ³⁴³ Johnson, “The Land-Use History of the Coast Range Preserve, Mendocino County, California,” 204.
- ³⁴⁴ Johnson, “The Land-Use History of the Coast Range Preserve, Mendocino County, California.”
- ³⁴⁵ Johnson.
- ³⁴⁶ Nelson, “Richard H. Goodwin, 96, Leader in Land Conservation.”
- ³⁴⁷ “Reserve History | Angelo Coast Range Reserve.”
- ³⁴⁸ “Reserve History | Angelo Coast Range Reserve”; Ford and Norris, “The University of California Natural Reserve System,” August 1, 1988.
- ³⁴⁹ Dexter, “History of the Ecologists’ Union”; Adams, *The Future of the Wild: Radical Conservation for a Crowded World*; The Nature Conservancy, “Who We Are - Our History”; Luke, *Ecocritique: Contesting the Politics of Nature, Economy, and Culture*.
- ³⁵⁰ Adams, *The Future of the Wild: Radical Conservation for a Crowded World*.
- ³⁵¹ Shelford, “The Organization of the Ecological Society of America 1914-19”; White, “The First Ten Years”; The Nature Conservancy, “Who We Are - Our History”; Adams, *The Future of the Wild: Radical Conservation for a Crowded World*.
- ³⁵² Shelford, “Ecological Succession. I. Stream Fishes and the Method of Physiographic Analysis”; Shelford and Powers, “An Experimental Study of the Movements of Herring and Other Marine Fishes”; Shelford, “Faith in the Results of Controlled Laboratory Experiments as Applied in Nature”; Tjossem, “Victor Shelford.”
- ³⁵³ Shelford, “Twenty-Five-Year Effort at Saving Nature for Scientific Purposes”; Adams, *The Future of the Wild: Radical Conservation for a Crowded World*.
- ³⁵⁴ Adams, *The Future of the Wild: Radical Conservation for a Crowded World*.

- ³⁵⁵ Dexter, "History of the Ecologists' Union"; Adams, *The Future of the Wild: Radical Conservation for a Crowded World*, 51; The Nature Conservancy, "Who We Are - Our History."
- ³⁵⁶ Peluso, "Coercing Conservation?"; Luke, *Ecocritique: Contesting the Politics of Nature, Economy, and Culture*; Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks*; Jacoby, *Crimes Against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation*; Kosek, *Understories: The Political Life of Forests in Northern New Mexico*; West, Igoe, and Brockington, "Parks and Peoples"; Igoe, Neves, and Brockington, "A Spectacular Eco-Tour around the Historic Bloc"; Kelly, "Conservation Practice as Primitive Accumulation."
- ³⁵⁷ Johnson, "The Land-Use History of the Coast Range Preserve, Mendocino County, California," 21; Richards, "Pilot Calibration of the Elder Creek Watershed," 9.
- ³⁵⁸ Johnson, "The Land-Use History of the Coast Range Preserve, Mendocino County, California"; Richards, "Pilot Calibration of the Elder Creek Watershed."
- ³⁵⁹ Richards, "Pilot Calibration of the Elder Creek Watershed," 7.
- ³⁶⁰ Angelo Coast Range Reserve, "Publications"; Richards, "Pilot Calibration of the Elder Creek Watershed." We should recall that just northeast of the NCCRP, in Humboldt Redwoods State Park, during the same period Richards' was undertaking his research, Becking (1968) was also calibrating soils.
- ³⁶¹ Richards, "Pilot Calibration of the Elder Creek Watershed," 22.
- ³⁶² Richards, 22.
- ³⁶³ Richards, 22.
- ³⁶⁴ Richards, 22.
- ³⁶⁵ Richards, 23–32.
- ³⁶⁶ Richards, 51–63.
- ³⁶⁷ Richards, 23–24.
- ³⁶⁸ Heidegger, "Modern Science, Metaphysics, and Mathematics."
- ³⁶⁹ Richards, "Pilot Calibration of the Elder Creek Watershed," 40.
- ³⁷⁰ Angelo Coast Range Reserve, "Publications."
- ³⁷¹ Angelo Coast Range Reserve.
- ³⁷² Barrows and Balderston, "Roost Characteristics and Behavioral Thermoregulation in the Spotted Owl."
- ³⁷³ Trush, "The Influence of Channel Morphology and Hydrology on Spawning Populations of Steelhead Trout in South Fork Eel River Tributaries."
- ³⁷⁴ Barrows, "Cool Owls of the Old Forest"; Angelo Coast Range Reserve, "Publications."
- ³⁷⁵ Barrows, "Habitat Relations of Winter Wrens in Northern California"; Angelo Coast Range Reserve, "Publications."
- ³⁷⁶ Teague, Knight, and Teague, "Stream Microhabitat Selectivity, Resource Partitioning, and Niche Shifts in Grazing Caddisfly Larvae."
- ³⁷⁷ Teague, Knight, and Teague, 3.
- ³⁷⁸ Teague, Knight, and Teague, 3.
- ³⁷⁹ Teague, Knight, and Teague, 3.
- ³⁸⁰ Teague, Knight, and Teague, 4.
- ³⁸¹ Barrows, "Diet Shifts in Breeding and Nonbreeding Spotted Owls."
- ³⁸² Hill and Knight, "Experimental Analysis of the Grazing Interaction Between a Mayfly and Stream Algae."
- ³⁸³ Hill and Knight, 1956.
- ³⁸⁴ Hill and Knight, 1956.
- ³⁸⁵ Hill and Knight, 1962.
- ³⁸⁶ Hill and Knight, 1956.
- ³⁸⁷ Power, "Curriculum Vitae: Mary Eleanor Power."
- ³⁸⁸ Matthews, Power, and Stewart, "Depth Distribution of *Camptostoma* Grazing Scars in an Ozark Stream"; Power and Stewart, "Disturbance and Recovery of an Algal Assemblage Following Flooding in an Oklahoma Stream."
- ³⁸⁹ Power, "Curriculum Vitae: Mary Eleanor Power."
- ³⁹⁰ Ford and Norris, "The University of California Natural Reserve System," August 1, 1988; Power, "Curriculum Vitae: Mary Eleanor Power."
- ³⁹¹ Feminella, Power, and Resh, "Periphyton Responses to Invertebrate Grazing and Riparian Canopy in Three Northern California Coastal Streams."
- ³⁹² Feminella, Power, and Resh, 446, 448.
- ³⁹³ U.S. Fish and Wildlife Service, "Eel River, California."
- ³⁹⁴ Johnson, "The Land-Use History of the Coast Range Preserve, Mendocino County, California."

³⁹⁵ Ford and Norris, “The University of California Natural Reserve System,” August 1, 1988.

³⁹⁶ Norris, “California’s Natural Land and Water Reserve System.”

³⁹⁷ Ford and Norris, “The University of California Natural Reserve System,” August 1, 1988.

³⁹⁸ Power, “Effects of Fish in River Food Webs.”

³⁹⁹ Power, “Eyes on the Eel: Synoptic Summer Surveys of Food Web Biomass in the South Fork and Mainstem Eel River.”

Chapter 3

⁴⁰⁰ From here forward, I ask the reader to listen to *causal* as it speaks of causation in general, whether formal, material, efficient, or final. (One can ask what *cause* is and why it is sensed and, thus, understood as it is contemporarily, though I save this for later work.) Epistemologically metaphysically and, thereof, scientifically-epistemologically, however, what is generally sensed, understood, considered, spoken of, written of, and evaluated, examined, and explained is efficient causation. Epistemologically metaphysically, the other three are common sensibly given to the world and, thus, generally understood to be modalities of efficient causation. Epistemologically metaphysically, even final causation is generally sensed, understood, considered, spoken of, written of, and evaluated, examined, and explained as a modality of efficient causation. I discuss this briefly in chapter 5.

⁴⁰¹ Courchamp and Bradshaw, “100 Articles Every Ecologist Should Read.”

⁴⁰² For some off-the-cuff perspective on the scientific accomplishment and influence this ranking indicates, I may do the following: In issue one of volume one (1920) of the Ecological Society of America’s flagship journal *Ecology* there were 7 research articles. In issue one of volume fifty (1969) there were 23. In issue one of volume one hundred (2019) there were 21. Let us say the average of number of research articles per issue (7, 23, 21) is 17. In *Ecology* 1 there were 4 issues. In *Ecology* 50 there were 6 issues. In *Ecology* 100 there were 12 issues. Let us say the average of number of issues per volume is 7.3. If I multiply 17 articles by 7.3 issues by 100 years of volumes (17 x 7.3 x 100) I arrive at 12,410 articles published in *Ecology* over 100 years of its publication. This is an underestimate. However, if I divide 100 by 12,410 I arrive at 0.0081, or 0.81%. If there were, from 1920 to 2019, only one universal journal – *Ecology* – that published articles from all of the fields of the ecological sciences combined, then Power’s 1990 article, its readership, and its impact on the science of ecology would rank among the top 0.81% of the entirety of these contributions. Clearly, Power’s accomplishment, her article’s readership, and this article’s influence is *vastly* greater. For counts, see “Front Matter,” 1920; “Front Matter,” 1969; “Issue Information.”

⁴⁰³ Stevens, “Theory on the Number of Links in Food Chain Is Upheld in River Test.”

⁴⁰⁴ Power, “Effects of Fish in River Food Webs.”

⁴⁰⁵ Georgakakos, “Species Interactions Both Hinder and Help Salmon Recovery in the Eel River”; Power, “Introduction.” During his finishing talk, Georgakakos, a former doctoral student of Power, described her ecological food web diagram as “endearing.”

⁴⁰⁶ *Hesperoleucus symmetricus* and *Oncorhynchus mykiss*, respectively

⁴⁰⁷ Power, “Effects of Fish in River Food Webs,” 813.

⁴⁰⁸ Power, 811.

⁴⁰⁹ Power, 811.

⁴¹⁰ See Appendix A

⁴¹¹ Newton, *The Mathematical Principles of Natural Philosophy*; Newton, *Newton’s Principia. The Mathematical Principles of Natural Philosophy*.

⁴¹² Power, “Effects of Fish in River Food Webs,” 811.

⁴¹³ Liddell and Scott, “Τροφικός, ἡ, Ον”; Liddell and Scott, “Τροφή, ἡ.”

⁴¹⁴ Power, “Effects of Fish in River Food Webs,” 811.

⁴¹⁵ Power, 811.

⁴¹⁶ “The role of fish in river food webs has been hotly debated. The earlier notion that physical factors play stronger roles than trophic interactions in structuring ecological communities in flowing waters (1) is being challenged by the view that both matter (2, 3). Although some field studies have shown that herbivorous fish can directly control algal standing crops in rivers (3, 4), and by implication must influence other parts of algal-based food webs, no studies in rivers have demonstrated that effects of predatory fish can cascade through food webs to alter primary producers, as has been show in lakes (5, 6). In this report, I present experimental evidence of strong fish effects on both predatory and herbivorous insects, and on macro- and epiphytic algae in a river. These effects are direct and indirect, and propagate through four trophic levels in the river food web.”

⁴¹⁷ Power, "Effects of Fish in River Food Webs," 811.

⁴¹⁸ As with *to play a role* or *to have a role*, for example, I must qualify: *Ecological* (i.e. scientific-epistemological) factor is *ecological* (i.e. scientific-epistemological) cause. To ecologically factor is to ecologically cause. I notice, again, that Power writes of (abiotic) factors without qualification. I may plausibly suspect, then, that insofar as something is a factor at all, as factor, Power understands it to be, at least, scientific-epistemological (and possibly, thereof, ecological). Likewise, insofar as somethings factors, she understands it to scientifically-epistemologically (and possibly, thereof, ecologically) factor. To be a factor is to be scientifically-epistemologically.

⁴¹⁹ Power, "Habitat Quality and the Distribution of Algae-Grazing Catfish in a Panamanian Stream"; Power, Matthews, and Stewart, "Grazing Minnows, Piscivorous Bass, and Stream Algae"; Power, Stewart, and Matthews, "Grazer Control of Algae in an Ozark Mountain Stream."

⁴²⁰ I could continue: Perhaps, then, the scientist-epistemologist is herself a means to activate and, thereby, actualize, or make, revelations if, for example, her activity-reactivity both demonstrates and actualizes or, what is the same, actively produces and reproduces her nature—her nature not as a scientist-epistemologist—*who* she is—but rather as a human being interactively existing in and of the scientific-epistemological world in proactively interactive community with others of the biological species, human being (*Homo sapiens sapiens*)—i.e. *what* she is. Marx, for example, early on gave lawful human voice to this understanding. See Marx, "Comments on James Mill, *Éléments d'économie Politique*," pp. 216-17: "Exchange, both of human activity within production itself and of *human products* against one another, is equivalent to *species-activity* and *species-spirit*, the real, conscious and true mode of existence of which is *social* activity and *social* enjoyment. Since *human nature* is the *true community* of men, by manifesting their *nature* men *create*, produce, the *human community*, the social entity, which is no abstract universal power opposed to the single individual, but is the essential nature of each individual, his own activity, his own life, his own spirit, his own wealth. Hence this *true community* does not come into being through reflection, it appears owing to the *need* and *egoism* of individuals, i.e., it is produced directly by their life activity itself." See also Han, "The New Vantage Point on Comments on James Mill."

⁴²¹ Power's understandings of interaction and interactor are no different than R. M. May's, R. H. MacArthur's, and R. T. Paine's. See, for example, MacArthur, "Strong, or Weak, Interactions?"; May and MacArthur, "Niche Overlap as a Function of Environmental Variability"; May, *Stability and Complexity in Model Ecosystems*, 1973; Paine, "Food Webs: Linkage, Interaction Strength, and Community Infrastructure"; Paine, "Food Webs: Road Maps of Interactions or Grist for Theoretical Development?"

⁴²² Interactors are either strong or weak. Interactions are either strong or weak. Causes are either strong or weak. Strong or weak is the evaluation of the effectivity of the cause relational to other causes under examination and evaluation. Strong and weak is not the present author's language; he follows the authors of key primary ecological sources, many of which are seminal publications in history of ecology. These authors do recognize the possibility of gradients of strength and weakness. Nevertheless, interactors are either strong or weak, though they may be stronger or weaker overall, or stronger or weaker as compared to some other interactor or group or category of interactors. The strength of any particular interactor is believed to be context dependent and can change. Again, the gradient of the context dependence is strong to weak. For the original distinction between strong and weak interactors, see MacArthur, "Strong, or Weak, Interactions?"; May, "Will a Large Complex System Be Stable?"; May, *Stability and Complexity in Model Ecosystems*. MacArthur suggests that many, if not most, interactors will be on the "borderline the between strong and weak." During the 1960s, Robert H. MacArthur collaborated closely with his older brother, John W. MacArthur, Jr., who has been described as a "dominant influence" on his younger brother throughout the latter's life. See MacArthur and MacArthur, "On Bird Species Diversity"; MacArthur, MacArthur, and Preer, "On Bird Species Diversity. II. Prediction of Bird Census from Habitat Measurements"; Wilson and Hutchinson, "Robert Helmer MacArthur, 1930-1972." J. W. MacArthur, Jr., received a Master's Degree in physics from the University of Chicago and his Ph.D. in physics from Rensselaer Polytechnic Institute in 1953 with a dissertation titled "Alpha-particle induced pulses in cadmium-sulfide." See "John W. MacArthur"; MacArthur, "Alpha-Particle Induced Pulses in Cadmium-Sulphide." Shortly after R. H. MacArthur published "Strong, or Weak, Interactions?" he co-authored "Niche overlap as a function of environmental variability" with Robert M. May. See May and MacArthur, "Niche Overlap as a Function of Environmental Variability." During this same year, R. M. May published the seminal work, *Stability and Complexity in Model Ecosystems* as well as a highly influential article in *Nature*, "Will a Large Complex System Be Stable?" Both *Stability and Complexity* and "Will a Large Complex System Be Stable?" are about ecological interactions and their strengths. Similarly to John W. MacArthur, Jr., Robert M. May trained as a theoretical physicist, receiving his doctorate in 1959. His dissertation was titled "Investigations towards an understanding of superconductivity." Both J. W. MacArthur, Jr. and R. M. May, at the very least, generally understood the four fundamental interactions of contemporary particle physics and therefore, with the exception of gravitation, quantum field theory: gravitational, electromagnetic, strong nuclear, and weak nuclear. The latter two

are often abbreviated simply as the strong and weak (fundamental) interactions. See May, "Investigations towards an Understanding of Superconductivity." Robert T. Paine (1980), citing MacArthur (1972), follows MacArthur's distinction: interactors are either strong or weak. Paine (1980) also cites May (1973). As did MacArthur, Paine recognizes degrees of strength and weakness. These are, nonetheless, degrees between strongest and weakest. See Paine, "Food Webs." In another pivotal publication, Paine (1988) again cites R. M. May's *Stability and Complexity* in direct reference to interaction strength. See Paine, "Road Maps of Interactions or Grist for Theoretical Development?" See also Paine, "Food-Web Analysis through Field Measurement of per Capita Interaction Strength." Power follows R. H. MacArthur, R. M. May, and R. T. Paine with no discernable difference or alteration of understanding or language of strong and weak interactors. As did they, she recognizes a gradient between strongest and weakest. This remains the case until the near present, as reflected in the dates of the articles below. Power cites Paine (1980) in all of the following publications. She cites MacArthur (1972) in 1985, "Grazing minnows." See Power, Matthews, and Stewart, "Grazing Minnows, Piscivorous Bass, and Stream Algae"; Power, "Top-Down and Bottom-Up Forces in Food Webs"; Power, "Habitat Heterogeneity and The Functional Significance of Fish in River Food Webs"; Power, Marks, and Parker, "Variation in the Vulnerability of Prey to Different Predators"; Power, Dietrich, and Finlay, "Dams and Downstream Aquatic Biodiversity"; Power et al., "Challenges in the Quest for Keystones"; Power, Parker, and Wootton, "Disturbance and Food Chain Length in Rivers"; Power and Dietrich, "Food Webs in River Networks"; Power, Parker, and Dietrich, "Seasonal Reassembly of a River Food Web"; Power, Holomuzki, and Lowe, "Food Webs in Mediterranean Rivers."

⁴²³ Power, Matthews, and Stewart, "Grazing Minnows, Piscivorous Bass, and Stream Algae"; Power, "Top-Down and Bottom-Up Forces in Food Webs"; Power, "Habitat Heterogeneity and The Functional Significance of Fish in River Food Webs"; Power, Marks, and Parker, "Variation in the Vulnerability of Prey to Different Predators"; Power, Dietrich, and Finlay, "Dams and Downstream Aquatic Biodiversity"; Power et al., "Challenges in the Quest for Keystones"; Power, Parker, and Wootton, "Disturbance and Food Chain Length in Rivers"; Power and Dietrich, "Food Webs in River Networks"; Power, Parker, and Dietrich, "Seasonal Reassembly of a River Food Web"; Power, Holomuzki, and Lowe, "Food Webs in Mediterranean Rivers."

⁴²⁴ Paine, "Food Webs"; Paine, "Food Webs: Road Maps of Interactions or Grist for Theoretical Development?" See also Paine, "Food-Web Analysis through Field Measurement of per Capita Interaction Strength."

⁴²⁵ Smith, "Spatial Heterogeneity, Stability, and Diversity in Ecosystems"; Paine, "Frederick Edward Smith."

⁴²⁶ Paine, "Food Web Complexity and Species Diversity"; Paine, "A Note on Trophic Complexity and Community Stability."

⁴²⁷ Hairston, Smith, and Slobodkin, "Community Structure, Population Control, and Competition," 1960; Golley, *A History of the Ecosystem Concept in Ecology: More than the Sum of Its Parts*, 207.

⁴²⁸ McNaughton, "Diversity and Stability of Ecological Communities," 516.

⁴²⁹ Smith, "Effects of Enrichment in Mathematical Models."

⁴³⁰ Power, "Top-Down and Bottom-Up Forces in Food Webs"; Power, "Habitat Heterogeneity and The Functional Significance of Fish in River Food Webs."

⁴³¹ MacArthur, "Strong, or Weak, Interactions?," 179.

⁴³² MacArthur, 179; Hutchinson, "Homage to Santa Rosalia or Why Are There So Many Kinds of Animals?"

⁴³³ Wilson and Hutchinson, "Robert Helmer MacArthur, 1930-1972."

⁴³⁴ MacArthur and MacArthur, "On Bird Species Diversity"; MacArthur, MacArthur, and Preer, "On Bird Species Diversity. II. Prediction of Bird Census from Habitat Measurements."

⁴³⁵ "John W. MacArthur"; MacArthur, "Alpha-Particle Induced Pulses in Cadmium-Sulphide."

⁴³⁶ "John W. MacArthur."

⁴³⁷ MacArthur, "Fluctuations of Animal Populations and a Measure of Community Stability"; MacArthur, "On the Relative Abundance of Bird Species"; Wilson and Hutchinson, "Robert Helmer MacArthur, 1930-1972." In his 1955 article, MacArthur draws heavily upon Shannon and Weaver, *The Mathematical Theory of Communication*.

⁴³⁸ May and MacArthur, "Niche Overlap as a Function of Environmental Variability."

⁴³⁹ May, *Stability and Complexity in Model Ecosystems*, 1973, 49.

⁴⁴⁰ May, 49.

⁴⁴¹ May, "Will a Large Complex System Be Stable?," 414.

⁴⁴² May, 414.

⁴⁴³ Holling, "Resilience and Stability of Ecological Systems," 4.

⁴⁴⁴ Holling, 4; May, "Limit Cycles in Predator-Prey Communities."

⁴⁴⁵ Gardner and Ashby, "Connectance of Large Dynamic (Cybernetic) Systems."

⁴⁴⁶ Margalef, *Perspectives in Ecological Theory*.

⁴⁴⁷ Margalef, 4-5.

- ⁴⁴⁸ Margalef, 6–7.
- ⁴⁴⁹ May, “Investigations towards an Understanding of Superconductivity.”
- ⁴⁵⁰ May, “Stability in Multispecies Community Models”; Krebs, Hassell, and Godfray, “Lord Robert May of Oxford OM. 8 January 1936—28 April 2020.”
- ⁴⁵¹ May, *Stability and Complexity in Model Ecosystems*, 1973, 64.
- ⁴⁵² May, 65.
- ⁴⁵³ Ohanian and Markert, *Physics for Engineers and Scientists*, 2007, vol. 3, chap. 41.
- ⁴⁵⁴ Ohanian and Markert, vol. 3, chap. 41; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*, sec. 13.8.
- ⁴⁵⁵ Braibant, Giacomelli, and Spurio, *Particles and Fundamental Interactions: An Introduction to Particle Physics*, 103; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Penrose, *The Road to Reality: A Complete Guide to the Laws of the Universe*; Hossenfelder, *Existential Physics: A Scientist’s Guide to Life’s Biggest Questions*.
- ⁴⁵⁶ Braibant, Giacomelli, and Spurio, *Particles and Fundamental Interactions: An Introduction to Particle Physics*; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Penrose, *The Road to Reality: A Complete Guide to the Laws of the Universe*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007; Rennie and Law, “Fundamental Interactions”; Gribbin, “Forces of Nature.”
- ⁴⁵⁷ Rennie and Law, “Fundamental Interactions.”
- ⁴⁵⁸ Ohanian and Markert, *Physics for Engineers and Scientists*, 2007, 3:1406.
- ⁴⁵⁹ Braibant, Giacomelli, and Spurio, *Particles and Fundamental Interactions: An Introduction to Particle Physics*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Penrose, *The Road to Reality: A Complete Guide to the Laws of the Universe*; Rennie and Law, “Fundamental Interactions”; Gribbin, “Forces of Nature.”
- ⁴⁶⁰ Ohanian and Markert, *Physics for Engineers and Scientists*, 2007, vol. 3, chap. 41.
- ⁴⁶¹ Wilczek, *Fundamentals: Ten Keys to Reality*, chap. 4.
- ⁴⁶² Wilczek, chap. 4.
- ⁴⁶³ Davies, “Particles Do Not Exist.”
- ⁴⁶⁴ May, “Stability in Multispecies Community Models”; May, “Will a Large Complex System Be Stable?”; May, *Stability and Complexity in Model Ecosystems*, 1973; Volterra, “Fluctuations in the Abundance of a Species Considered Mathematically”; Volterra, “Variations and Fluctuations of the Number of Individuals in Animal Species Living Together”; GOEL, MAITRA, and MONTROLL, “On the Volterra and Other Nonlinear Models of Interacting Populations”; Berryman, “The Conceptual Foundations of Ecological Dynamics.”
- ⁴⁶⁵ Gause, *The Struggle for Existence*, 18–19.
- ⁴⁶⁶ Park, “Analytical Population Studies in Relation to General Ecology,” sec. “Discussion of the paper by Thomas Park, ‘Analytical population studies in relation to general ecology’ by Dr. G. F. Gause [p. 255]”; Hardin, “The Competitive Exclusion Principle.”
- ⁴⁶⁷ Hutchinson, “Circular Causal Systems in Ecology”; Birch, “The Intrinsic Rate of Natural Increase of an Insect Population”; Hutchinson, “Concluding Remarks”; Cole, “The Population Consequences of Life History Phenomena”; Smith, “Quantitative Aspects of Population Growth”; Smith, “Experimental Methods in Population Dynamics”; Park, “Experimental Studies of Interspecies Competition II. Temperature, Humidity, and Competition in Two Species of *Tribolium*”; Paine, “Food Web Complexity and Species Diversity”; Oksanen et al., “Exploitation Ecosystems in Gradients of Primary Productivity.”
- ⁴⁶⁸ Lotka, *Elements of Physical Biology*, 344.
- ⁴⁶⁹ Forbes, “The Lake as a Microcosm,” 550.
- ⁴⁷⁰ Mayr, “Adam Smith and the Concept of the Feedback System.”
- ⁴⁷¹ Darwin and Wallace, “On the Tendency of Species to Form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection.”
- ⁴⁷² Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, 187.
- ⁴⁷³ Darwin, 309.
- ⁴⁷⁴ Darwin, 75–76.
- ⁴⁷⁵ Darwin, 64.
- ⁴⁷⁶ Darwin, 78–79.
- ⁴⁷⁷ Elder Creek Ecologist, Anonymous Elder Creek Ecologist on the Ecology of the Eel River.
- ⁴⁷⁸ Here I quote an ecologist I interviewed for this study. See also Gross and Averill, “Evolution and Patriarchal Myths of Scarcity and Competition”; Urry et al., *Campbell Biology*, chap. 54; Wootton, “The Nature and

- Consequences of Indirect Effects in Ecological Communities”; Wootton and Emmerson, “Measurement of Interaction Strength in Nature”; Barker et al., “Synthesizing Perspectives on the Evolution of Cooperation within and between Species”; Bruno, Stachowicz, and Bertness, “Inclusion of Facilitation into Ecological Theory”; Callaway, “Positive Interactions among Plants”; Callaway, *Positive Interactions and Interdependence in Plant Communities*; Stachowicz, “Mutualism, Facilitation, and the Structure of Ecological Communities”; Zélé et al., “Ecology and Evolution of Facilitation among Symbionts.”
- ⁴⁷⁹ Power, Marks, and Parker, “Variation in the Vulnerability of Prey to Different Predators.”
- ⁴⁸⁰ For confirmation, see Power et al., “Challenges in the Quest for Keystones,” 612.
- ⁴⁸¹ MacArthur, “Strong, or Weak, Interactions?”; May, “Will a Large Complex System Be Stable?”; May, *Stability and Complexity in Model Ecosystems*, 1973.
- ⁴⁸² Paine, “Food Webs”; Paine, “Food Webs: Road Maps of Interactions or Grist for Theoretical Development?”; Paine, “Food-Web Analysis through Field Measurement of per Capita Interaction Strength.”
- ⁴⁸³ “Validly methodologically validated” is not pleonastic, as I will discuss in future work.
- ⁴⁸⁴ Lindeman, “The Trophic-Dynamic Aspect of Ecology”; Thienemann, “Der Nahrungskreislauf Im Wasser.”
- ⁴⁸⁵ Odum, *Fundamentals of Ecology*, chap. 3; Elton, *Animal Ecology*, chap. V.
- ⁴⁸⁶ Power, “Effects of Fish in River Food Webs,” 811.
- ⁴⁸⁷ Paine, “Food Web Complexity and Species Diversity”; Paine, “A Note on Trophic Complexity and Community Stability”; Paine, “Intertidal Community Structure. Experimental Studies on the Relationship between a Dominant Competitor and Its Principal Predator”; Paine, “Food Webs.”
- ⁴⁸⁸ Power, “Effects of Fish in River Food Webs,” 813.
- ⁴⁸⁹ See, for example, Power, “Top-Down and Bottom-Up Forces in Food Webs,” 737.
- ⁴⁹⁰ Newton, *Newton’s Principia. The Mathematical Principles of Natural Philosophy*, 83.
- ⁴⁹¹ Wheeler, *A Journey into Gravity and Spacetime*, xi–xii.
- ⁴⁹² Carroll, *Spacetime and Geometry: An Introduction to General Relativity*, 151, 155, 158.
- ⁴⁹³ Carroll, 166; Westphal et al., “Measurement of Gravitational Coupling between Millimetre-Sized Masses”; Wilczek, *The Lightness of Being: Mass, Ether, and the Unification of Forces*, 101, 234; Braibant, Giacomelli, and Spurio, *Particles and Fundamental Interactions: An Introduction to Particle Physics*, 76–78; Gribbin, “Coupling Constant”; Feynman, *The Theory of Fundamental Processes*; Feynman, Leighton, and Sands, *The Feynman Lectures on Physics*, I: Mainly Mechanics, Radiation, and Heat:2.17, 51.9.
- ⁴⁹⁴ Gribbin, “Casimir Effect”; Gribbin, “Coupling Constant”; Gribbin, “CPT Conservation”; Gribbin, “Quantum Fluctuation”; Gribbin, “Quantum Vacuum”; Gribbin, “Renormalization,” 1998; Gribbin, “Self-Interaction”; Gribbin, “Vacuum”; Gribbin, “Vacuum Fluctuation”; Gribbin, “Zero-Point Energy”; Feynman, “28. Self-Energy of the Electron”; Feynman, “Electrons and Their Interactions”; Feynman, *The Theory of Fundamental Processes*; Penrose, *The Road to Reality: A Complete Guide to the Laws of the Universe*, 638–40; Carroll, “How Quantum Field Theory Becomes ‘Effective’”; Carroll, *Something Deeply Hidden: Quantum Worlds and the Emergence of Spacetime*, 325–34; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007, vol. 3, sec. 41.4, 41.5.
- ⁴⁹⁵ Why, if I give Power and the others the benefit of the doubt, must I conclude that not one of them has been aware of the scientific-epistemological problems of which I write, much less of these problems’ scientific-epistemological implications of scientific-epistemological research, explanation, and knowledge-making? I must conclude this because all of these parties are ethically, if not morally, responsible to—at the very least—recognize and acknowledge a scientific-epistemological problem in their own explanations or those of explanations in the work of the scientists-epistemologists they mentor, teach, read, review, publish, cite, and so on. To be aware of such a scientific-epistemological problem and *choose* not to, minimally, formally bring it to the attention of other scientists-epistemologists, whether colleagues or students, is unethical—if not immoral—in science-epistemology, at least, because it is both knowingly dishonest and knowingly deceptive. For an example of a strict empiricist who, at least in his criticisms and critiques, though never with unambiguous scientific-epistemological consistency, generally falls in line with the tradition of G. Berkeley, D. Hume, E. Mach, and P. W. Bridgeman, see Peters, “Some General Problems for Ecology Illustrated by Food Web Theory”; Peters, *A Critique for Ecology*. Peters emphatically discourages ecologists from attending to or seeking to reveal and evaluate causes. He does not, however, and he *cannot* do the same for actors and actions, reactors and reactions (i.e. effects), and, thus, interactors and interactions.
- ⁴⁹⁶ Power, Parker, and Wootton, “Disturbance and Food Chain Length in Rivers”; Paine, “Food Webs.”
- ⁴⁹⁷ Power, Parker, and Wootton, “Disturbance and Food Chain Length in Rivers,” 288.
- ⁴⁹⁸ Power, “Hydrologic and Trophic Controls of Seasonal Algal Blooms in Northern California Rivers”; Wootton, Parker, and Power, “Effects of Disturbance on River Food Webs”; Power, “Oct 30: Interaction Strengths, Context Dependence.”
- ⁴⁹⁹ *Riverine Food Webs: How Flow Rates Affect Biomass*; Power, “Effects of Fish in River Food Webs.”

⁵⁰⁰ Power, Parker, and Wootton, “Disturbance and Food Chain Length in Rivers.”

⁵⁰¹ Power, “Effects of Fish in River Food Webs,” 813.

⁵⁰² Unlike steelhead, California roach are not piscivorous.

⁵⁰³ In the case of the South Fork Eel River, “Drought” is the only relevant qualifier as of October 2017. The removal from the South Fork of the Benbow Dam, whose construction was begun in 1931 and completed in 1937, was the second largest concrete structure removed from a California riverine waterway as of 2017. This said, the University of California-Berkeley’s Angelo Coast Range Reserve—where Power undertook the studies corresponding to the 1990 and 1996 publications discussed here—is south of the dam’s former location and was unregulated by artificial impediment at the time of her research. There are, however, two other dams on the Eel River: the Cape Horn Dam and the Scott Dam. The Eel River, including its south fork, flows south to north. See *The Times-Standard*, “Benbow Dam Removal Completed”; California Department of Parks and Recreation, “Benbow State Recreation Area.”

⁵⁰⁴ Power, “Effects of Fish in River Food Webs,” 811, 813.

⁵⁰⁵ Ecologists, past or present, *overwhelmingly* understand “to control” to be the same as “to determine,” “to regulate,” “to limit,” and “to check.” These each are understood to be, fundamentally, “to cause.” The noun corresponding to each of these verbs is understood to be “a cause.” Likewise, they *overwhelmingly* do not ask what each of these is, or if they are the same. There are a very small number of exceptions over the years which I will have occasion to visit in future chapters. To preemptively clarify, I am not speaking here of “to control” the written word. Nor am I speaking of a term’s definition. I am speaking of what to control is and thus what the *word* says when spoken in voice or thought.

⁵⁰⁶ I recall the scientific-epistemological problem, if not scientific-epistemological contradiction, of scientifically-epistemologically discerning, distinguishing, and identifying—much less scientifically-epistemologically examining, evaluating, and testing—interactor from interaction. Hence, the above could read, instead, and with important scientific-epistemological implications: “Therefore, with figure 2, Power scientifically-epistemologically explains that large roach and juvenile steelhead, as secondary predators, cause a trophic cascade in which strong *interactions* alternately control or release the strong-interactor biological organisms comprising the populations of primary predators, herbivores, and producers further down the illustrated chains. These large effects, as she writes, are direct and indirect. The interactions between secondary predators and primary predators directly control the primary predators. The interactions between primary predators and the tuft-weaving release these algivores, whose populations increase. The interactions, in turn, between these chironomids and the primary producer, or algae, limit the latter, holding its populational biomass⁵⁰⁶ in check by consumption (which Power understands to be eating, feeding upon).”

⁵⁰⁷ See note 35.

⁵⁰⁸ Power, “Effects of Fish in River Food Webs,” 813.

⁵⁰⁹ Albertos and Mareels, *Feedback and Control for Everyone*; Åström and Murray, *Feedback Systems: An Introduction for Scientists and Engineers*; Richardson, *Feedback Thought: Social Science and Systems Theory*; Berryman, “The Conceptual Foundations of Ecological Dynamics”; Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*; Ashby, *An Introduction to Cybernetics*; Margalef, *Perspectives in Ecological Theory*.

⁵¹⁰ See note 25 concerning “Drought or Artificial Regulation.” For “Artificial Regulation” I may at present consider it strictly the abiotic concrete structure of a dam. The causes of this structure—immediate, ongoing, or sequentially prior—plunge us into scientific-epistemological explanatory difficulties to which I will return. Notably, they do likewise to Power, though she does not acknowledge as much.

⁵¹¹ Power, Parker, and Wootton, “Disturbance and Food Chain Length in Rivers,” 287.

⁵¹² For confirmation, see Figure 4 in Power et al., “Hydraulic Food-Chain Models,” 162. See also p. 160: “We recognize that the strengths of interaction between or among the trophic levels are modulated by the hydrologic changes accompanying the flood pulse.” Likewise, the authors explain that trophic linkages between species “form, break, and change in strength as environmental conditions change...” (p. 161). The authors do acknowledge, however, that “[t]here are few data quantifying how hydraulic parameters affect the performance of organisms likely to be dominant interactors in river food webs,” so the “elucidation of mechanistic linkages between physical environmental variables and species’ performance and impacts is one of the most crucial areas of research for the eventual application of models to actual problems” (p. 163). See Figure 14 in Power, Parker, and Dietrich, “Seasonal Reassembly of a River Food Web,” 278. See Power, Holomuzki, and Lowe, “Food Webs in Mediterranean Rivers,” 119: “River food webs are subject to two regimes of longitudinally varying ecological control: productivity and disturbance. *Light-limited* productivity increases as channels widen downstream. Time

windows for growth, however, shrink as discharge increases, substrate particle size decreases, and the frequencies of flood-driven mobilization increases downstream” [emphasis added].

⁵¹³ Power, “Effects of Fish in River Food Webs,” 811.

⁵¹⁴ Power and Rainey, “Food Webs and Resource Sheds: Towards Spatially Delimiting Trophic Interactions”; Power and Dietrich, “Food Webs in River Networks”; Power, “Food Webs in River Networks: Algal Mediated Linkages of Rivers to Watershed and Near-Shore Marine Ecosystems.”

⁵¹⁵ Power, “What Enables Trophic Cascades?,” 444.

⁵¹⁶ Power and Dietrich, “Food Webs in River Networks,” 451.

⁵¹⁷ Georgakakos, “Species Interactions Both Hinder and Help Salmon Recovery in the Eel River”; Power, “Food Webs in River Networks: Algal Mediated Linkages of Rivers to Watershed and Near-Shore Marine Ecosystems”; Power, “Drought, Floods, and Alternative States of Algal-Based River Food Webs: The Thirsty Eel”; Power, “Introduction.”

⁵¹⁸ Power, “Trophic Cascades in Rivers”; Power, “Oct 23: Trophic Cascades and Trophic Downgrading.” Power varies the first arrangement of this diagram slightly from time to time, exchanging a mayfly nymph for a tadpole, or vice versa. This variation can be found in the second and third arrangements of this diagram, as well.

⁵¹⁹ Power, “Trophic Cascades in Rivers.”

⁵²⁰ Power, “Food Webs in River Networks: Algal Mediated Linkages of Rivers to Watershed and Near-Shore Marine Ecosystems”; Power, “Aug 23: Introduction, Overview and Approaches to Ecology.”

⁵²¹ Power, “Oct 23: Trophic Cascades and Trophic Downgrading,” 29.

⁵²² Power, “Food Webs in River Networks: Algal Mediated Linkages of Rivers to Watershed and Near-Shore Marine Ecosystems”; Power, “Aug 23: Introduction, Overview and Approaches to Ecology.”

⁵²³ Power, “Trophic Cascades in Rivers”; Power, “Oct 23: Trophic Cascades and Trophic Downgrading.”

⁵²⁴ See Figure 6-2 in Power, Dietrich, and O’Sullivan, “Experimentation, Observation, and Inference in Rivers and Watershed Investigations,” 118.

⁵²⁵ See note 16. Along this 4-trophic level chain of strong ecological trophic interactions-interactors, Power discovers, discerns between, and identifies strong and weak interactors, which is to say, strong and weak causes.

⁵²⁶ Power, “Top-Down and Bottom-Up Forces in Food Webs,” 742.

⁵²⁷ See Figure 14 in Power, Parker, and Dietrich, “Seasonal Reassembly of a River Food Web,” 278.

⁵²⁸ Sculley et al., “Eighty Years of Food-Web Response to Interannual Variation in Discharge Recorded in River Diatom Frustules from an Ocean Sediment Core,” 10155.

⁵²⁹ Again, see note 16.

⁵³⁰ Again, see note 16.

⁵³¹ Power, Dietrich, and O’ Sullivan, “Experimentation, Observation, and Inference in River and Watershed Investigations,” 118; Power, Parker, and Dietrich, “Seasonal Reassembly of a River Food Web,” 278.

⁵³² Power, Marks, and Parker, “Variation in the Vulnerability of Prey to Different Predators.”

⁵³³ Power, Parker, and Wootton, “Disturbance and Food Chain Length in Rivers”; Power, Parker, and Dietrich, “Seasonal Reassembly of a River Food Web.”

⁵³⁴ Power, Parker, and Dietrich, “Seasonal Reassembly of a River Food Web.”

⁵³⁵ Wootton, Parker, and Power, “Effects of Disturbance on River Food Webs,” 290.

⁵³⁶ Power, Parker, and Dietrich, “Seasonal Reassembly of a River Food Web,” 277.

⁵³⁷ Power, Marks, and Parker, “Variation in the Vulnerability of Prey to Different Predators”; Power, “Oct 30: Interaction Strengths, Context Dependence.”

Chapter 4

⁵³⁸ Allee et al., *Principles of Animal Ecology*; Golley, *A History of the Ecosystem Concept in Ecology: More than the Sum of Its Parts*, 63; Worster, *Nature’s Economy: A History of Ecological Ideas*, 326.

⁵³⁹ Allee et al., *Principles of Animal Ecology*, 5.

⁵⁴⁰ Allee et al., 5.

⁵⁴¹ For example, see Macfadyen, *Animal Ecology: Aims and Methods*; Odum, *Fundamentals of Ecology*; Allan and Castillo, *Stream Ecology: Structure and Function of Running Waters*; Cain, Bowman, and Hacker, *Ecology*.

⁵⁴² Authors that cite Allee et al.’s *Principles of Animal Ecology* include, for example: McIntosh, *The Background of Ecology: Concept and Theory*; Mittman, *The State of Nature: Ecology, Community, and American Social Thought, 1900-1950*; Hagen, *An Entangled Bank*; Golley, *A History of the Ecosystem Concept in Ecology: More than the Sum of Its Parts*; Worster, *Nature’s Economy: A History of Ecological Ideas*; Kingsland, *Modeling Nature: Episodes in the History of Population Ecology*; Cooper, *The Science of the Struggle for Existence: On the Foundations of*

Ecology; Egerton, “Understanding Food Chains and Food Webs, 1700–1970”; and Bocking, *Ecologists and Environmental Politics*.

⁵⁴³ Allee et al., *Principles of Animal Ecology*, 495.

⁵⁴⁴ The space-time community lattice is *utilized*. See Allee et al., 495, 562, 578.

⁵⁴⁵ Allee et al., 6.

⁵⁴⁶ While this is readily apparent throughout the book, see, for example, Allee et al., 495.

⁵⁴⁷ Allee et al., 6.

⁵⁴⁸ See, for example, pp. 6, 25, 32, 241, 369, 370, 414, 437, 495, and 530.

⁵⁴⁹ Allee et al., 6: “The reaction to these needs may be summarized by the concept of a ‘drive’ towards favorable ecological position.”

⁵⁵⁰ The scientific-epistemological entailments and implications of Allee *et al.*’s understandings go further than one might initially suspect or comprehend. For example, see Allee et al., 697–98 concerning *action*, *reaction*, and *coaction* while noting the section and chapter to which this discussion contributes: *Section V: Ecology and Evolution*; chapter 35, “Evolution of Interspecies Integration and the Ecosystem.”

⁵⁵¹ Allee et al., 6.

⁵⁵² The authors write “attainment.” I have followed, and will continue to follow, the authors and write *to attain* or *attainment* rather than *to obtain* or *obtainment*, even when the latter may seem correct. The difference between the two is subtle but important. See further discussion in the subsequent section, “Allee et al.’s historical contribution to the study of food webs.”

⁵⁵³ Allee et al., *Principles of Animal Ecology*, 6.

⁵⁵⁴ See Wheeler, “The Ant-Colony as an Organism.” Allee *et al.*’s definition of biological organism follows Wheeler’s. See Allee et al., *Principles of Animal Ecology*, 437.

⁵⁵⁵ This is apparent throughout Chapter 27. In particular, see Allee et al., *Principles of Animal Ecology*, 495, 508–9.

⁵⁵⁶ Allee et al., 1.

⁵⁵⁷ Allee et al., 6. Regarding attainment: The authors write “attainment.” I have followed, and will continue to follow, the authors and write *to attain* or *attainment* rather than *to obtain* or *obtainment*, even when the latter may seem correct. The difference between the two is subtle but important.

⁵⁵⁸ The authors’ discussion makes this clear that this is their understanding. See Allee et al., 437, 442.

⁵⁵⁹ Allee et al., 211–12, 227–35, 252, 361, 529, 697.

⁵⁶⁰ See “Section II. Analysis of the Environment” (all chapters), as well as chapters 26, “Community Organization: Stratification,” and 28, “Community Organization: Periodism,” in Allee et al., *Principles of Animal Ecology*.

⁵⁶¹ Allee et al., 495.

⁵⁶² Allee et al., 437, 441–42.

⁵⁶³ Allee et al., 442.

⁵⁶⁴ Allee et al., 442.

⁵⁶⁵ Allee et al., 528.

⁵⁶⁶ Allee et al., 528, 436, 508.

⁵⁶⁷ Allee et al., 558.

⁵⁶⁸ Allee et al., 2, 6, 24–27, 60–61, 263–71, 271–419. Additionally, notice how the authors write of biological individual and biological population in chapter 34, “Natural Selection.”

⁵⁶⁹ For example, see Allee et al., pp. 6, 25, and 437 concerning biological organisms, species, populations, and ecological communities.

⁵⁷⁰ Allee et al., *Principles of Animal Ecology*, 1, 263–419, 605, 599–729.

⁵⁷¹ Allee et al., 1, 495.

⁵⁷² Allee et al., 495.

⁵⁷³ Allee et al., 437.

⁵⁷⁴ Allee et al., 495.

⁵⁷⁵ Allee et al., 436.

⁵⁷⁶ Allee et al., 436.

⁵⁷⁷ Oxford University Press, “Compose, v.”; Oxford University Press, “Composition, n.”; Klein, “Compose, Tr. and Intr. v.”; Klein, “Composition, n.”; Skeat, “Compose”; Skeat, “Composition”; Lewis, “Com-Pōnō”; Lewis and Short, “Com-Pōno”; Lewis, “Pōnō”; Lewis and Short, “Pōno”; The British Academy and Latham, “Componere”; The British Academy and Howlett, “Ponere”; The British Academy and Latham, “Compositio”; Oxford University Press, “Compōnō”; Oxford University Press, “Pōnō”; Oxford University Press, “Compositiō”; De Vaan, “Pōnō, -Ere.”

⁵⁷⁸ Allee et al., *Principles of Animal Ecology*, 436.

- ⁵⁷⁹ Allee et al., 495.
- ⁵⁸⁰ Allee et al., 496.
- ⁵⁸¹ Allee et al., 514.
- ⁵⁸² Allee et al., 516.
- ⁵⁸³ Allee et al., 495.
- ⁵⁸⁴ See Allee et al., 1: “The organism and groups of organisms are the essential biological units in ecology...”
- ⁵⁸⁵ Allee et al., 437.
- ⁵⁸⁶ Without the sun, the conditions necessary for the biological existing of chemosynthesizing organisms would, most probably, not exist.
- ⁵⁸⁷ Allee et al., *Principles of Animal Ecology*, 1.
- ⁵⁸⁸ Allee et al. write here, in the introduction to *Principles of Animal Ecology*, of animals specifically. As I will see very shortly, however, the authors do not limit these necessities and their necessary attainment to animals. On the contrary, they understand nourishment, protection, and reproduction to be fundamental to all biological organisms insofar as biological organism, and any and all biological organisms, are to be at all.
- ⁵⁸⁹ Allee et al., *Principles of Animal Ecology*, 6.
- ⁵⁹⁰ I find once again that Allee *et al.* write of drive as individual biological organism’s drive, and thus as each particular individual biological organism having such a drive. This understanding and scientific-epistemological explanation is—at best—fraught with scientific-epistemological incongruencies. I noticed and discussed this previously in the prior section, “Allee *et al.*’s historiography of food webs, in a footnote.”
- ⁵⁹¹ Allee et al., 437: “In most plants these vital requirements are inorganic salts..., carbon dioxide, water, and a portion of the radiant energy of the sun. The photosynthetic input is in turn utilized directly by herbivorous animals, and hence indirectly by carnivorous animals or less commonly...by carnivorous plants, and still more indirectly by saprophytic and saprophagous organisms.”
- ⁵⁹² Allee et al., 437. From Wheeler, “The Ant-Colony as an Organism,” 308: “As good a formal definition as I can frame is the following: An organism is a complex, definitely coördinated and therefore individualized system of activities, which are primarily directed to attaining (or obtaining) and assimilating substances from an environment, to producing other similar systems, known as offspring, and to protecting the system itself and usually also its offspring from disturbances emanating from the environment. The three fundamental activities enumerated in this definition [are][...] nutrition, reproduction and protection...”
- ⁵⁹³ See note 126.
- ⁵⁹⁴ Allee et al., *Principles of Animal Ecology*, 442.
- ⁵⁹⁵ Allee et al., 442.
- ⁵⁹⁶ Allee et al., 563.
- ⁵⁹⁷ Allee et al., 436, 9, 508, 723.
- ⁵⁹⁸ Allee et al., 436.
- ⁵⁹⁹ Allee et al., 437.
- ⁶⁰⁰ Allee et al., *Principles of Animal Ecology*, 8. See Allee et al., 6, where, in accord with their thoroughness, the authors write concerning principles and laws (both of which they place inside of quotation marks as scare quotes): “Ecology proceeds, as does any empirical science, (1) by the collection of relevant facts; (2) by the arrangement of these facts into ordered series according to their relations and patterns; and (3) by the development of higher-category knowledge or principles that synthesize and correlate the material at hand. Thus the ‘principles’ we shall attempt to formulate and interrelate are simply those generalizations inductively derived from the data of ecology. We regard the so-called ‘laws of nature’ as empirical, derived from the facts, and not the facts from the laws. In this view, a principle is a means of description of nature in succinct and compressed form.”
- ⁶⁰¹ Allee et al., *Principles of Animal Ecology*, 2.
- ⁶⁰² Allee et al., 2.
- ⁶⁰³ Allee et al., 2.
- ⁶⁰⁴ Allee et al., 2; Shelford, *Laboratory and Field Ecology: The Responses of Animals as Indicators of Correct Working Methods*, 2.
- ⁶⁰⁵ Allee et al., *Principles of Animal Ecology*, 437.
- ⁶⁰⁶ Allee et al., 6.
- ⁶⁰⁷ Allee et al., 495.
- ⁶⁰⁸ Allee et al., 6.
- ⁶⁰⁹ Allee et al., 495.
- ⁶¹⁰ Allee et al., 25.
- ⁶¹¹ Allee et al., 25.

⁶¹² Allee et al., 2, 6.

⁶¹³ Allee et al., 437.

⁶¹⁴ Allee et al., 516.

⁶¹⁵ Allee et al., 2.

⁶¹⁶ Allee et al., 437.

⁶¹⁷ Allee et al., 495.

⁶¹⁸ Bersier, “Community Ecology.”

⁶¹⁹ Bersier, “A History of the Study of Ecological Networks.”

⁶²⁰ Bersier, 365.

⁶²¹ *If I find this difference unintelligible or experience annoyance that this is valueless, unproductive, or pedantic semantic hair splitting, digression, or obfuscation, then I begin from an understanding of which I may or may not be consciously aware or intellectually attuned—not least of which is an understanding, perhaps in advance, of what language is, what to speak or to say is, what to write is, what meaning is, what a word’s senses are and from whence they come, and what to define is. Cogent disagreement in responses to these questions is welcomed, but not perfunctory dismissal on the basis of annoyance from unthought understandings in advance.*

⁶²² *If I take, for instance, my example of operational meanings and words-as-terms, the reader could—again, as an example—begin with preliminary 20th century readings on epistemological-scientific problems of meaning and language in analytic philosophy by consulting Tarski, “The Semantic Conception of Truth”; Quine, “Main Trends in Recent Philosophy”; Putnam, “The Meaning of ‘Meaning’”; Kripke, *Naming and Necessity*; Davidson, “Truth and Meaning.” I cite these sources for two reasons: (1) to demonstrate in passing what I say in the paragraph concerning scientific-epistemological disagreement on long-standing, unsolved but scientifically-epistemologically fundamental scientific-epistemological problems and (2) as a reference for the interested reader. I will not explore these authors’ work in detail. Nor do I intend to solve such scientific-epistemological problems.*

⁶²³ Bersier, “A History of the Study of Ecological Networks,” 365.

⁶²⁴ Bersier, 366.

⁶²⁵ Bersier, 366.

⁶²⁶ Bersier, 366.

⁶²⁷ See note 157.

⁶²⁸ Bersier, “A History of the Study of Ecological Networks,” 366.

⁶²⁹ *Are, or are defined as.* See the preceding discussion concerning their distinction and present relevance.

Henceforth in my discussion of Bersier, while I may write, for example, “Bersier tells us that x is y ,” recall that he is, in fact, scientific-epistemologically vacillatory, at best. As I have indicated, his vacillation scientifically-epistemologically entails scientific-epistemological discrepancies and unsolved problems.

⁶³⁰ Bersier, “Community Ecology.”

⁶³¹ Bersier, “A History of the Study of Ecological Networks,” 366.

⁶³² Bersier, 367.

⁶³³ Ricklefs, *Ecology*.

⁶³⁴ Bersier, “A History of the Study of Ecological Networks,” 367.

⁶³⁵ Bersier, 367.

⁶³⁶ Bersier, 369.

⁶³⁷ Bersier, 369.

⁶³⁸ Bersier, 366.

⁶³⁹ Bersier, 368.

⁶⁴⁰ Bersier, 368; Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, 426.

⁶⁴¹ Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, 75–76; Bersier, “A History of the Study of Ecological Networks,” 368.

⁶⁴² Bersier, “A History of the Study of Ecological Networks,” 369.

⁶⁴³ Maxwell, *A Treatise on Electricity and Magnetism*, 2:470; Einstein, “Autobiographical Notes,” 59; Einstein, 23–25; Einstein, “Maxwell’s Influence on the Development of the Conception of Physical Reality,” 71.

⁶⁴⁴ Bersier, “A History of the Study of Ecological Networks,” 368–69.

Chapter 5

⁶⁴⁵ Bouma-Gregson, “Keith Bouma-Gregson, PhD.”

⁶⁴⁶ Bouma-Gregson.

⁶⁴⁷ Bouma-Gregson; Keith Bouma-Gregson, “Lab People,” Power Lab: Food Web Research. Department of Integrative Biology. University of California, Berkeley., September 2022, https://ib.berkeley.edu/labs/power/lab_people.html#gabe; Keith Bouma-Gregson, “The Ecology of Benthic Toxigenic *Anabaena* and *Phormidium* (Cyanobacteria) in the Eel River, California” (Doctoral dissertation, Berkeley, University of California, Berkeley, 2017).

⁶⁴⁸ Bouma-Gregson, Bouma-Gregson on the Ecology of the Eel River of northern California.

⁶⁴⁹ Bouma-Gregson.

⁶⁵⁰ Bouma-Gregson.

⁶⁵¹ Throughout this dissertation, I write: opposite, simultaneous, equal, and scientifically-epistemologically causally indistinguishable. I include this note regarding the simultaneity of which I write. In 1905, Albert Einstein wrote (here translated in English): “If we wish to describe the *motion* of a material point, we give the values of its co-ordinates as functions of the time. Now we must bear carefully in mind that a mathematical description of this kind has not physical meaning unless we are quite clear as to what we understand by ‘time.’ We have to take into account that all our judgements in which time plays a part are always judgements of *simultaneous events*...So we see that we cannot attach any *absolute* signification to the concept of simultaneity, but that two events which, viewed from a system of co-ordinates, are simultaneous, can no longer be looked upon as simultaneous events when envisaged from a system which is in motion relatively to that system.” The two (or more) systems or frames of reference of which Einstein writes in 1905 (inertial), as well as those of general relativity (accelerating), i.e. the two (or more) systems which are in motion relative to each other, are nonetheless *simultaneously* in motion—whether inertial or accelerative—relative to each other *existentially absolutely*. These two (or more) systems, whether inertial or accelerating frames, also necessarily *exist simultaneously existentially absolutely*, regardless of their motion, this motion’s inertial or accelerative relativity, or any other relativity. What I write of the existentially absolute simultaneity seems to hold, I believe, regardless of whether one is a realist, a rationalist, an empiricist, or any other epistemologically-ontological category of human-being-subject or “human-being-subject” and regardless of whether such frames of reference are or are understood to be, for example, logical heuristics (e.g. such as those involved in merely logical problems) or physically existing with or even beyond and independent of one or another human-being-existing’s physical, mental, etc. activities. At least two such systems (or frames) must exist absolutely simultaneously, regardless of whether one or the other or both are inertial or accelerating frames, *if there is to be any relativity at all*, whether this be relativity of motion, space, time, position, perspective, or otherwise. Einstein, “On the Electrodynamics of Moving Bodies,” 39, 42–43.

⁶⁵² Regardless of whether one understands the tool to be a tool of, for, and/or by: the will, a will, a person, a biological organism, a species, evolution by natural selection, nature, labor, work, an individual, a group, a society, a culture, a city, a polis, a state, a town, a civilization, a tribe, a collective, a school, a cult, politics, violence, oppression, colonization, colonialism, imperialism, conquest, convincing, nationalism, racism, sexism, genderism, homophobia, transphobia, essentialism, relativism, empiricism, rationalism, logic, reason, rationality, realism, anti-realism, pluralism, perspectivalism, objectification, subjectification, totalitarianism, humanism, anti-humanism, post-humanism, other-than-humanism, Western or other-than-Western modernism, post-modernism, Christianity, Islam, Judaism, Buddhism, spirituality, atheism, agnosticism, Platonism, Aristotelianism, Cartesianism, Spinozianism, Humeanism, Kantianism, Marxism, Nietzscheanism, Heideggerianism, classism, materialism, physicalism, idealism, pan-psychism, power, force, a god, a goddesses, a social or natural scientist, an epistemologist, an ontologist, a metaphysician, argumentation, evidencing, evaluating, valuating, testing, *et al.*

⁶⁵³ Again, regardless of whether one understands the technique to be a technique of, for, and/or by: the will, a will, a person, a biological organism, a species, evolution by natural selection, nature, labor, work, an individual, a group, a society, a culture, a city, a polis, a state, a town, a civilization, a tribe, a collective, a school, a cult, politics, violence, oppression, colonization, colonialism, imperialism, conquest, convincing, nationalism, racism, sexism, genderism, homophobia, transphobia, essentialism, relativism, empiricism, rationalism, logic, reason, rationality, realism, anti-realism, pluralism, perspectivalism, objectification, subjectification, totalitarianism, humanism, anti-humanism, post-humanism, other-than-humanism, Western or other-than-Western modernism, post-modernism, Christianity, Islam, Judaism, Buddhism, spirituality, atheism, agnosticism, Platonism, Aristotelianism, Cartesianism, Spinozianism, Humeanism, Kantianism, Marxism, Nietzscheanism, Heideggerianism, classism, materialism, physicalism, idealism, pan-psychism, power, force, a god, a goddesses, a social or natural scientist, an epistemologist, an ontologist, a metaphysician, argumentation, evidencing, evaluating, valuating, testing, *et al.*

⁶⁵⁴ See note 9

⁶⁵⁵ See note 9

⁶⁵⁶ See note 9

⁶⁵⁷ See note 9

⁶⁵⁸ See note 9

⁶⁵⁹ See note 9

⁶⁶⁰ See note 9

⁶⁶¹ Bouma-Gregson, Bouma-Gregson on the Ecology of the Eel River of northern California.

⁶⁶² Bouma-Gregson.

⁶⁶³ Bouma-Gregson.

⁶⁶⁴ One may ask why there is a power differential in the work that can result from, ultimately the action and opposite, simultaneous, and equal action (i.e. the reaction) of two bodies upon the each other when the force of the action and reaction of these two bodies is always and everywhere opposite, simultaneous, and equal. Whence the power differential if only these two bodies interacting is considered? One may and, perhaps, should begin with such questions as: What are each of the following understood to be: Action? Reaction? Interaction? Force? Energy? Work? Power? What *is* each of the previous, if one or more of the previous are different from what one finds they are commonly understood to be?

⁶⁶⁵ Bouma-Gregson, Bouma-Gregson on the Ecology of the Eel River of northern California.

⁶⁶⁶ Bouma-Gregson.

⁶⁶⁷ Bouma-Gregson, “Keith Bouma-Gregson, PhD.”

⁶⁶⁸ Bouma-Gregson, Bouma-Gregson on the Ecology of the Eel River of northern California.

⁶⁶⁹ Bouma-Gregson.

⁶⁷⁰ Bouma-Gregson.

⁶⁷¹ Bouma-Gregson.

⁶⁷² Bouma-Gregson.

⁶⁷³ Albertos and Mareels, *Feedback and Control for Everyone*; Åström and Murray, *Feedback Systems: An Introduction for Scientists and Engineers*; Richardson, *Feedback Thought: Social Science and Systems Theory*; Henderson, *The Fitness of the Environment: An Inquiry into the Biological Significance of the Properties of Matter*; Cannon, *The Wisdom of the Body*; Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*; Ashby, *An Introduction to Cybernetics*; Hutchinson, “Circular Causal Systems in Ecology”; Hairston, Smith, and Slobodkin, “Community Structure, Population Control, and Competition,” 1960; Slobodkin, Smith, and Hairston, “Regulation in Terrestrial Ecosystems, and the Implied Balance of Nature”; Paine, “Food Web Complexity and Species Diversity”; Smith, “Effects of Enrichment in Mathematical Models”; Mangel and Clark, *Dynamic Modeling in Behavioral Ecology*; Power, “Top-Down and Bottom-Up Forces in Food Webs.”

⁶⁷⁴ Albertos and Mareels, *Feedback and Control for Everyone*; Åström and Murray, *Feedback Systems: An Introduction for Scientists and Engineers*; Richardson, *Feedback Thought: Social Science and Systems Theory*; Henderson, *The Fitness of the Environment: An Inquiry into the Biological Significance of the Properties of Matter*; Cannon, *The Wisdom of the Body*; Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*; Ashby, *An Introduction to Cybernetics*; Hutchinson, “Circular Causal Systems in Ecology”; Hairston, Smith, and Slobodkin, “Community Structure, Population Control, and Competition,” 1960; Slobodkin, Smith, and Hairston, “Regulation in Terrestrial Ecosystems, and the Implied Balance of Nature”; Paine, “Food Web Complexity and Species Diversity”; Smith, “Effects of Enrichment in Mathematical Models”; Mangel and Clark, *Dynamic Modeling in Behavioral Ecology*; Power, “Top-Down and Bottom-Up Forces in Food Webs.”

⁶⁷⁵ Albertos and Mareels, *Feedback and Control for Everyone*; Åström and Murray, *Feedback Systems: An Introduction for Scientists and Engineers*; Richardson, *Feedback Thought: Social Science and Systems Theory*; Henderson, *The Fitness of the Environment: An Inquiry into the Biological Significance of the Properties of Matter*; Cannon, *The Wisdom of the Body*; Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*; Ashby, *An Introduction to Cybernetics*; Hutchinson, “Circular Causal Systems in Ecology”; Hairston, Smith, and Slobodkin, “Community Structure, Population Control, and Competition,” 1960; Slobodkin, Smith, and Hairston, “Regulation in Terrestrial Ecosystems, and the Implied Balance of Nature”; Paine, “Food Web Complexity and Species Diversity”; Smith, “Effects of Enrichment in Mathematical Models”; Mangel and Clark, *Dynamic Modeling in Behavioral Ecology*; Power, “Top-Down and Bottom-Up Forces in Food Webs.”

⁶⁷⁶ Classically: Newton understood space to be absolutely passive. This passivity is absolute and should not be confused with inertness or, what is the same, the inertia of a body, whether at rest or at a constant velocity. The interactivity of absolute space is that of this *absolute* passivity with bodies that could be either *inertially* passive (at rest or moving at a constant velocity) or active (accelerating). Relativistically: As J. A. Wheeler writes, “[i]n this way, spacetime grips mass, telling it how to move. In this way, mass grips spacetime, telling it how to curve.” In other words, spacetime acts on mass, and mass acts on spacetime. This is an interaction. Jammer, *Concepts of Space: The History of Theories of Space in Physics*; DiSalle, “Newton’s Philosophical Analysis of Space and Time”;

- DiSalle, “Space and Time: Inertial Frames”; Hofer, Huggett, and Read, “Absolute and Relational Space and Motion: Classical Theories”; Rynasiewicz, “Newton’s Views on Space, Time, and Motion”; Wheeler, *A Journey into Gravity and Spacetime*, xi; Wheeler and Ford, *Geons, Black Holes, and Quantum Foam: A Life in Physics*, 235.
- ⁶⁷⁷ Bouma-Gregson, Bouma-Gregson on the Ecology of the Eel River of northern California.
- ⁶⁷⁸ Bouma-Gregson.
- ⁶⁷⁹ Bouma-Gregson.
- ⁶⁸⁰ Bouma-Gregson.
- ⁶⁸¹ Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Halliday, Resnick, and Walker, *Fundamentals of Physics*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007.
- ⁶⁸² Isaac Newton, *Newton’s Principia. The Mathematical Principles of Natural Philosophy*, trans. Andrew Motte (New York: Daniel Adee, 45 Liberty Street, 1846), 83; Isaac Newton, *PHILOSOPHÆ NATURALIS PRINCIPIA MATHEMATICA*, 1st ed. (London: S. PEPYS, Reg. Soc. PRÆSES., 1686), 12: *Mutationem motus proportionalem esse vi motrici impressæ, & fieri secundum lineam rectam qua vis illa imprimitur.*
- ⁶⁸³ Rennie and Law, “Power”; Halliday, Resnick, and Walker, *Fundamentals of Physics*, 155; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007, 3:253; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*, 252.
- ⁶⁸⁴ Rinnie and Law, “Work”; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007; Halliday, Resnick, and Walker, *Fundamentals of Physics*.
- ⁶⁸⁵ Halliday, Resnick, and Walker, *Fundamentals of Physics*, 144.
- ⁶⁸⁶ Halliday, Resnick, and Walker, 89.
- ⁶⁸⁷ Halliday, Resnick, and Walker, *Fundamentals of Physics*; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007.
- ⁶⁸⁸ Bouma-Gregson, Bouma-Gregson on the Ecology of the Eel River of northern California.
- ⁶⁸⁹ Oxford University Press, “Effect, v.,” June 2022; Klein, “Effect, n.”; Skeat, “Effect,” 1882; Lewis, “Efficiō”; Lewis and Short, “Ef-Ficiō”; Lewis, “Faciō”; Lewis and Short, “Făciō”; Oxford University Press, “Efficiō”; Oxford University Press, “Ex, ē,” 1968; Oxford University Press, “Faciō”; The British Academy, “Efficiere”; The British Academy, “Ex”; The British Academy, “Facere, Fieri”; De Vaan, “Ex, ē, Ec-”; De Vaan, “Faciō, -Ere.”
- ⁶⁹⁰ Rennie and Law, “Energy”; Halliday, Resnick, and Walker, *Fundamentals of Physics*; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007.
- ⁶⁹¹ Feynman, “28. Self-Energy of the Electron”; Milonni and Shih, “Zero-point Energy in Early Quantum Theory”; Milonni, *The Quantum Vacuum: An Introduction to Quantum Electrodynamics*; Milonni, “Zero-Point Energy”; Gribbin, “Zero-Point Energy”; Gribbin, “Vacuum Fluctuation”; Gribbin, “Vacuum”; Gribbin, “Self-Interaction”; Gribbin, “Renormalization,” 1998; Gribbin, “Quantum Vacuum”; Gribbin, “Quantum Fluctuation”; Rennie and Law, “Zero-Point Energy”; Carroll, *Something Deeply Hidden: Quantum Worlds and the Emergence of Spacetime*.
- ⁶⁹² Georgakakos, “Philip Georgakakos.”
- ⁶⁹³ Georgakakos.
- ⁶⁹⁴ Georgakakos.
- ⁶⁹⁵ Georgakakos, “Impacts of Native and Introduced Species on Native Vertebrates in a Salmon-Bearing River Under Contrasting Thermal and Hydrologic Regimes”; Georgakakos, “Lab People.”
- ⁶⁹⁶ Georgakakos, “Impacts of Native and Introduced Species on Native Vertebrates in a Salmon-Bearing River Under Contrasting Thermal and Hydrologic Regimes,” 1.
- ⁶⁹⁷ Georgakakos, 1.
- ⁶⁹⁸ Georgakakos, 1.
- ⁶⁹⁹ Georgakakos, 1.
- ⁷⁰⁰ Georgakakos, Philip Georgakakos on the Ecology of the Eel River.
- ⁷⁰¹ Georgakakos.
- ⁷⁰² Georgakakos.
- ⁷⁰³ Georgakakos.
- ⁷⁰⁴ Georgakakos.
- ⁷⁰⁵ Georgakakos.
- ⁷⁰⁶ Georgakakos. Georgakakos did not correctly remember physicists’ definition of their meaning for “energy.” Undoubtedly, had he known of my question beforehand and quickly reviewed, he would have remembered correctly, so this technical incorrectness is unimportant here. To his credit, he was very close: physicists often define their meaning and assign this meaning to the term “energy” as “the capacity to work or to do work.”

Scientifically-epistemologically, physicists' meaning and assignment of their definition of their meaning to the term "capacity" is distinct from physicists' meaning and assignment of their definition of their meaning to the term "potential."

⁷⁰⁷ Georgakakos.

⁷⁰⁸ Halliday, Resnick, and Walker, *Fundamentals of Physics*; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007.

⁷⁰⁹ Halliday, Resnick, and Walker, *Fundamentals of Physics*; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007.

⁷¹⁰ Halliday, Resnick, and Walker, *Fundamentals of Physics*; Frautschi et al., *The Mechanical Universe: Mechanics and Heat, Advanced Edition*; Ohanian and Markert, *Physics for Engineers and Scientists*, 2007.

⁷¹¹ Rennie and Law, "Potential."

⁷¹² Ohanian and Markert, *Physics for Engineers and Scientists*, 2007, 3:1405.

⁷¹³ Wheeler, *A Journey into Gravity and Spacetime*; Wheeler and Ford, *Geons, Black Holes, and Quantum Foam: A Life in Physics*.

⁷¹⁴ Newton, *The Mathematical Principles of Natural Philosophy*; Newton, *Newton's Principia. The Mathematical Principles of Natural Philosophy*.

⁷¹⁵ Einstein came to understand Mach's operationalism as "untenable," even as Einstein acknowledges that without Mach, he would not have arrived at the theory of special or general relativity (see "Notes for an Autobiography"). Einstein, for example, in his contribution to a commemorative volume in honor of J. C. Maxwell, writes what Mach, I believe, never would have: "*The belief in an external world independent of the subject is the foundation of all science. But since our sense-perceptions inform us only indirectly of this external world, or Physical Reality, it is only by speculation that it can become comprehensible to us. From this it follows that our conceptions of Physical Reality can never be definitive; we must always be ready to alter them, to alter, that is, the axiomatic basis of physics, in order to take account of the facts of perception with the greatest possible logical completeness.*" (p. 66 of *James Clerk Maxwell: A Commemoration Volume, 1831-1931*, emphases added). Einstein, "Notes for an Autobiography"; Einstein, "Autobiographical Notes"; Einstein, "Maxwell's Influence on the Development of the Conception of Physical Reality"; Pais, "*Subtle Is the Lord...*": *The Science and the Life of Albert Einstein*; Wolters, "Mach and Einstein, or, Clearing Troubled Waters in the History of Science."

⁷¹⁶ Berkeley, "De Motu; or On the Principle and Nature of Motion, and on the Cause of the Communication of Motion."; Hume, *An Enquiry Concerning Human Understanding*; Mach, "The Analysis of the Sensations. Antimetaphysical"; Mach, *The Analysis of Sensations and the Relation of the Physical to the Psychical*; Mach, *The Science of Mechanics: A Critical and Historical Account of Its Development*; Mach, "The Guiding Principles of My Scientific Theory of Knowledge and Its Reception by My Contemporaries"; Bridgman, *The Logic of Modern Physics*; Feynman, Leighton, and Sands, "Conservation of Energy"; Feynman, Leighton, and Sands, "Characteristics of Force"; Feynman, "Seeking New Laws"; Peters, *A Critique for Ecology*.

⁷¹⁷ Grantham, "Ted Grantham. Associate Cooperative Extension Specialist and Adjunct Professor."; Grantham, "Ted Grantham. Associate Professor of Cooperative Extension."

⁷¹⁸ Grantham, "Stream Flows for Salmon and Society: Managing Water for Human and Ecosystem Needs in Mediterranean-Climate California."

⁷¹⁹ Grantham, "Ted Grantham. Associate Professor of Cooperative Extension."

⁷²⁰ Grantham, "Theodore (Ted) Grantham."

⁷²¹ Ted Grantham, Ted Grantham on the Ecology of Northwestern California Rivers, Zoom (video chat) interview, March 6, 2020.

⁷²² Grantham.

⁷²³ Grantham.

⁷²⁴ Grantham.

⁷²⁵ Grantham.

⁷²⁶ Grantham.

⁷²⁷ Grantham.

⁷²⁸ Grantham.

⁷²⁹ Feynman, "28. Self-Energy of the Electron"; Milonni and Shih, "Zero-point Energy in Early Quantum Theory"; Milonni, *The Quantum Vacuum: An Introduction to Quantum Electrodynamics*; Milonni, "Zero-Point Energy"; Milonni, Spruch, and Kleppner, "Vacuums, Retardation and Casimir Interactions"; Rennie and Law, "Zero-Point Energy"; Rennie and Law, "Vacuum State"; Rennie and Law, "Renormalization"; Rennie and Law, "Casimir Effect"; Gribbin, "Casimir Effect"; Gribbin, "Quantum Fluctuation"; Gribbin, "Quantum Vacuum"; Gribbin, "Renormalization," 1998; Gribbin, "Self-Interaction"; Gribbin, "Vacuum"; Gribbin, "Vacuum Fluctuation";

Gribbin, “Zero-Point Energy”; Carroll, *Something Deeply Hidden: Quantum Worlds and the Emergence of Spacetime*; Yu et al., “Quantum Correlations between Light and the Kilogram-Mass Mirrors of LIGO”; Carroll, “The Quantum Field Theory on Which the Everyday World Supervenes”; Munday, “A New Twist on the Quantum Vacuum”; Tryon, “Is the Universe a Vacuum Fluctuation?”; Kleppner, “With Apologies to Casimir”; Lamoreaux, “Casimir Forces.”

⁷³⁰ Schmaltz, *Efficient Causation: A History*; Paul and Hall, *Causation: A User’s Guide*; Aguilar and Buckareff, *Causing Human Actions: New Perspectives on the Causal Theory of Action*; Sosa and Tooley, *Causation*; Gabbey, “New Doctrines of Motion”; Lambeth, “Rethinking the Structure of Events: Heidegger on Kant and the Concept of Cause”; Davidson, *Essays on Actions and Events*; Davidson, “Actions, Reasons, and Causes”; Anscombe, *Intention*; Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*.

⁷³¹ Koutroufinis, “Biological Neo-Teleologism vs Aristotle’s Genuine Telos”; Koutroufinis, *Life and Process: Towards a New Biophilosophy*; Deacon and Koutroufinis, “Complexity and Dynamical Depth”; Keller, “Organisms, Machines, and Thunderstorms,” February 1, 2008; Keller, “Organisms, Machines, and Thunderstorms,” February 1, 2009; Keller, “Ecosystems, Organisms, and Machines”; Basile, *Leibniz, Whitehead and the Metaphysics of Causation*; Mir, “Whitehead and Efficient Causation”; Nobo, “Transition in Whitehead”; Harman, “Whitehead and Schools X, Y, and Z”; Ford, “NANCY FRANKENBERRY’S CONCEPTION OF THE POWER OF THE PAST”; Levins and Lewontin, *The Dialectical Biologist*.

⁷³² Oxford University Press, “Affect, v.2”; Klein, “Affect, Tr. v.”; Skeat, “Affect”; Lewis, “Adficiō”; Lewis and Short, “Af-Fīciō”; Oxford University Press, “Afficiō”; The British Academy and Latham, “Afficere.”

⁷³³ De Vaan, “Ad”; Oxford University Press, “Ad”; Lewis, “Faciō”; Lewis and Short, “Fāciō”; Oxford University Press, “Faciō”; The British Academy, “Facere, Fieri”; De Vaan, “Faciō, -Ere.”

⁷³⁴ Oxford University Press, “Effect, v.” June 2022; Klein, “Effect, n.”; Skeat, “Effect,” 1882; Oxford University Press, “Ex, ē,” 1968; De Vaan, “Ex, ē, Ec-”; Lewis, “Efficiō”; Lewis, “Effectus”; Lewis and Short, “Ef-Fīciō”; Lewis and Short, “Effectus”; Oxford University Press, “Efficiō”; The British Academy, “Efficere”; Lewis, “Faciō”; Lewis and Short, “Fāciō”; Oxford University Press, “Faciō”; The British Academy, “Facere, Fieri”; De Vaan, “Faciō, -Ere.”

⁷³⁵ Tuozzo, “Aristotle and the Discovery of Efficient Causation.”

⁷³⁶ Tuozzo.

⁷³⁷ Oxford University Press, “Create, v.”; Klein, “Create, Tr. v.”; Skeat, “Create”; Lewis, “Creō”; Lewis and Short, “Crēo”; Oxford University Press, “Creō”; The British Academy and Latham, “Creare”; De Vaan, “Creō, -Āre.”

⁷³⁸ Oxford University Press, “Produce, v.”; Klein, “Produce, Tr. and Intr. v.”; Skeat, “Produce”; Lewis, “Prō-Dūcō”; Lewis and Short, “Prō-Dūco”; Oxford University Press, “Prōdūcō”; The British Academy and Howlett, “Producere.”

⁷³⁹ De Vaan, “Prō”; Lewis, “Dūcō”; Lewis and Short, “Dūco”; Oxford University Press, “Dūcō”; The British Academy, Latham, and Howlett, “Ducere”; De Vaan, “Dūcō, -Ere.”

⁷⁴⁰ Everett, “‘Relative State’ Formulation of Quantum Mechanics”; DeWitt and Graham, *The Many-Worlds Interpretation of Quantum Mechanics*; Wallace, “Worlds in the Everett Interpretation”; Wallace, *The Emergent Multiverse: Quantum Theory According to the Everett Interpretation*; Carroll, *Something Deeply Hidden: Quantum Worlds and the Emergence of Spacetime*.

⁷⁴¹ Grantham, Ted Grantham on the Ecology of Northwestern California Rivers.

⁷⁴² Grantham.

⁷⁴³ Grantham.

⁷⁴⁴ Grantham.

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⁷⁴⁹ Grantham.

⁷⁵⁰ Grantham.

⁷⁵¹ Grantham.

⁷⁵² Grantham.

⁷⁵³ Heidegger, “Letter on Humanism,” 217.

⁷⁵⁴ Oxford University Press, “Accomplish, v.”; Klein, “Accomplish, Tr. v.”; Skeat, “Accomplish”; Lewis, “Ad”; Lewis and Short, “Ad”; Oxford University Press, “Ad”; De Vaan, “Ad”; Lewis, “Compleō”; Lewis and Short, “Com-Plēo”; Oxford University Press, “Compleō”; The British Academy and Latham, “Complēre.”

⁷⁵⁵ Lewis and Short, “Plēo”; Oxford University Press, “Plēo”; The British Academy and Howlett, “Plere”; De Vaan, “-Plēō.”

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- 756 Heidegger, "Letter on Humanism," 217.
- 757 Heidegger, 217–18.
- 758 Heidegger, 218.
- 759 Heidegger, 263.
- 760 Marx, "Theses on Feuerbach"; Marx, "Thesen Über Feuerbach"; Krell, "Letter on Humanism [Prefatory Remarks]," 214.
- 761 Marx, "Theses on Feuerbach."
- 762 Marx.
- 763 Marx; Marx, "Thesen Über Feuerbach."
- 764 Marx, "Theses on Feuerbach"; Marx, "Thesen Über Feuerbach."
- 765 I interpret Marx here to mean to give voice to *critical's* (*kritischen*) sense of *critique*, not *criticism*. There is a subtle, and perhaps small, but nevertheless important difference between *critique* and *criticism* and *to critique* and *to criticize*. As Kant understood so well, one can critique without criticizing.
- 766 Marx, "Theses on Feuerbach"; Marx, "Thesen Über Feuerbach."
- 767 Heidegger, "Letter on Humanism," 263.
- 768 Heidegger, 263, 262.
- 769 Heidegger, 217.
- 770 Heidegger, 263.
- 771 Heidegger, 217.
- 772 Heidegger, 263.
- 773 Heidegger, 262.
- 774 Heidegger, 262.
- 775 Heidegger, 263.
- 776 Heidegger, 263.
- 777 Heidegger, 262.
- 778 Heidegger, 217.
- 779 Heidegger, 217.
- 780 Heidegger, 217–18.
- 781 Heidegger, 259.
- 782 Heidegger, (i) - (vii): 217; (viii) - (x): 218; (xi) - (xvii): 259; (xviii): 260; (ixx) - (xxiv): 262; (xv) - (xxviii): 263
- 783 Delancey, "Action, the Scientific Worldview, and Being-in-the-World," 356.
- 784 Delancey, 356.
- 785 Delancey, 356.
- 786 Delancey, 357.
- 787 Delancey, 358.
- 788 Delancey, 358.
- 789 Delancey, 358.
- 790 Delancey, 357.
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- 796 Delancey, 361.
- 797 Delancey, 362.
- 798 Delancey, 362.
- 799 Delancey, 362.
- 800 Delancey, 362.
- 801 Delancey, 362.
- 802 Delancey, 362.
- 803 Delancey, 363.
- 804 Delancey, 363.
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- 806 Delancey, 363.
- 807 Delancey, 363.
- 808 Delancey, 375.

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- ⁸⁰⁹ Delancey, 375.
- ⁸¹⁰ Dreyfus, *Being-in-the-World: A Commentary on Heidegger's Being and Time, Division I*, 57–58.
- ⁸¹¹ Dreyfus, 47.
- ⁸¹² Dreyfus, 22.
- ⁸¹³ Dreyfus and Wrathall, “Martin Heidegger: An Introduction to His Thought, Work, and Life,” 5.
- ⁸¹⁴ Dreyfus and Wrathall, 5.
- ⁸¹⁵ Dreyfus and Wrathall, 5.
- ⁸¹⁶ Dreyfus and Wrathall, 5.
- ⁸¹⁷ Dreyfus and Wrathall, 5.
- ⁸¹⁸ Dreyfus, “Forward to Time and Death (2005),” 62–63.
- ⁸¹⁹ Wrathall, “Heidegger on Human Understanding.”
- ⁸²⁰ Wrathall, 184.
- ⁸²¹ Wrathall, 178.
- ⁸²² Wrathall, 178.
- ⁸²³ Wrathall, 178.
- ⁸²⁴ Wrathall, 179.
- ⁸²⁵ Wrathall, 179.
- ⁸²⁶ Wrathall, 179.
- ⁸²⁷ Wrathall, 198.
- ⁸²⁸ Wrathall, 190.
- ⁸²⁹ Wrathall, 190.
- ⁸³⁰ Wrathall, 190.
- ⁸³¹ Wrathall, 179.
- ⁸³² Urry et al., *Campbell Biology*; Hall and Halliday, *Behaviour and Evolution*; Piaget, *Behaviour and Evolution*; Rubenstein and Alcock, *Animal Behavior*; Levitis, Lidicker, and Freund, “Behavioural Biologists Do Not Agree on What Constitutes Behaviour.”
- ⁸³³ Wrathall, “Introduction: Hubert Dreyfus and the Phenomenology of Human Intelligence,” 3; Dreyfus, *Being-in-the-World: A Commentary on Heidegger's Being and Time, Division I*, 57–58.
- ⁸³⁴ Wrathall, “Introduction: Hubert Dreyfus and the Phenomenology of Human Intelligence,” 3; Dreyfus, *Being-in-the-World: A Commentary on Heidegger's Being and Time, Division I*, 57.
- ⁸³⁵ Wrathall to Parks, “Follow up to Our December/January Emails,” May 19, 2022.
- ⁸³⁶ Wrathall, “Introduction: Background Practices and Understandings of Being,” 4.
- ⁸³⁷ Wrathall, “Introduction: Hubert Dreyfus and the Phenomenology of Human Intelligence,” 14.
- ⁸³⁸ Wrathall, 14.
- ⁸³⁹ Wrathall, “Introduction: Background Practices and Understandings of Being,” 4.
- ⁸⁴⁰ Wrathall, 4.
- ⁸⁴¹ Wrathall, 4–5.
- ⁸⁴² Wrathall, 5.
- ⁸⁴³ Wrathall, 5.
- ⁸⁴⁴ Wrathall, 6.
- ⁸⁴⁵ Wrathall, 6.
- ⁸⁴⁶ Wrathall, 6.
- ⁸⁴⁷ Wrathall, 6.
- ⁸⁴⁸ Wrathall, 6.
- ⁸⁴⁹ Wrathall, 7.
- ⁸⁵⁰ Wrathall, 7.
- ⁸⁵¹ Wrathall, 7.
- ⁸⁵² Wrathall, 8.
- ⁸⁵³ Wrathall, 8–9.
- ⁸⁵⁴ Wrathall, 9.
- ⁸⁵⁵ Wrathall, “Heidegger on Human Understanding,” 184.
- ⁸⁵⁶ Wrathall, 178–79, 187–93.
- ⁸⁵⁷ Wrathall, 190.
- ⁸⁵⁸ Davis, “Heidegger's Releasement From the Technological Will.”
- ⁸⁵⁹ As of this writing, I have not read: *Bremen and Freiburg Lectures. Insight Into That Which Is and Basic Principles of Thinking* (2012); *Country Path Conversations* (2010); *Discourse on Thinking* (1966); *The End of*

Philosophy (1973); *Four Seminars* (2003); *The Heidegger Controversy: A Critical Reader* (1993); *Nietzsche*, volumes 1-4; *Parmenides* (1992); *The Principle of Reason* (1991). I have not read *Pathmarks* (1998) directly, but I have read several of Heidegger's essays that are included in this volume. I have read a selection from *Parmenides* (1992), pp. 35-58, as selected by Nancy Weston during her spring semester course, 2017, in the Department of Rhetoric at the University of California, Berkeley. I have not yet read Davis' own book, *Heidegger and the Will: On the Way to Gelassenheit* (2007).

⁸⁶⁰ Davis, "Heidegger's Releasement From the Technological Will," 139.

⁸⁶¹ Davis, 138.

⁸⁶² Davis, 140.

⁸⁶³ Davis, 141.

⁸⁶⁴ Davis, 141.

⁸⁶⁵ Davis, 141.

⁸⁶⁶ Davis, 141.

⁸⁶⁷ Davis, 141.

⁸⁶⁸ Davis, 143.

⁸⁶⁹ Davis, 143.

⁸⁷⁰ Capobianco, *Heidegger's Way of Being*, 93.

⁸⁷¹ Capobianco, 93.

⁸⁷² Capobianco, 93.

⁸⁷³ Capobianco, 29–30, 34–37; Capobianco, *Heidegger's Being: The Shimmering Unfolding*, 56; Oxford University Press, "Glimpse, v."; Oxford University Press, "Glance, v. 1"; Oxford University Press, "Glance, v. 2"; Klein, "Glimpse, Tr. and Intr. v."; Klein, "Glimmer, Intr. v."; Klein, "Glance, Intr. and Tr. v."; Klein, "Glance, n."; Klein, "Glance, Tr. v."; Skeat, "Glimmer"; Skeat, "Glimpse"; Skeat, "Glance."

⁸⁷⁴ Capobianco, *Heidegger's Being: The Shimmering Unfolding*, 118–19.

⁸⁷⁵ Capobianco, *Engaging Heidegger*, 99.

⁸⁷⁶ Capobianco, 95.

⁸⁷⁷ Capobianco, *Heidegger's Being: The Shimmering Unfolding*, 123–24.

⁸⁷⁸ Capobianco, "Heidegger's Being as Aletheia: 'Older' than the Human Being," 32–33.

⁸⁷⁹ Capobianco, 33.

⁸⁸⁰ Capobianco, *Engaging Heidegger*, 90.

⁸⁸¹ Heidegger, "Recapitulation [Recapitulations (1)- (3)]."

⁸⁸² In writing of essence here, I purposely write of essence as I understand it in advance, epistemologically metaphysically and relativistically metaphysically, thereby remaining soundly within both our scientific-epistemological tradition and convention. I write of *essence* as unshakable, unchanging *whatness*, i.e. as I understand it to be in advance: *essentia*, or *quidditas*, i.e. the *whatness* that is a *thing* or a *being* and upon which properties, characteristics, and relations supervene, become, depend, and disappear or depart. I note, here only in passing, that what *essence* and *to essence* are, are eminently questionable. This question—*what is to essence?*—is an essential question to which I need return.

⁸⁸³ Oxford University Press, "Perceive, v."; Klein, "Perceive"; Skeat, "Perceive"; Oxford University Press, "Percipiō"; Lewis and Short, "Per-Cīpiō"; Lewis, "Percipiō"; de Vaan, "Per"; de Vaan, "Capiō, -Ere."

⁸⁸⁴ Oxford University Press, "Conceive, v."; Klein, "Conceive, Tr. and Intr. v."; Oxford University Press, "Concipiō"; Lewis, "Concipiō"; Lewis and Short, "Con-Cīpiō"; Lewis, "Capiō"; Lewis and Short, "Cāpiō"; de Vaan, "Capiō, -Ere."

⁸⁸⁵ Oxford University Press, "Cogitate, v."; Klein, "Cogitate, Intr. v."; Oxford University Press, "Cōgitō"; Oxford University Press, "Agitō"; Lewis, "Agitō"; Lewis, "Agō"; Lewis and Short, "Āgīto"; Lewis and Short, "Āgo"; De Vaan, "Agō, -Ere."

⁸⁸⁶ In this dissertation, I respond to the call of essential questions. The language that I write is, therefore, not my own. If there are words, phrases, or sentences that speak clearly through my writing, then it is *they* that speak clearly, not I. I assist, as I am guided and with as much care and attention as I can muster daily, in bringing them to presence on the page—and *that is all*. Nor is language—the language I write and speak—a tool; a network of terms for communication; a terminology; a whole of intra-referential meanings, representational or not; a representational whole comprised of sub-vehicles (i.e. terms) for which and to which human-being-subjects or "human-being-subjects," collectively or individually, make and attach meanings as means to goals, such as survival, satisfying desires, or human-to-human communication; a biological evolutionary strategy, construct, or product; etc. The language—the words, the sentences, *their senses*—comes to me as I respond to the call of essential questions. I am given to thinking, and in turn I give myself to thinking, to looking, to listening. These are *practices*, not acts,

however imperfectly I practice. The language that comes as I do my best to faithfully and responsibly listen to and think the call of essential questions is given to me in thinking by the questions themselves. Language is given to me as I abide and dwell faithfully in questioning. I began to write chapter 4 on June 25, 2021. On January 11, 2022, I met with my co-advisor, Jon Kosek. In this meeting I told him I would send a completed draft of chapter 4 to him and Kathryn De Master by the end of the month. On January 19 and 20, 2022, I read for the first time Heidegger's essay, "The Onto-Theo-Logical Constitution of Metaphysics." In this essay, he, too, writes of grounding ground. I write this word throughout chapter 4, and elsewhere. While I have read carefully various essays and lecture series of Martin Heidegger over the last five years, I had not yet ever read this word: grounding-ground. I was surprised. The commonsense, goal-oriented, and ambitious contemporary academic in me was disappointed. I could no longer claim to have been *the first* to write these words, and thereby to claim them to my name, as belonging to me and my spark of genius, and thereby requiring citation of my name, with all the contemporary academic perks and benefits this mode of proceeding accrues to one, i.e. "grounding-ground": this is my term, my theory, my property as properly *mine*, etc. My response was mixed, of course, and imperfect. I also understood and felt deeply my arrogance, my impiouness, my willful ambition, and most importantly, my lack of sincerity and gratitude. Grounding-ground: These are not my words. Nor are they Heidegger's. When I am able to sincerely question my initial arrogance, impiouness, willful ambition, and ingratitude, I am awed that Heidegger, too, was given such words (as they are translated in English) as he followed the questions before him. This reminds me that I am called to be faithful to the questions that call me, and that doing so is never easy. Here I direct the reader to the page of the essay in which Heidegger writes these words: Heidegger, "The Onto-Theo-Logical Constitution of Metaphysics," 58.

⁸⁸⁷ Oxford University Press, "Cause, n.," December 2021; Oxford University Press, "Cause, v.1"; Klein, "Cause, n.," Skeat, "Cause."

⁸⁸⁸ Oxford University Press, "Cause, v.1"; Oxford University Press, "Cause, n.," September 2022; Klein, "Cause, n.," Lewis, "Causa"; Lewis and Short, "Causa"; Lewis, "Causor"; Lewis and Short, "Causor"; Oxford University Press, "Causa"; De Vaan, "Causa"; Niermeyer, "1. Causa"; The British Academy, "Causa"; The British Academy, "Causare, ~ari."

⁸⁸⁹ Oxford University Press, "Cause, v.1"; Oxford University Press, "Cause, n.," September 2022; Klein, "Cause, n.," Lewis, "Causa"; Lewis and Short, "Causa"; Lewis, "Causor"; Lewis and Short, "Causor"; Oxford University Press, "Causa"; De Vaan, "Causa"; Niermeyer, "1. Causa"; The British Academy, "Causa"; The British Academy, "Causare, ~ari."

⁸⁹⁰ Oxford University Press, "Cause, v.1"; Oxford University Press, "Cause, n.," September 2022; Lewis, "Causa"; Lewis and Short, "Causa"; Lewis, "Causor"; Lewis and Short, "Causor"; Oxford University Press, "Causa"; Niermeyer, "1. Causa"; The British Academy, "Causa"; The British Academy, "Causare, ~ari"; Oxford University Press, "Effect, v.," September 2022; Oxford University Press, "Effect, n.," Oxford University Press, "Efficiency, n.," Klein, "Effect, n.," Klein, "Efficient, Adj.," Skeat, "Effect," 1882; Skeat, "Efficient"; Lewis, "Ef-Ficiō"; Lewis, "Effectus"; Lewis, "Efficiēns"; Lewis, "Efficientia"; Lewis, "Efficiō"; Lewis and Short, "Effectus"; Lewis and Short, "Efficiēns"; Lewis and Short, "Efficientia"; Oxford University Press, "Efficiens"; Oxford University Press, "Efficientia"; Oxford University Press, "Efficiō"; The British Academy, "Efficientia"; The British Academy, "Efficiere."

⁸⁹¹ Oxford University Press, "Effect, v.," September 2022; Oxford University Press, "Effect, n.," Oxford University Press, "Efficiency, n.," Klein, "Effect, n.," Klein, "Efficient, Adj.," Skeat, "Effect," 1882; Skeat, "Efficient"; Lewis, "Ef-Ficiō"; Lewis, "Efficiō"; Oxford University Press, "Efficiō"; The British Academy, "Efficiere."

⁸⁹² Oxford University Press, "Ex-, Prefix1"; Klein, "Ex-"; Skeat, "Ex-, E, Prefix"; Oxford University Press, "Ex, ē," 1968; De Vaan, "Ex, ē, Ec-"; The British Academy, "Ex."

⁸⁹³ Lewis, "Faciō"; Lewis and Short, "Faciō"; Oxford University Press, "Faciō"; De Vaan, "Faciō, -Ere"; The British Academy, "Facere, Fieri."

⁸⁹⁴ Heidegger was etymologically mistaken when he wrote that "[c]ausa, casus, belongs to the verb *cadere*, 'to fall,' and means that which brings it about that something falls out as a result in such and such a way." See Heidegger, *The Questions Concerning Technology and Other Essays*, 7; Oxford University Press, "Cause, n.," September 2022; Oxford University Press, "Cause, v.1"; Klein, "Cause, n.," Skeat, "Cause"; Lewis, "Cūdō"; Lewis and Short, "Cūdo"; Oxford University Press, "Cūdō"; De Vaan, "Cūdō, -Ere"; The British Academy, "Cudere."

⁸⁹⁵ Oxford University Press, "Legal, Adj. and n.," Klein, "Legal, Adj.," Skeat, "Legal"; Lewis and Short, "Lēgālis"; Oxford University Press, "Lēgālis"; The British Academy and Howlett, "Legalis"; De Vaan, "Lēx, Lēgis."

⁸⁹⁶ In his famous lecture, "Logos (Heraclitus, Fragment B 50)," Heidegger is mistaken throughout that λέγειν is *to lay, to lie together, to lay down or to lay down before*. He confuses and subsequently conflates the Old High German and German *legen* with the ancient Greek λέγειν. His understanding and subsequent interpretation of

Heraclitus' fragment B 50 reflects this mistaken understanding throughout. The Old High German and German *legen* is of, and thus speaks the senses of and from, the proto-Germanic **lagjan* and *lage*, both of the Proto-Indo-European root, *legh-*, to lie, recline, set down. The German *legen* speaks the same senses, therefore, as the English *law*, the Old English *lagu*, the Old Icelandic *lag*. It does not speak its senses of or from the Latin *legō* (*legere*) or the ancient Greek *λέγω* (*légein*). The Latin and the ancient Greek words speak the senses I may still sense in the PIE *leg-*: to gather, to collect, to bring together. For example, see pp. 59-63 in Heidegger, "Logos (Heraclitus, Fragment B 50)"; Kroonen, "**lagjan*"; Kluge, "Lage"; Oxford University Press, "Law, n.1"; Klein, "Law, n."; Skeat, "Law." 897 Oxford University Press, "Law, n.1"; Klein, "Law, n."; Skeat, "Law"; Kroonen, "**lagjan*"; Kluge, "Lage"; Pokorny, "Legh-"; Linguistics Research Center, "Indo-European Lexicon. Pokorny Master PIE Etyma." 898 Oxford University Press, "Judge, n."; Oxford University Press, "Judge, v."; Oxford University Press, "Judicial, Adj. and n."; Klein, "Judge, n."; Klein, "Judicial"; Skeat, "Judge"; Skeat, "Judicial." 899 Oxford University Press, "Jure, n."; Oxford University Press, "Just, Adj."; Oxford University Press, "Justice, n."; Klein, "Just, Adj."; Klein, "Justice, n."; Skeat, "Just"; Skeat, "Justice." 900 Oxford University Press, "Diction, n."; Lewis, "Dīcō"; Lewis and Short, "Dīcō"; Oxford University Press, "Dīcō"; The British Academy, Latham, and Howlett, "2. Dicere"; De Vaan, "Dīcō, -Ere." 901 Lewis, "Iūs"; Lewis and Short, "Jūs"; Oxford University Press, "Iūs"; De Vaan, "Iūs, -Ris"; Pokorny, "Iεuos-"; Pokorny, "2. Iεu-, Iεuə-, Iεu-g-"; Linguistics Research Center, "Indo-European Lexicon. Pokorny Master PIE Etyma." 902 Lewis, "Iūdex"; Lewis, "Iūdiālis"; Lewis, "Iūdicō"; Oxford University Press, "Iūdex"; Oxford University Press, "Iūdiālis"; Oxford University Press, "Iūdicium"; Oxford University Press, "Iūdicō"; The British Academy and Howlett, "Judex"; The British Academy and Howlett, "Judicare." 903 Oxford University Press, "Right, Adj. and Int."; Oxford University Press, "Right, n."; Oxford University Press, "Regulate, v."; Oxford University Press, "Rule, n.1"; Oxford University Press, "Rule, v."; Klein, "Right, Adj."; Klein, "Regulate, Tr. v."; Klein, "Rule, n."; Skeat, "Right"; Skeat, "Regular"; Skeat, "Rule"; Lewis, "Regō"; Lewis, "Rēctus"; Lewis and Short, "Rēgo"; Lewis and Short, "Rēctus"; Oxford University Press, "Regō"; De Vaan, "Regō, -Ere"; The British Academy and Howlett, "Regula"; The British Academy and Howlett, "Regere"; Pokorny, "1. Reg-"; Linguistics Research Center, "Indo-European Lexicon. Pokorny Master PIE Etyma." 904 Oxford University Press, "Right, Adj. and Int."; Oxford University Press, "Right, n."; Klein, "Right, Adj."; Skeat, "Right"; Kroonen, "**rehta-*"; Kluge, "Reich"; Lewis, "Rēctus"; Lewis and Short, "Rēctus"; Oxford University Press, "Rectus"; The British Academy and Howlett, "Rectus"; De Vaan, "Regō, -Ere." 905 Oxford University Press, "Effect, n."; Oxford University Press, "Effect, v.," September 2022; Oxford University Press, "Efficiency, n."; Klein, "Effect, n."; Klein, "Efficient, Adj."; Skeat, "Effect," 1882; Skeat, "Efficient"; Lewis, "Ef-Fīcīō"; Lewis, "Efficiō"; Oxford University Press, "Efficiō"; The British Academy, "Efficiere"; Oxford University Press, "Ex-, Prefix1"; Klein, "Ex-"; Skeat, "Ex-, E, Prefix"; Oxford University Press, "Ex, ē," 1968; The British Academy, "Ex"; Lewis, "Faciō"; Lewis and Short, "Fācīō"; Oxford University Press, "Faciō"; De Vaan, "Faciō, -Ere"; The British Academy, "Facere, Fieri." 906 Lewis and Short, "Sisto"; Lewis, "Sistō"; Klein, "Exist, Intr. v."; De Vaan, "Sistō, Ere"; Sheehan, "Heidegger and the Right Heideggerians: Phenomenology vs. Crypto-Metaphysics," 7, n. 25. 907 Aristotle, for example, writes of *eudaimonīā* in Aristotle, *Nicomachean Ethics*; Liddell and Scott, "Εὐδαιμονία"; Liddell and Scott, "Εὐδαιμών"; Liddell and Scott, "Εὐδαιμον-Ια"; Liddell and Scott, "Εὐδαιμό-Ων"; Slater, "Εὐδαιμονία"; Slater, "Εὐδαιμών." 908 Dubray, "Actus Purus"; Cross and Livingstone, "Actus Purus"; Dubray, "Actus Primus." 909 In footnote 1, William Lovitt draws the reader's attention to Heidegger's understanding of what *essence* and *to essence* are. See Heidegger, "The Question Concerning Technology," 3-4. 910 See, for example, "On Alfred North Whitehead" in the Appendix. 911 Oxford University Press, "Real, Adj.2, n.2, and Adv."; Klein, "Real, Adj."; Skeat, "Real"; Lewis, "Rēs"; Lewis and Short, "Rēs"; Oxford University Press, "Rēs"; Niermeyer, "Res"; The British Academy and Howlett, "1. Realis"; The British Academy and Howlett, "1. Res"; De Vaan, "Rēs, Rei." 912 I do not share the thinking-understanding of what human-being is of which Heidegger wrote in *Being and Time* and seemed to think-understand up until, but not unarguably beyond, the early 1930s. Nor do I share the thinking-understanding of *Being and Time* of what human-being-existing is. (And do not be mistaken: This is not an epistemological judgement as to whether Heidegger's understanding-thinking is correct or incorrect and thereby true or false.) Even so, yes, human-being-existing is human-*da-Sein*. Human-being-existing *is* human-standing-there-being-presencing in the world. Even so, human-*da-Sein* is world-historical, is temporal and, perhaps, is time. And perhaps, further, *Dasein* is ~~Sein~~-there-existing in the world, though this dissertation is not, and cannot be, the appropriate place for me to respond to this last question. While I may respond, I respond in hearing the call and

faithfully corresponding upon the way opening before me in questioning. I cannot, of my own, will a response, much less an answer. My response is of me, yes, but belongs to the question. See for example, p. 153 in Martin Heidegger, *Being and Time*, trans. John MacQuarrie and Edward Robinson (New York: Harper & Row, Publishers, 1962); Martin Heidegger, “Phenomenology and Theology,” in *Pathmarks*, trans. James G. Hart and John C. Maraldo (New York: Cambridge University Press, 1998), 48. See also Franco Volpi, “In Whose Name?: Heidegger and ‘Practical Philosophy,’” *European Journal of Political Theory* 6, no. 1 (January 1, 2007): 31–51, <https://doi.org/10.1177/1474885107070828>.

⁹¹³ Kant, “On the Common Saying: ‘This May Be True in Theory, but It Does Not Apply in Practice,’” 61.

⁹¹⁴ Blackburn, “Theory.”

⁹¹⁵ n.a., “What Is a Theory?”

⁹¹⁶ The National Academy of Sciences, *Teaching about Evolution and the Nature of Science*, 4.

⁹¹⁷ The National Academy of Sciences Institute of Medicine, *Science, Evolution, and Creationism*, 11.

⁹¹⁸ Feynman, “Seeking New Laws.”

⁹¹⁹ Feynman.

⁹²⁰ Boyd and Bogen, “Theory and Observation in Science.”

⁹²¹ Oxford University Press, “Theory, n.”

⁹²² Oxford University Press, “Explain, v.”; Klein, “Explain, Tr. and Intr. v.”; Skeat, “Explain.”

⁹²³ Oxford University Press, “Ex-, Prefix1”; Klein, “Ex-”; Skeat, “Ex-, E, Prefix”; Oxford University Press, “Ex, ē,” 1968; De Vaan, “Ex, ē, Ec-”; The British Academy, “Ex.”

⁹²⁴ Lewis, “Plānus”; Lewis and Short, “Plānus”; Oxford University Press, “Plānus”; Niermeyer, “Planare”; The British Academy and Howlett, “Planare”; De Vaan, “Plānus.”

⁹²⁵ Lewis, “Explānō”; Lewis and Short, “Ex-Plāno”; Oxford University Press, “Explānō”; The British Academy, Latham, and Howlett, “Explanare.”

⁹²⁶ Oxford University Press, “Con-, Prefix”; Oxford University Press, “Com-, Prefix”; de Vaan, “Capiō, -Ere”; Lewis and Short, “Cāpiō”; Lewis, “Capiō.”

⁹²⁷ Kant, “On the Common Saying: ‘This May Be True in Theory, but It Does Not Apply in Practice’”; Oxford University Press, “Theory, n.”

⁹²⁸ Kant, “On the Common Saying: ‘This May Be True in Theory, but It Does Not Apply in Practice,’” 61–62; Kant, “Über Den Gemeinspruch: Das Mag in Der Theorie Richtig Sein, Taugt Aber Nicht Für Die Praxis.”

⁹²⁹ Oxford University Press, “Experience, n.”; Oxford University Press, “Experiment, n.”; Klein, “Experience, n.”; Klein, “Experiment, n.”; Oxford University Press, “Experientia”; Oxford University Press, “Experimentum”; Oxford University Press, “Experior”; Lewis and Short, “Ex-Pērīor”; Lewis, “Experior.”

⁹³⁰ Lewis and Short, “Pērītus”; Lewis, “Pērītus”; Oxford University Press, “Pērītus.”

⁹³¹ Oxford University Press, “Fare, v.1,” Oxford English Dictionary, June 2022, <https://www.oed-com.libproxy.berkeley.edu/view/Entry/68196?rskey=9LTSm9&result=5&isAdvanced=false>; Ernest Klein, “Fare, Intr. v.,” in *A Comprehensive Etymological Dictionary of the English Language* (Amsterdam, The Netherlands: Elsevier Science, 1971); Walter W. Skeat, “Fare,” in *A Concise Etymological Dictionary of the English Language* (Oxford, U.K.: Clarendon Press, 1882).

⁹³² Kroonen, “*uz”; Kluge, “Er”; Kluge, “Ur.”

⁹³³ Friedrich Kluge, “Fahren,” in *An Etymological Dictionary of the German Language*, trans. John Francis Davis (London: George Bell & Sons, 1891); Guus Kroonen, “*faran,” in *Etymological Dictionary of Proto-Germanic*, Leiden Indo-European Etymological Dictionary Series 2 (Leiden, The Netherlands: Brill, 2013).

⁹³⁴ Liddell and Scott, “Ἐμπειρία”; Liddell and Scott, “Ἐμπεiros,” 1889; Liddell and Scott, “Ἐμπειρ-Ἰα”; Liddell and Scott, “Ἐμπεiros,” 1940.

⁹³⁵ I shall discuss *banausic* (βαναυσος) in chapter 6.

⁹³⁶ Liddell and Scott, “Ἐν,” 1889; Liddell and Scott, “Ἐν,” 1940; Autenrieth, “Ἐν, Ἐνί, Εἰν, Εἰνί”; Beekes, “Ἐν.”

⁹³⁷ Liddell and Scott, “Πεῖρα,” 1889; Liddell and Scott, “Πεῖρα,” 1940; Slater, “Πεῖρα”; Beekes, “Πεῖρα.”

⁹³⁸ I must not deride, reject, condescend, criticize, critique, dismiss, unsettle, agitate, or war against; nor try to change, correct, and thereby fix to my willful liking and willed goals, the technician. Insofar as I am a subject, *I am human-being-in-the-world* as this technician. In friendship, I must welcome him or her or us with compassion and perhaps, thereof, understanding and, if appropriate, from compassion (with or without understanding), forgiveness. What is taken to be compassion, for example, is not compassion at all if condescending or if willfully striving to change or fix what or who is beheld. A technician can be *useful* and even *useable*—though I must be very attentive and careful here, for I am speaking of myself—even if the technician is purely a technician, i.e. a technician exhaustively and exclusively of *know-how* with *know-how* (skills, techniques). Any technician may, at any time, rest her tools and her hands—even if only in brief rest periods between labor—so as to properly attune herself to the

call and claim of the essential questions, and thereby to listen, heed, and genuinely act in responding humanly, faithfully, as only humans can and do: *What? Who? Why?*

⁹³⁹ Augustine, *St. Augustine's Confessions*, I:386.

⁹⁴⁰ Lewis and Short, “Intellēgo”; Lewis, “Intellegō”; Oxford University Press, “Intellegō”; Lewis and Short, “Lēgo”; Lewis, “Legō”; Oxford University Press, “Legō”; De Vaan, “Legō, -Ere”; Lewis and Short, “Con-Spīciō”; Lewis, “Cōnspiciō”; Oxford University Press, “Conspiciō”; De Vaan, “Speciō, -Ere.”

⁹⁴¹ Oxford University Press, “Fact, n., Int., and Adv.”; Klein, “Fact, n.”; Skeat, “Fact”; Lewis, “Faciō”; Lewis, “Factum”; Lewis and Short, “Fāciō”; Lewis and Short, “Factum”; Oxford University Press, “Faciō”; De Vaan, “Faciō, -Ere.”

⁹⁴² Oxford University Press, “Act, v.”; Klein, “Act, n.”; Skeat, “Act”; Lewis, “Agō”; Lewis and Short, “Āgo”; Oxford University Press, “Agō”; De Vaan, “Agō, -Ere.”

⁹⁴³ Here, I allude primarily but by no means exclusively to Arendt, *The Human Condition*. Arendt understands in advance *prāxis* to be *poiēsis*, despite her great and very scholarly efforts to distinguish them by bringing the reader's attention to the former—understood, of course, exclusively and exhaustively, to be practical *activity*.

⁹⁴⁴ Oxford University Press, “Destine, v.”; Klein, “Destine, Tr. v.”; Skeat, “Destine”; Lewis, “Dēstinō”; Lewis and Short, “Dē-Stīno”; Lewis, “Stō”; Lewis and Short, “Sto”; Oxford University Press, “Stō”; De Vaan, “Stō, Stāre.”

⁹⁴⁵ Here again I allude to Arendt, *The Human Condition*. She, too, understood in advance all ex-sisting, whether human or otherwise, to be exclusively and exhaustively and essentially, activity—including, as I have written, both the *vita contemplativa* and the *poiēsis* of work—especially the work and politics, or political activity, that historically, at least, were for, of, and in the public realm, or the *rēs pūblica*. As I have written in a prior note, Arendt understood in advance *prāxis* to be *poiēsis*. *Prāxis*, insofar as it exist and can exist at all, is practical *activity*.

⁹⁴⁶ Both Heidegger and Arendt give voice to this lawful understanding. See, for example, Martin Heidegger, “The Origin of the Work of Art,” in *Basic Writings. From Being and Time (1927) to The Task of Thinking (1964)*, ed. David Farrell Krell (London: Harper Perennial, 2008), 143–212 and Arendt, *The Human Condition*, pp. 167–174.

⁹⁴⁷ Oxford University Press, “Passion, n.”; Klein, “Passion, n.”; Skeat, “Passion”; Lewis and Short, “Passiō”; Oxford University Press, “Passiō”; Niermeyer, “Passio”; The British Academy and Howlett, “Passio.”

⁹⁴⁸ Lewis, “Patiōr”; Lewis and Short, “Pātiōr”; Oxford University Press, “Patiōr”; Niermeyer, “Pati”; The British Academy and Howlett, “Pati”; De Vaan, “Patiōr, Patī.”

⁹⁴⁹ Oxford University Press, “Passive, Adj. and n.”; Klein, “Passive, Adj.”; Skeat, “Passive”; Lewis and Short, “Passivus”; Oxford University Press, “Passivus (2)”; Niermeyer, “Passivus”; The British Academy and Howlett, “Passivus.”

⁹⁵⁰ Oxford University Press, “Patient, Adj. and n.”; Klein, “Patient, Adj.”; Skeat, “Patient”; Lewis, “Patiēns”; Lewis and Short, “Pātiēns”; Oxford University Press, “Patiens”; Oxford University Press, “Patientia”; Niermeyer, “Patiens”; The British Academy and Howlett, “Patientia.”

⁹⁵¹ Isaac Newton, *The Mathematical Principles of Natural Philosophy*, trans. Andrew Motte (London: Benjamin Motte, at the Middle-Temple-Gate, in Fleet Street, 1729), 83.

⁹⁵² Liddell and Scott, “Ποιέω,” 1889; Liddell and Scott, “Ποιέω,” 1940; Autenrieth, “Ποιέω”; Thayer, “Ποιέω”; Arndt and Gingrich, “Ποιέω”; Beekes, “Ποιέω”; Preus, “Poiein, Poiēsis, Poiētikē.”

⁹⁵³ Liddell and Scott, “Ποίημα”; Liddell and Scott, “Ποί-Ημα”; Thayer, “Ποίημα.”

⁹⁵⁴ Liddell and Scott, “Ποίησις”; Liddell and Scott, “Ποί-Ησις”; Thayer, “Ποίησις.”

⁹⁵⁵ Liddell and Scott, “Ποιητής”; Liddell and Scott, “Ποι-Ητής”; Thayer, “Ποιητής.”

⁹⁵⁶ Aristotle, “The Categories,” 12–109; Aristotle, “Categories,” 3–24; Liddell and Scott, “Πάσχω,” 1889; Liddell and Scott, “Πάσχω,” 1940; Autenrieth, “Πάσχω”; Slater, “Πάσχω”; Thayer, “Πάσχω”; Arndt and Gingrich, “Πάσχω”; Beekes, “Πάσχω”; Preus, “PASCHHEIN.”

⁹⁵⁷ Oxford University Press, “Affect, v.1”; Oxford University Press, “Affect, v.2”; Oxford University Press, “Affect, n.”; Oxford University Press, “Affection, n.1”; Klein, “Affect, Tr. v.”; Klein, “Affection, n.”; Skeat, “Affect.”

⁹⁵⁸ Oxford University Press, “Ad”; De Vaan, “Ad.”

⁹⁵⁹ Lewis and Short, “Fāciō”; Lewis, “Faciō”; Oxford University Press, “Faciō”; De Vaan, “Faciō, -Ere.”

⁹⁶⁰ Henry George Liddell and Robert Scott, “Πάσχω,” in *An Intermediate Greek-English Lexicon* (Oxford, U.K.: Clarendon Press, 1889); Henry George Liddell and Robert Scott, “Πάσχω,” in *A Greek-English Lexicon* (Oxford, U.K.: Clarendon Press, 1940); Joseph Henry Thayer, “Πάσχω,” in *Greek-English Lexicon of the New Testament* (New York: American Book Company, 1889); Georg Autenrieth, “Πάσχω,” in *A Homeric Dictionary for Schools and Colleges* (New York: Harper and Brothers, 1891); William J. Slater, “Πάσχω,” in *Lexicon to Pindar* (Berlin: De Gruyter, 1969); Johannes P. Louw and Eugene A. Nida, eds., “24.78 Πάσχω; Πάθημα, Τος,” in *Greek-English Lexicon of the New Testament Based on Semantic Domains* (New York: United Bible Societies, 1988); Johannes P. Louw and Eugene A. Nida, eds., “89.32 Ἐπεί; Ἐπειδή; Ἐπειδήπερ,” in *Greek-English Lexicon of the New Testament*

Based on *Semantic Domains* (United Bible Societies, 1988); Johannes P. Louw and Eugene A. Nida, eds., “90.66 Πάσχω,” in *Greek-English Lexicon of the New Testament Based on Semantic Domains* (New York: Unitee Bible Societies, 1988); Anthony Preus, “PASCHEIN,” in *Historical Dictionary of Ancient Greek Philosophy* (New York: Rowman & Littlefield, 2015); Robert Beekes, “Πάσχω,” in *Etymological Dictionary of Greek*, Leiden Indo-European Etymological Dictionary Series 1 (Leiden, The Netherlands: Brill, 2010).

⁹⁶¹ Liddell and Scott, “Παθητικός”; Liddell and Scott, “Πα^θ-Ητικός”; Liddell and Scott, “Πρακτικός”; Liddell and Scott, “Πρακ-τικός”; Liddell and Scott, “Πάθος,” 1889; Liddell and Scott, “Πάθος,” 1940; Liddell and Scott, “Πρᾶξις,” 1889; Liddell and Scott, “Πρᾶξις,” 1940; Slater, “Πρᾶξις”; Thayer, “Πάθος”; Thayer, “Πάσχω”; Thayer, “Πάθημα”; Thayer, “Πράξις -Εως”; Thayer, “Πράσσω.”

⁹⁶² Liddell and Scott, “Πάθος,” 1889; Liddell and Scott, “Πάθος,” 1940; Liddell and Scott, “Πρᾶξις,” 1889; Liddell and Scott, “Πρᾶξις,” 1940; Slater, “Πρᾶξις”; Thayer, “Πάθος”; Thayer, “Πάθημα”; Thayer, “Πράξις -Εως”; Thayer, “Πάσχω”; Thayer, “Πράσσω”; Preus, “PATHOS, PATHĒ”; Preus, “PRAXIS, PRAKTIKĒ. Πρᾶξις, Πρακτική”; Preus, “PASSION.”

⁹⁶³ Plato, “Θεαίτητος (Theaetetus)”; Plato, “Theaetetus”; Plato, “Plato’s Theaetetus”; Aristotle, “The Categories,” 12–109; Aristotle, *Nicomachean Ethics*; Liddell and Scott, “Ποιέω,” 1889; Liddell and Scott, “Ποίημα”; Liddell and Scott, “Ποίησις”; Liddell and Scott, “Ποιητής”; Liddell and Scott, “Ποιέω,” 1940; Liddell and Scott, “Ποί-Ημα”; Liddell and Scott, “Ποί-Ησις”; Liddell and Scott, “Ποι-Ητής”; Autenrieth, “Ποιέω”; Thayer, “Ποιέω”; Thayer, “Ποίημα”; Thayer, “Ποίησις”; Thayer, “Ποιητής”; Preus, “Poiein, Poiēsis, Poiētikē”; Beekes, “Ποιέω.”

⁹⁶⁴ Preus, “Poiein, Poiēsis, Poiētikē.”

⁹⁶⁵ Oxford University Press, “Compassion, n.”; Klein, “Compassion, n.”; Skeat, “Compassion”; Lewis and Short, “Com-Pātiōr”; The British Academy and Latham, “Compassio.”

⁹⁶⁶ Oxford University Press, “Belligerate, v.”; Klein, “Belligerent, Adj.”; Skeat, “Belligerent.”

⁹⁶⁷ Lewis, “Belliger”; Lewis and Short, “Belliger”; Oxford University Press, “Belligero”; The British Academy and Latham, “Belliger.”

⁹⁶⁸ De Vaan, “Agō, -Ere”; De Vaan, “Gerō, -Ere”; Pokorny, “Aġ-”; Pokorny, “1. Ġhei-, Ġhēi-”; Pokorny, “Ueġh-”; Linguistics Research Center, “Indo-European Lexicon. Pokorny Master PIE Etyma.”

⁹⁶⁹ Oxford University Press, “Identify, v.”; Klein, “Identify, Tr. v.”; Oxford University Press, “-Fy, Suffix”; Oxford University Press, “-Ficus”; The British Academy and Howlett, “Identificare”; Lewis, “Faciō”; Lewis and Short, “Fāciō”; Oxford University Press, “Faciō”; De Vaan, “Faciō, -Ere.”

⁹⁷⁰ Liddell and Scott, “Στάσις”; Thayer, “Στάσις”; Beekes, “Στάσις”; Preus, “STASIS.”

⁹⁷¹ Liddell and Scott, “Ἰστημι,” 1889; Liddell and Scott, “Ἰστημι,” 1940; Thayer, “Ἰστημι”; Beekes, “Ἰστημι.”

⁹⁷² Liddell and Scott, “Ἰστημι,” 1889; Liddell and Scott, “Ἰστημι,” 1940; Thayer, “Ἰστημι”; Beekes, “Ἰστημι.”

⁹⁷³ Liddell and Scott, “Ἐπίσταμαι,” 1889; Liddell and Scott, “Ἐπιστήμη,” 1889; Liddell and Scott, “Ἐπίσταμαι,” 1940; Liddell and Scott, “Ἐπιστήμη,” 1940; Thayer, “Ἐπίσταμαι”; Thayer, “Ἐπιστήμων”; Preus, “EPISTĒMĒ.”

⁹⁷⁴ Liddell and Scott, “Ἐπί,” 1889; Liddell and Scott, “Ἐπί,” 1940; Thayer, “Ἐπί”; Beekes, “Ἐπί.”

⁹⁷⁵ The one metaphysical and, thereof and therefrom, epistemological metaphysical exception is the *causa prima*, or what is the same, *the actus primus-the actus purus*, or what is the same again, *the primum movens*.

⁹⁷⁶ Oxford University Press, “Courage, n.”; Klein, “Courage, n.”; Skeat, “Courage”; Lewis, “Cor”; Lewis and Short, “Cor”; The British Academy and Latham, “Cor”; Oxford University Press, “Cor”; De Vaan, “Cor, Cordis”; Liddell and Scott, “Καρδία”; Liddell and Scott, “Καρδί-α”; Slater, “Καρδία”; Thayer, “Καρδία”; Beekes, “Καρδία.”

⁹⁷⁷ Liddell and Scott, “Φρήν,” 1889; Liddell and Scott, “Φρονέω”; Liddell and Scott, “Φρόνησις”; Liddell and Scott, “Φρήν,” 1940; Liddell and Scott, “Φρον-Εω”; Liddell and Scott, “Φρόν-Ησις”; Autenrieth, “Φρήν”; Autenrieth, “Φρονέω”; Thayer, “Φρήν”; Thayer, “Φροσέω”; Thayer, “Φρόνημα, -Τος, Τό”; Beekes, “Φρήν.”

⁹⁷⁸ Oxford University Press, “Sympathy, n.”; Klein, “Sympathy, n.”; Skeat, “Sympathy”; Liddell and Scott, “Συμπάθεια”; Liddell and Scott, “Συμπαθέω”; Liddell and Scott, “Συμπαθής”; Liddell and Scott, “Συμπάθ-Εια”; Liddell and Scott, “Συμπαθ-Εω”; Liddell and Scott, “Συμπαθ-Ης”; Thayer, “Συμπαθέω”; Thayer, “Συμπαθής, -Ες”; Thayer, “Σθμ-Πάσχω.”

⁹⁷⁹ Liddell and Scott, “Σύν,” 1889; Liddell and Scott, “Σύν,” 1940; Autenrieth, “Σύν, Ξύν”; Slater, “Σύν”; Beekes, “Ξύν.”

⁹⁸⁰ Liddell and Scott, “Πάθος,” 1889; Liddell and Scott, “Πάσχω,” 1889; Liddell and Scott, “Πάθη”; Liddell and Scott, “Πάθος,” 1940; Liddell and Scott, “Πάσχω,” 1940; Liddell and Scott, “Πα^θ-η”; Autenrieth, “Πάσχω”; Slater, “Πάσχω”; Thayer, “Πάθος”; Thayer, “Πάθημα”; Thayer, “Πάσχω”; Preus, “PATHOS, PATHĒ”; Beekes, “Πάθος”; Beekes, “Πάσχω.”

⁹⁸¹ Oxford University Press, “Kinetic, Adj. and n.”; Oxford University Press, “Kinesis, n.”; Klein, “Kinetic, Adj.”; Liddell and Scott, “Κίνησις,” 1889; Liddell and Scott, “Κίνησις,” 1940.

⁹⁸² Liddell and Scott, “Κινέω”; Liddell and Scott, “Κι_νέω”; Autenrieth, “Κι_νέω”; Slater, “Κινέω”; Preus, “KINĒSIS”; Beekes, “Κινέω.”

⁹⁸³ Pokorny, “Kēi-”; Linguistics Research Center, “Indo-European Lexicon. Pokorny Master PIE Etyma”; Beekes, “Κινέω”; De Vaan, “Cieō”; Lewis, “Cieō”; Lewis and Short, “Cīō”; Oxford University Press, “Cieō”; The British Academy and Latham, “Ciēre, Ciēre.”

⁹⁸⁴ Oxford University Press, “Motion, n.”; Oxford University Press, “Move, v.”; Oxford University Press, “Motive, n.”; Klein, “Motion, n.”; Klein, “Move, Tr. and Intr. v.”; Klein, “Motive, n.”; Skeat, “Motion”; Skeat, “Move”; Skeat, “Motive.”

⁹⁸⁵ Lewis, “Mōtiō”; Lewis, “Moveō”; Lewis and Short, “Mōtīo”; Lewis and Short, “Mōvĕo”; Oxford University Press, “Mōtiō”; Oxford University Press, “Moueō”; The British Academy, Howlett, and Blundell, “Motio”; The British Academy, Howlett, and Blundell, “Movere”; De Vaan, “Moveō”; Pokorny, “2. Μευ-, Μευα-”; Linguistics Research Center, “Indo-European Lexicon. Pokorny Master PIE Etyma.”

⁹⁸⁶ When I write of love, I write *wholistically* of: ἀγάπη (*agāpē*); ἔρως (*ērōs*) which is not *merely* desire or appetite alone, which would not and could not be *love*; στοργή, (*storgē*); φιλαυτία (*philautia*) which is not and cannot be vanity, selfishness, or egotism; and φιλία (*philia*).

⁹⁸⁷ See Appendix

⁹⁸⁸ Arendt, *The Human Condition*, 242.

⁹⁸⁹ I find Arendt’s understanding of *what* love is to be perfectly contemporarily commonsensical but essentially superficial, particularly when she writes: “precisely because [love, i.e. the person that loves one’s self or another] is unconcerned to the point of total unworldliness with *what* the loved person may be, with his qualities and shortcomings no less than with his achievements, failings, and transgressions.” Arendt speaks of what is commonly called blind love. Love, insofar as it is love at all, cannot be blind, or deaf, or in any other way senseless. Arendt is not, however, incorrect. She is perfectly epistemologically metaphysically and relativistically metaphysically correct. Yet what she writes—while lawful as lawfully given to sense and understanding-in-advance of epistemological metaphysics—must be *heard*, in faith and *love* and *trust*, as the call of essential questions to journey in thinking towards the epistemologically metaphysically *unknown*: *What is love?* Love, again, is not and cannot be *at all, whatsoever*, insofar as love is blind. Love is not *merely ex-sisting*, i.e. worldly, but it *does ex-sist!* It is and can be *worldly*. Love is not *dimensional*, however, in any worldly sense or measure and most certainly not exhaustively or exclusively dimensional, i.e. measurable and evaluated exhaustively and absolutely, *by us*, human-beings-existing in the world. When I speak, then, of blind love, I do not speak of love at all. What is it, then, of which I speak when I speak, as does Arendt, of blind love?

⁹⁹⁰ Arendt, *The Human Condition*, 242.

Chapter 6

⁹⁹¹ Since at least Allee *et al.* (1949), as well as, Stauffer (1957), the English translations of Haeckel have read something similar the following translations: (1) From Allee *et al.* (1949), translating from Haeckel (1902 [1869]), p. 20. “*By ecology we mean* the body of knowledge concerning the economy of nature...” [italics added] (2) From Stauffer (1957), translating from Haeckel (1866), p. 286: “*By ecology, we mean* the whole science of the relations of the organism to the environment including, in the broad sense, all the ‘conditions of existence’” [italics added]. In an important sense, neither of these translations are accurate of what Haeckel wrote. They tell us more about ourselves, perhaps, than they do about what Haeckel understood ecology to be. In (1), Haeckel wrote: “Unter Ökologie verstehen wir die Lehrer von der Ökonomie, von dem haushalt der thierifchen Organismen.” In English: “Under [By] ecology we understand the teachers of the economy of the household of animal organisms.” In (2), Haeckel wrote: “Unter Oecologie verstehen wir die gesammte Wissenschaft von den Beziehungen des Organismus zur umgebenden Aussenwelt, wohin wir im weiteren Sinne alle „Existenz-Bedingungen“ rechnen können.” In English: “Under [By] ecology we understand the whole science of the relations of the organism to the surrounding outside world, where, in a broad sense, all the conditions of existence can count.” *To mean* and *to understand* are not the same! *Under* (the literal translation) and *by* are not the same. See: Haeckel, *Generelle Morphologie Der Organismen. Allgemeine Grundzüge Der Organischen Formen-Wissenschaft, Mechanisch Begründet Durch Die von Charles Darwin Reformirte Descendenztheorie*, 2:286; Haeckel, “Ueber Entwicklungsgang Und Aufgabe Der Zoologie. Vortrag, Gehalten Am 12. Januar 1869 Beim Eintritt in Die Philosophische Facultät Zu Jena,” 20; Allee *et al.*, *Principles of Animal Ecology*, frontispiece, 34, 42; Stauffer, “Haeckel, Darwin, and Ecology”; Friederichs, “A Definition of Ecology and Some Thoughts About Basic Concepts”; McIntosh, *The Background of Ecology: Concept and Theory*, 2–3, 7–8; Kingsland, *Modeling Nature: Episodes in the History of Population Ecology*, 11; Worster,

Nature's Economy: A History of Ecological Ideas, 192–93; Cooper, *The Science of the Struggle for Existence: On the Foundations of Ecology*, 4–7; Egerton, “History of Ecological Sciences, Part 47.”

⁹⁹² Haeckel, *Generelle Morphologie Der Organismen. Allgemeine Grundzüge Der Organischen Formen-Wissenschaft, Mechanisch Begründet Durch Die von Charles Darwin Reformirte Descendenztheorie*, 2:286.

⁹⁹³ Beekes, “Οἶκος.”

⁹⁹⁴ Oxford University Press, “Hold, v.”; Klein, “Hold, Tr. and Intr. v.”; Skeat, “Hold”; Ringe and Taylor, “PGmc *haldana,” 184.

⁹⁹⁵ My attention was first brought to this question upon reading Heidegger’s sensitive response. See Martin Heidegger, “Logos (Heraclitus, Fragment B 50),” in *Early Greek Thinking*, trans. David Farrell Krell and Frank A. Capuzzi (San Francisco: Harper and Row, 1984), 59–78.

⁹⁹⁶ Oxford University Press, “Logos, n.”; Klein, “Logos, n.”; Klein, “-Logy”; Skeat, “Logic”; Beekes, “Λόγος”; Liddell and Scott, “Λόγος,” 1889; Liddell and Scott, “Λόγος,” 1940.

⁹⁹⁷ Liddell and Scott, “Λόγος,” 1889; Liddell and Scott, “Λόγος,” 1940; Autenrieth, “Λόγος”; Beekes, “Λόγος.”

⁹⁹⁸ Liddell and Scott, “Λέγω (2)”; Liddell and Scott, “Λέγω (3)”; Liddell and Scott, “Λέγω (B)”; Beekes, “Λέγω”; De Vaan, “Legō, -Ere”; Kluge, “Lesen, Vb.”; Kroonen, “*lesan-.”

⁹⁹⁹ To define a word is to will to *determine*, regulate, and control its speaking, its saying, and the senses it gives us by willing to make them belong to me (or us)—as being not only *of* and *from* us originally and finally, and efficiently causally thereby grounded upon our technical ingenuity, but effectively by me (or us) *in order to* utilize the word and its senses—or operationalize it—at our will, as I will, for our purposes, and to achieve our goals. So determined efficiently by me (or us), I am left with a mere *term*. And insofar as I stockpile *terms* into *terminologies* standing by at our will ready for flexible deployment in the actualization-by-achievement of our end-goals, I am left with a graveyard of words that I have willfully terminated. Perhaps I fear the uncertainty of words’ senses, or the beauty, truth, and goodness of words speaking *of* themselves, *as they are* and *as they come* giving themselves to me (and us) that I may sense the world’s sensibility. Perhaps I fear the gentle, giving selectivity of words’ calling and gathering of us together, in familiar human communion, to sense the world’s sensibility in the first place and begin to respond together as I am existing here and now in the world. To define a word is to *terminate* its speaking, its saying, its telling, and therewith, its giving sense to the world’s sensibility. To terminate a word is annihilate is always giving gift of bringing us to our senses, to sensitivity, and to not only see but look toward, not on hear but listen to the possibilities sensibly given to presence before me as I fare along my way through the world. *To define a world is to silence it. To silence a word is an act. To silence a word is to terminate the word forcefully.* A modern dictionary, common or etymological, which comes to be made contemporarily from what I am epistemologically metaphysically given in advance to understand dictionaries to be, is a graveyard of terms—vastly ordered into columns and columns of terminologies. A contemporary dictionary’s value to us is not to be underestimated, nor is it to be doubted, much less resisted as a problem. A contemporary dictionary is very valuable. Indeed, I have made use of several as I respond thinkingly in this dissertation. Yet I understand that I am given lawfully to understanding in advance. These dictionaries are graveyards nonetheless, utterly awing yet dreadfully solemn in their sheer scholarly technicality and the immense labor necessary for their actualization by achievement. I walk carefully among the graves, as openingly and vulnerably as I am able, as sensitively has I have been given to sense. I walk mournfully among the terms in theses dictionaries pages, always thankful for the dictionaries and their authors, but nonetheless I walk among the terms to learn what comes to us and what leaves us, now and here, as well as then and there, as well as what I am given to understand in advance. I do walk, and I am thankful. But I walk the most sensitive regard, reverence, and, often enough, sorrow for the terminated grace and generosity of the words that I will to put up here terminally. Thankfully, again, I belong to the words speaking senses. Despite our efforts, the words and the sensibility of the world remains beautifully and truthfully awing before the belonging and wonder it blesses me with as I exist presencingly in and of it.

¹⁰⁰⁰ Lewis, “Sciō”; Lewis, “Secō”; Lewis and Short, “Sciō”; Lewis and Short, “Sēco”; Oxford University Press, “Sciō”; Oxford University Press, “Secō”; De Vaan, “Sciō, Scīre”; De Vaan, “Secō, -Āre”; Beekes, “Σχίζω”; Kroonen, “*sagō-”; Kroonen, “*sahsa-”; Kluge, “Säge”; Pokorny, “Sēk-”; Pokorny, “Skēi-”; Pokorny, “(S)k(h)Ed-, (s)k(h)e-n-d-”; Linguistics Research Center, “Indo-European Lexicon. Pokorny Master PIE Etyma.”

¹⁰⁰¹ Oxford University Press, “Com-, Prefix”; Oxford University Press, “Con-, Prefix”; Oxford University Press, “Conscious, Adj. and n.”; Klein, “Conscious, Adj.”; Skeat, “Conscious”; Skeat, “Conscience”; Oxford University Press, “Consciō.”

¹⁰⁰² Oxford University Press, “Conscience, n.”; Skeat, “Conscience.”

¹⁰⁰³ Lewis, “Sciō”; Lewis, “Secō”; Oxford University Press, “Sciō”; Oxford University Press, “Secō”; De Vaan, “Sciō, Scīre”; De Vaan, “Secō, -Āre”; Beekes, “Σχίζω”; Kroonen, “*sagō-”; Kroonen, “*sahsa-”; Kluge, “Säge”;

Pokorny, “Sĕk-”; Pokorny, “Skĕi-”; Pokorny, “(S)k(h)Ed-, (s)k(h)e-n-d-”; Linguistics Research Center, “Indo-European Lexicon. Pokorny Master PIE Etyma.”

¹⁰⁰⁴ Lewis, “Sciō”; Oxford University Press, “Secō”; Lewis and Short, “Sciō”; Oxford University Press, “Sciō”; De Vaan, “Sciō, Scīre”; De Vaan, “Secō, -Āre”; Kroonen, “*sagō-”; Kroonen, “*sahsa-”; Kluge, “Säge.”

¹⁰⁰⁵ Oxford University Press, “Science, n.”; Klein, “Science, n.”; Skeat, “Science”; Oxford University Press, “Sciens”; Lewis, “Scientia”; Lewis and Short, “Sciētia.”

¹⁰⁰⁶ Oxford University Press, “Know, v.”; Klein, “Know, Tr. and Intr. v.”; Skeat, “Know”; Beekes, “Γιγνώσκω”; Preus, “GNŌSIS. Γνώσις”; Oxford University Press, “Noscō”; De Vaan, “Nōscō, -Ere”; Kroonen, “*kanjan”; Kroonen, “*kannjan”; Pokorny, “Ĝen-, Ĝenā-, Ĝnē-, Ĝnō-”; Linguistics Research Center, “Indo-European Lexicon. Pokorny Master PIE Etyma.”

¹⁰⁰⁷ Beekes, “Γιγνώσκω”; Beekes, “Κοννέω.”

¹⁰⁰⁸ Beekes, “Κοννέω.”

¹⁰⁰⁹ Oxford University Press, “Wise, Adj. (n.3 and Adv.)”; Klein, “Wise, Adj.”; Skeat, “Wise”; Beekes, “Οἶδᾶ”; Kroonen, “*witan-”; Pokorny, “Ū(e)Id-”; Linguistics Research Center, “Indo-European Lexicon. Pokorny Master PIE Etyma.”

¹⁰¹⁰ Liddell and Scott, “Φιλοσοφία”; Liddell and Scott, “Φι[^]λοσοφ-Ια”; Oxford University Press, “Philosophy, n.”; Skeat, “Philosophy”; Klein, “Philosophy.”

¹⁰¹¹ Liddell and Scott, “Φίλος,” 1940; Liddell and Scott, “Φίλος,” 1889; Beekes, “Φίλος”; Skeat, “Philosophy.”

¹⁰¹² Liddell and Scott, “Σοφός,” 1889; Liddell and Scott, “Σοφός,” 1940; Arndt and Gingrich, “Σοφός”; Beekes, “Σοφός”; Preus, “Sophos, Sophoi, Sophia.”

¹⁰¹³ Liddell and Scott, “Ποιέω,” 1889; Liddell and Scott, “Ποιέω,” 1940; Arndt and Gingrich, “Ποιέω”; Beekes, “Ποιέω”; Preus, “Poiein, Poiēsis, Poiētikē.”

¹⁰¹⁴ Oxford University Press, “Banausic, Adj.”; Klein, “Banausic”; Liddell and Scott, “Βάναισος,” 1889; Liddell and Scott, “Βάναισος,” 1940; Arndt and Gingrich, “Βάναισος, Ου”; Beekes, “Βάναισος, -Ου”; Whitney, *Paradise Restored: The Mechanical Arts from Antiquity through the Thirteenth Century*; Arnāutu, “Early Modern Philosophy of Technology: Bacon and Descartes.”

¹⁰¹⁵ Heidegger understood this, though he was, perhaps, not clear enough that at its end, philosophy is only beginning as philosophy fulfilled. Heidegger, “The End of Philosophy and the Task of Thinking.”

¹⁰¹⁶ Liddell and Scott, “Διατίθημι,” 1889; Liddell and Scott, “Διατίθημι,” 1940; Liddell and Scott, “Διάθεσις,” 1889; Liddell and Scott, “Διάθεσις,” 1940; Arndt and Gingrich, “Διατίθημι”; Liddell and Scott, “Ποιητής”; Liddell and Scott, “Ποι-Ητής”; Arndt and Gingrich, “Ποιητής, Ου”; Liddell and Scott, “Ποίημα”; Liddell and Scott, “Ποί-Ημα”; Arndt and Gingrich, “Ποίημᾶ.”

¹⁰¹⁷ Oxford University Press, “Practic, Adj. and n.2”; Klein, “Practical”; Skeat, “Practice”; Liddell and Scott, “Πρακτικός”; Liddell and Scott, “Πρακ-Τικός”; Beekes, “Πράσσω”; Preus, “Praxis, Praktikē”; Oxford University Press, “Pragmatic, Adj. and n.”; Skeat, “Pragmatic”; Klein, “Pragmatic”; Liddell and Scott, “Πρᾶγμα,” 1889; Liddell and Scott, “Πρᾶγμα,” 1940; Arndt and Gingrich, “Πραγμα, Ατος, Τό”; Preus, “Pragma. Πρᾶγμα.”

¹⁰¹⁸ Liddell and Scott, “Πρακτικός”; Liddell and Scott, “Πρακ-Τικός”; Oxford University Press, “Practic, Adj. and n.2”; Skeat, “Practice”; Klein, “Practice, Tr. and Intr. v.”; Klein, “Practical”; Liddell and Scott, “Πράσσω,” 1889; Liddell and Scott, “Πράσσω,” 1940; Arndt and Gingrich, “Πράσσω”; Beekes, “Πράσσω”; Preus, “Praxis, Praktikē”; Oxford University Press, “Pragmatic, Adj. and n.”; Skeat, “Pragmatic”; Klein, “Pragmatic”; Liddell and Scott, “Πρᾶγμα,” 1889; Liddell and Scott, “Πρᾶγμα,” 1940; Arndt and Gingrich, “Πραγμα, Ατος, Τό”; Preus, “Pragma. Πρᾶγμα.”

¹⁰¹⁹ Liddell and Scott, “Φρονέω”; Liddell and Scott, “Φρον-Εω”; Arndt and Gingrich, “Φρονέω”; Liddell and Scott, “Φρόνησις”; Liddell and Scott, “Φρόν-Ησις”; Arndt and Gingrich, “Φρόνησις, Εως”; Preus, “Phronēsis.”

¹⁰²⁰ Klein, “Epistemic, Adj.”; Beekes, “Επίσταμαι [v.]”; Oxford University Press, “Episteme, n.”

¹⁰²¹ Liddell and Scott, “Επίσταμαι,” 1889; Liddell and Scott, “Επίσταμαι,” 1940; Beekes, “Επίσταμαι.”

¹⁰²² I may notice here that questions of poiēsis (ποίησις), tékhnē (τέχνη), sophós (σοφός) (whence sophiā [σοφία] of philosophiā [φιλοσοφία]), craft, art, will, and power all arise within the essential realm of questioning into which the question of *what epístamai* (ἐπίσταμαι) is ushers us.

¹⁰²³ Parry, “Episteme and Techne”; Whitney, *Paradise Restored: The Mechanical Arts from Antiquity through the Thirteenth Century*; Arnāutu, “Early Modern Philosophy of Technology: Bacon and Descartes”; Morrison, “Philosophy and History in Bacon”; Schadewaldt, “The Concepts of ‘Nature’ and ‘Technique’ According to the Greeks”; Mitcham, “Philosophy and the History of Technology”; JONAS, “TECHNOLOGY AND RESPONSIBILITY”; Jonas, “The Practical Uses of Theory”; Heidegger, “The Question Concerning Technology.”

¹⁰²⁴ Liddell and Scott, “Επίσταμαι,” 1940.

¹⁰²⁵ Liddell and Scott, “Οἶδᾶ”; Beekes, “Οἶδᾶ.”

- ¹⁰²⁶ Liddell and Scott, “Οἶδα”; Slater, “Οἶδα”; Beekes, “Οἶδᾶ.”
- ¹⁰²⁷ Beekes, “Οἶδᾶ.”
- ¹⁰²⁸ Beekes; Liddell and Scott, “Οἶδα”; Liddell and Scott, “Εἶδω”; Beekes, “Εἶδομαι”; Liddell and Scott, “Εἶδον.”
- ¹⁰²⁹ Liddell and Scott, “Ιδέα,” 1889; Liddell and Scott, “Ιδέα,” 1940; Beekes, Robert, “Ιδέᾶ”; Beekes, “Ιδεῖν”; Liddell and Scott, “Εἶδω.”
- ¹⁰³⁰ Caution: That I am not merely circling uselessly, however, does not necessarily entail that I am efficiently making or producing epistemological-scientific progress; solving epistemological metaphysical problems; making, producing, or formulating useful tools, theoretical or otherwise; grounding or otherwise evidencing epistemological scientific arguments; or framing epistemological metaphysical or relativistic metaphysical pictures, perspectives, views, or worldviews.
- ¹⁰³¹ “John 9:1-12.” “John 9:1-12,” Bible Hub, 2021, <https://biblehub.com/john/9.htm>.
- ¹⁰³² Dreyfus and Kelly, *All Things Shining: Reading the Western Classics to Find Meaning in a Secular Age*.
- ¹⁰³³ Liddell and Scott, “Ἐπί,” 1889; Beekes, “Ἐπῖ.”
- ¹⁰³⁴ Liddell and Scott, “Ἰστημι,” 1940; Liddell and Scott, “Ἰστημι,” 1889; Autenrieth, “Ἰστημι”; Beekes, “Ἰστημι.”
- ¹⁰³⁵ Heidegger, “Modern Science, Metaphysics, and Mathematics”; Heidegger, “The Age of the World Picture.”
- ¹⁰³⁶ Beekes, “Φαίνω, -Ομαι”; Liddell and Scott, “Φαίνω,” 1889; Liddell and Scott, “Φαίνω,” 1940; Autenrieth, “Φαίνω”; Slater, “Φαίνω.”
- ¹⁰³⁷ Beekes, “Φαίνω, -Ομαι.”
- ¹⁰³⁸ Liddell and Scott, “Υπόκειμαι,” 1889; Liddell and Scott, “Υπόκειμαι,” 1940; Beekes, “Υπό, Υπο”; Beekes, “Κεῖμαι.”
- ¹⁰³⁹ Heidegger, *Nietzsche*; Heidegger, “The Age of the World Picture.”
- ¹⁰⁴⁰ Lewis, “Subiectus”; Oxford University Press, “Subiectūus”; Oxford University Press, “Subiectō”; Lewis and Short, “Sūb-Īciō”; Lewis, “Subiciō”; Oxford University Press, “Sūbiciō”; Lewis, “Iaciō”; de Vaan, “Iaciō, -Ere.”
- ¹⁰⁴¹ “Sūbiciō”; Oxford University Press, “Subiectō.”
- ¹⁰⁴² Gier, “The Hypokeimenon Story”; Heidegger, *Nietzsche*.
- ¹⁰⁴³ de Vaan, “Iaciō, -Ere”; Lewis, “Obiectus”; Lewis and Short, “Ōbīciō”; Lewis, “Obiciō”; Oxford University Press, “Obiciō”; Oxford University Press, “Obiectus”; Oxford University Press, “Obiectum”; Oxford University Press, “Obiectō.”
- ¹⁰⁴⁴ de Vaan, “Ob”; de Vaan, “Iaciō, -Ere”; Lewis, “Obiciō”; Oxford University Press, “Obiciō.”
- ¹⁰⁴⁵ *Why* words speak to me (and us), orient me (and us), and guide me (and us) along the way of sense to which I (and we) belong in the world is a most essential question. *Why* I am sent, carried into, oriented and disposed in fundamental human dispositions along a way of sense in the world such that I not only listen to, but that I only—nearly exhaustively and exclusively—hear whatsoever the efficiently causal senses of, for example, *epistamai* or *phainómenon* is, likewise, a genuinely essential question. These are questions to whose call our response can only ever be a beginning. These are questions whose obligation is utmost to not only hear, but to listen to faithfully. To respond to these question’s call would overwhelm this dissertation. I cannot, therefore, follow them further here.
- ¹⁰⁴⁶ Heidegger, “The End of Philosophy and the Task of Thinking.”
- ¹⁰⁴⁷ Plato, “Τίμαιος (Timaeus),” sec. 28b; Plato, “Timaeus,” sec. 28b; Plato, “Plato’s Timaeus,” secs. 28b, 28c.
- ¹⁰⁴⁸ Plato, “Τίμαιος (Timaeus),” secs. 28b, 30b, 31b; Plato, “Timaeus,” 28b, 30b, 31b; Plato, “Plato’s Timaeus,” secs. 28b, 30b, 31b.
- ¹⁰⁴⁹ Plato, “Τίμαιος (Timaeus),” secs. 28b, 31b, 32b, 32a–32b, 53c; Plato, “Timaeus,” secs. 28b, 31b, 32b, 32a–32b, 53c; Plato, “Plato’s Timaeus,” secs. 28b, 31b, 32b, 32a–32b, 53c.
- ¹⁰⁵⁰ Plato, “Τίμαιος (Timaeus),” sec. 28b; Plato, “Timaeus,” sec. 28b; Plato, “Plato’s Timaeus,” sec. 28b.
- ¹⁰⁵¹ Plato, “Timaeus,” sec. 28b; Plato, “Plato’s Timaeus,” 28b.
- ¹⁰⁵² Plato, “Τίμαιος (Timaeus),” secs. 28a, 28b, 28c, et al.; Liddell and Scott, “Τίγνομαι,” 1889; Liddell and Scott, “Τίγνομαι,” 1940; Autenrieth, “Τίγνομαι”; Beekes, “Τίγνομαι.”
- ¹⁰⁵³ Oxford University Press, “Exist, v.”; Klein, “Exist, Intr. v.”; Skeat, “Exist”; Oxford University Press, “Ex(s)Istō, ~ere”; Lewis, “Ex-Sistō or Existō”; Lewis and Short, “Ex-Sisto or Existo”; Oxford University Press, “Sistō, ~ere”; Lewis, “Sistō”; Lewis and Short, “Sisto”; de Vaan, “Sisto, -Ere.”
- ¹⁰⁵⁴ Oxford University Press, “Ex, ē,” 1968; De Vaan, “Ex, ē, Ec-.”
- ¹⁰⁵⁵ Oxford University Press, “Sistō, ~ere”; Lewis, “Sistō”; Lewis and Short, “Sisto”; de Vaan, “Sisto, -Ere.”
- ¹⁰⁵⁶ Oxford University Press, “Episteme, n.”; Klein, “Epistemic, Adj.”; Liddell and Scott, “Ἐπίσταμαι,” 1889; Liddell and Scott, “Ἐπίσταμαι,” 1940; Beekes, “Ἐπίσταμαι”; Liddell and Scott, “Ἰστημι,” 1889; Liddell and Scott, “Ἰστημι,” 1940; Beekes, “Ἰστημι”; Beekes, “Ἰστημι.”
- ¹⁰⁵⁷ Liddell and Scott, “Ἐπί,” 1889; Liddell and Scott, “Ἐπί,” 1940; Autenrieth, “Ἐπί”; Slater, “Ἐπί”; Beekes, “Ἐπί.”
- ¹⁰⁵⁸ Liddell and Scott, “Ἰστημι,” 1889; Liddell and Scott, “Ἰστημι,” 1940; Autenrieth, “Ἰστημι”; Beekes, “Ἰστημι.”

- ¹⁰⁵⁹ Liddell and Scott, “Υπάρχω,” 1889; Liddell and Scott, “Υπάρχω,” 1940; Autenrieth, “Υπ-Ἀρχω.”
- ¹⁰⁶⁰ Oxford University Press, “Presence, n.”; Klein, “Present, Adj.”; Skeat, “Present.”
- ¹⁰⁶¹ Oxford University Press, “Prae-”; De Vaan, “Prae.”
- ¹⁰⁶² Oxford University Press, “Sum”; De Vaan, “Sum, Esse.”
- ¹⁰⁶³ To exist is to presence, but to exist does not exhaust presencing. A being could presence in the world without standing out or standing on or upon another being or thing. To be. Then to presence. Then to exist. In epistemological metaphysics, to be is, exhaustively and exclusively, to exist. Epistemologically-metaphysically, and thereof, scientifically-epistemologically, to presence, then, is to exist and to presence is exhausted by existing. However, it is the other way around. To exist is to presence existingly. If one is to stand out, one must be-presencing. What is to absence, epistemologically metaphysically understood?
- ¹⁰⁶⁴ Aristotle, *Aristotle’s Metaphysics*, sec. 1029b.
- ¹⁰⁶⁵ Plato, “Τίμαιος (Timaeus),” secs. 28a, 28b, 28c, et al.; Liddell and Scott, “Τίγνομαι,” 1889; Liddell and Scott, “Τίγνομαι,” 1940; Autenrieth, “Τίγνομαι”; Beekes, “Τίγνομαι.”
- ¹⁰⁶⁶ Plato, “Τίμαιος (Timaeus),” 28b, 30b, 31b, 44c, 44d, et al.; Plato, “Timaeus,” secs. 28b, 30b, 31b, 44c, 44d, et al.; Plato, “Plato’s Timaeus,” secs. 28b, 30b, 31b, 44c, 44d, et al.
- ¹⁰⁶⁷ Plato, “Timaeus,” sec. 28b; Plato, “Plato’s Timaeus,” 28b.
- ¹⁰⁶⁸ Plato, “Τίμαιος (Timaeus),” secs. 28a, 28b, 28c, et al.; Liddell and Scott, “Τίγνομαι,” 1889; Liddell and Scott, “Τίγνομαι,” 1940; Autenrieth, “Τίγνομαι”; Beekes, “Τίγνομαι.”
- ¹⁰⁶⁹ Liddell and Scott, “Τίγνομαι,” 1889; Liddell and Scott, “Τίγνομαι,” 1940; Oxford University Press, “Bear, v.1”; Oxford University Press, “Born, v.”; Oxford University Press, “Birth, n.1”; Oxford University Press, “Birde, n.”; Klein, “Birth, n.”; Klein, “Born, Borne.”
- ¹⁰⁷⁰ Oxford University Press, “Exist, v.”; Klein, “Exist, Intr. v.”; Skeat, “Exist”; Oxford University Press, “Ex(s)Istō, ~ere”; Lewis, “Ex-Sistō or Existō”; Lewis and Short, “Ex-Sisto or Existo”; Oxford University Press, “Sistō, ~ere”; Lewis, “Sistō”; Lewis and Short, “Sisto”; de Vaan, “Sisto, -Ere.”
- ¹⁰⁷¹ Oxford University Press, “Episteme, n.”; Klein, “Epistemic, Adj.”; Liddell and Scott, “Επίσταμαι,” 1889; Liddell and Scott, “Επίσταμαι,” 1940; Beekes, “Επίσταμαι”; Liddell and Scott, “Ιστημι,” 1889; Liddell and Scott, “Ιστημι,” 1940; Beekes, “Ιστημι”; Beekes, “Ιστημι.”
- ¹⁰⁷² Liddell and Scott, “Πράσσω,” 1889; Liddell and Scott, “Πράσσω,” 1940; Beekes, “Πράσσω”; Preus, “Pragma. Πράγμα.”
- ¹⁰⁷³ Liddell and Scott, “Πράσσω,” 1889; Liddell and Scott, “Πράσσω,” 1940; Beekes, “Πράσσω”; Preus, “Pragma. Πράγμα.”
- ¹⁰⁷⁴ Oxford University Press, “Sacrifice, n.”; Oxford University Press, “Sacrific, Adj.”; Oxford University Press, “-Fic (Suffix)”; Klein, “Sacrifice, n.”; Skeat, “Sacrifice”; Oxford University Press, “Sacrificō, ~āre”; Oxford University Press, “Faciō”; Lewis, “Faciō”; Lewis and Short, “Fāciō”; De Vaan, “Faciō, -Ere.”
- ¹⁰⁷⁵ Oxford University Press, “Genuine, Adj.1”; Klein, “Genuine, Adj.”; Skeat, “Genuine”; Kroonen, “*kindi-”; Kroonen, “*kanjan”; Beekes, “Τίγνομαι”; De Vaan, “Gignō, -Ere.”
- ¹⁰⁷⁶ Oxford University Press, “Bear, v.1”; Oxford University Press, “Born, v.”; Oxford University Press, “Birth, n.1”; Oxford University Press, “Birde, n.”; Klein, “Birth, n.”; Klein, “Born, Borne.”
- ¹⁰⁷⁷ Oxford University Press, “Agent, n.1 and Adj.”; Klein, “Agent, Adj. and n.”; Skeat, “Agent”; Oxford University Press, “Agens”; Lewis, “Agō”; Lewis and Short, “Āgo”; Oxford University Press, “Agō”; Oxford University Press, “Agitō”; De Vaan, “Agō, -Ere”; Oxford University Press, “Patient, Adj. and n.”; Oxford University Press, “Passive, Adj. and n.”; Oxford University Press, “Passion, n.”; Klein, “Patient, Adj.”; Klein, “Passive, Adj.”; Klein, “Passion, n.”; Skeat, “Patient”; Skeat, “Passive”; Skeat, “Passion”; Lewis, “Pātor”; Lewis and Short, “Pātor”; Lewis and Short, “Passivus”; Oxford University Press, “Patiens”; Oxford University Press, “Pātor”; De Vaan, “Pātor, Patī.”
- ¹⁰⁷⁸ Oxford University Press, “Abstract, v.”; Klein, “Abstract, Adj.”; Skeat, “Abstract”; Lewis, “Abs-Trāho”; Lewis, “Abs - Trahō”; Oxford University Press, “Abstrahō.”
- ¹⁰⁷⁹ Liddell and Scott, “Φρονέω”; Liddell and Scott, “Φρον-Εω”; Georg Autenrieth, “Φρονέω,” in *A Homeric Dictionary for Schools and Colleges* (New York: Harper and Brothers, 1891); Robert Beekes, “Φρήν,” in *Etymological Dictionary of Greek*, Leiden Indo-European Etymological Dictionary Series 1 (Leiden, The Netherlands: Brill, 2010).
- ¹⁰⁸⁰ Liddell and Scott, “Φρήν,” 1889; Liddell and Scott, “Φρήν,” 1940; Autenrieth, “Φρήν”; Beekes, “Φρήν.”
- ¹⁰⁸¹ Liddell and Scott, “Φρήν,” 1889; Liddell and Scott, “Φρήν,” 1940; Autenrieth, “Φρήν”; Beekes, “Φρήν.”
- ¹⁰⁸² Liddell and Scott, “Νοέω”; Liddell and Scott, “No-Εω”; Autenrieth, “Νοέω”; Slater, “Νοέω”; Beekes, “Νόος”; Oxford University Press, “Intelligence, n.”; Klein, “Intelligent, Adj.”; Skeat, “Intellect”; Lewis, “Legō”; Lewis and Short, “Lēgo”; Oxford University Press, “Intellegō”; De Vaan, “Legō, -Ere.”

¹⁰⁸³ Liddell and Scott, “Νόος,” 1889; Liddell and Scott, “Νόος,” 1940; Autenrieth, “Νόος”; Slater, “Νόος”; Beekes, “Νόος.”

¹⁰⁸⁴ Plato, “Τίμαιος (Timaeus),” secs. 28a, 30b, 30d, et al.; Plato, “Timaeus,” secs. 28a, 30b, 30d, et al.; Plato, “Plato’s Timaeus,” secs. 28a, 30b, 30d, et al.

¹⁰⁸⁵ Plato, “Τίμαιος (Timaeus),” secs. 29a, 34a, 40a, 46e, 48c, 71d, 71e, 75a, 75e, 88b, 90b, 90c; Plato, “Timaeus,” secs. 29a, 34a, 40a, 46e, 48c, 71d, 71e, 75a, 75e, 88b, 90b, 90c; Plato, “Plato’s Timaeus,” secs. 29a, 34a, 40a, 46e, 48c, 71d, 71e, 75a, 75e, 88b, 90b, 90c.

¹⁰⁸⁶ Plato understood their essential kinship. See, for example, Plato, “Τίμαιος (Timaeus),” sec. 34a.

¹⁰⁸⁷ Lewis, “Abs-Trāho”; Lewis, “Abs - Trahō”; Oxford University Press, “Abstrahō”; De Vaan, “Trahō, -Ere.”

¹⁰⁸⁸ Augustine, *Confessions*, 151–52.

¹⁰⁸⁹ Oxford University Press, “Perceive, v.”; Skeat, “Perceive”; Klein, “Perceive”; Oxford University Press, “Percipiō”; Lewis, “Capiō”; Lewis and Short, “Căpio”; de Vaan, “Capiō, -Ere.”

¹⁰⁹⁰ Dreyfus and Kelly, *All Things Shining: Reading the Western Classics to Find Meaning in a Secular Age*.

¹⁰⁹¹ Hubert Dreyfus and Sean Dorrance Kelly, *All Things Shining: Reading the Western Classics to Find Meaning in a Secular Age* (New York: Free Press, 2011), 113–16. I find the authors’ intermittent, subtle and not so subtle dismissals, modern and contemporary critiques, and occasional but overly assured “but now we know!” type commentaries (very professionally and professorially moderated, of course) uncomfortably familiar to us as human-being-subjects or “human-being-subjects.” Perhaps the authors’ understanding-in-advance, for example, that “inward desires” are *inward* or that “outward actions” are outward and thereby actions at all, still tells us more of ourselves, human-being-subjects or “human-being-subjects,” as I understand human-being in advance, than it tells us of Plato and the other ancient Greek thinkers, of the ancient Hebrews, of Jesus Christ, of St. Paul, or of Augustine himself. I learn more about myself if I attend and concern ourselves with to the authors’ preoccupation with overcoming disembodiment by means of recognizing that human-being-living-in-the-world is always already embodied, experiencing, and experienced. The authors’ unflagging emphasis is sensical only in our lawfully given belonging in advance to epistemological and relativistic metaphysics. It is an opposite reaction, or reaction in opposition to epistemological metaphysical understanding-in-advance of, for example, theory as disembodied, experience-less, ineffective, passive, and thereby impractical, as well as to an understanding-in-advance of human-being. As a reaction, the authors’ emphasis is in essence of the same as that to which the authors stand opposed and seek to fix or undermine. Dreyfus and Kelly—whom I have chosen as an example, and from whom I have learned and continue to learn a great deal—often (in this book) place their own arguments and willful goals of effectively luring the gods back, and encouraging us to do likewise (so that I may have—or rather, find and thereby experience—meaning again) before the *questions* that called those *faithful* thinkers the cite (e.g. Plato, Aristotle, St. Paul, Augustine, Aquinas, Luther, Descartes, Kant, Nietzsche, Heidegger). More generally, I find that their title, *All Things Shining*, speaks to us in irony. The phenomenon of whooshing up (φύσις, or *phúsis*), as the authors understand and consistently describe it, and of effectively being aligned, or of effectively aligning oneself with the sway of this whooshing up’s prevailing mood, is—again, as the authors describe it repeatedly throughout the book, from introduction to conclusion—precisely *not* of all things, in all places or situations, at all times, even in aggregate for each one of us individually. Indeed, if I ask what human-being is, our *coming-to-presence-presencing--itself* very *phúsis* like—as human-being in the world obligates us to turn again and respond to the call of essential questions. Whooshing up, as the authors understand and consistently describe it, is precisely *not a revealing-opening way* to which I am given, to which I belong, in which I am gathered and sheltered, and along which I travel in world as *the world*. Whooshing up happens--efficiently causally--*to us*, not unlike Gilbert’s description of poetry. *I may*, however, *if* I successfully develop the appropriate tools and skill, skillfully guide and appropriate instances of whooshing up. *I may*, if I develop the appropriate know-how, willfully decide to effectively allow ourselves to be whoosed up, to participate at will in the whooshing up, or willfully stand aside of a particular instance of whooshing up. In any case, I am involved efficiently in effect and as an efficient actor of acts and actions. Whooshing up is the efficient cause or causes, as the authors write, that are the relatively momentary, novel, and fleeting appearances and efficiently effective interventions of a god or gods. This god or gods *are* the whooshing up, prevailing, and desisting of a mood that carries us in and then drops us from its sway, effectively giving meaning to the world and, thereby, to us. If I successfully develop the appropriate know-how, I can willfully shape our own meanings conjointly with those revealed by any particular instance of whooshing up. Yet, whooshing up are mere instances, the coming to presence and going from presence. As such, perhaps I could remember the story of Heraclitus, hovering humbly, warming himself, in a most unremarkable room, over a most ordinary oven. To the astonished visitors seeking to experience the great thinker precisely in the extraordinary whooshing up moment when he is carried away out-of-himself in great thinking, Heraclitus does nothing extraordinary, uncommon, or unhabitual whatsoever. Rather, he invites them to come *into* his commonplace, ordinary abode to warm themselves, saying: *ειναι γάρ και*

ἐνταυθα θεός (*einai gar kai entautha theous*); that is, “Here too the gods come to presence.” Even Dreyfus’ and Kelly’s cup-of-coffee scenario—arriving at the very end of their book and exemplifying something akin to the humility of the most common, ordinary everydayness of Heraclitus’s situation—surpasses in luxury the description of Heraclitus’s abode. There, there is only Heraclitus—being-human-there, dwelling in the warmth of the opening-revealing of world *as the world*, in his clothes, by the oven fire, without warm drink, no favorite mug, no warm blanket—and the gods. Here *too*, in this overwhelming ordinariness, commonness, and everyday exceptionlessness, the gods dwell. For this interpretation of the story of Heraclitus, see Martin Heidegger, “Letter on Humanism,” in *Basic Writings*, ed. David Farrell Krell (London: HarperCollins Publishers, 1993), 256–58.

¹⁰⁹² Oxford University Press, “Volition, n.”; De Vaan, “Volō, Velle”; Klein, “Volition, n.”; Oxford University Press, “Uoluntārius”; Oxford University Press, “Uoluō.”

¹⁰⁹³ Lewis and Short, “Āgo”; Lewis, “Agō”; De Vaan, “Agō, -Ere.”

¹⁰⁹⁴ René Descartes, *Meditations of First Philosophy with Selections from the Objections and Replies*, ed. and trans. John Cottingham (New York: Cambridge University Press, 1996). See, for example, in “Fourth Meditation,” pp. 39–42.

¹⁰⁹⁵ Arendt, *The Human Condition*.

¹⁰⁹⁶ Though I do not understand what human being is as Jonas understands, that is, human-being-subject, Jonas does understand, and writes succinctly and neatly, that human-being-subject, and thus human-being, is *me cogito sum*, or *ego cogito sum*. Likewise, he understands that human-being-subject, or *me cogito sum* or *cogito me cogitare*, is and can only be, in its beginning and end, essentially and primordially, *volo me velle*. Jonas writes: “Every willing wills itself and has at each moment already chosen itself. The will thus has in itself its own inherent reflexiveness in whose performance it primally constitutes itself as what it is, and by which it is radically distinguished from any mere desire or impulse (*appetitus* of any sort) [here I recall Alfred North Whitehead]: impulse, directive as it is, is non-reflective, appetition is not concurrently an *appeto me appetere* as volition is a *volo me velle*. It must be noted that the reflection of the will is itself volition, the will is at once the willful positing and affirmation of itself...Thus understood the will is not just another and particular physical function among others, classifiable under wishing, desiring, striving, impulse and the like. Nor is it the same as explicit resolve or, in general, anything that appears and disappears, is sometimes present and sometimes absent...It precedes any explicit resolve, any particular decision, although it is in itself, in its essential nature, nothing but continuously operative decision about itself—that permanent self-determination from which the subject cannot withdraw into the alibi of any neutral, indifferent, ‘will-free’ state: for the primal decision of will is itself the condition of the possibility of any such state, be it indifference or its opposite” (pp. 338-39). Jonas, “The Abyss of the Will: Philosophical Mediation on the Seventh Chapter of Paul’s Epistle to the Romans.”

¹⁰⁹⁷ As epistemological metaphysics opens, reveals, and gives way to relativistic metaphysics, will to power to will, in autonomous sovereignty, would rather will *nothing, nihil*, than not will at all. “Human-being” and “human-being-subject” are willed as the epitome of *nihil*—pure function, pure value, pure flexibility standing by for deployment into causatively efficient mobilization. I am grateful to Professor Nancy Weston, lecturer in the University of California, Berkeley’s Rhetoric Department during 2017’s spring semester, for, at some point during our illuminating course, saying: “The will would rather will nothing than not will.”

¹⁰⁹⁸ Lewis and Short, “Āgo”; Lewis, “Agō”; Oxford University Press, “Cōgitō”; Oxford University Press, “Agitō”; De Vaan, “Agō, -Ere.”

¹⁰⁹⁹ Here, in preparation, I must recall, carefully and attentively, what God spoke to Moses: “*Dixit Deus ad Mosen, ‘Ego sum qui sum.’ Ait, ‘Sic dices filiis Israhel: ‘Qui est misit me ad vos.’*” God: *Ego sum qui sum...Qui est. God: Qui est. (God) Who is. God who is (qui est), and therefore (ergo): ego qui est, ergo sum qui sum. God is, therefore God is who God is. I should not assume that est of “qui est” is of res or ens rather than of esse, and therefor that it is of res or ens rather than οὐσία and, thus, that it is of res or ens rather than εἶναι. εἶναι is a verb, but not first or at all in an efficient causative sense of action. English translation: “God said to Moses, ‘I am who I am.’ He said, ‘Thus shalt thou say to the children of Israel: ‘He who is hath sent me to you.’”” Edgar, “Exodus 3:14.”*

¹¹⁰⁰ Perhaps unlike Jünger, I do not write of war primarily empirically, as if, for example, I were to write historiographically of World War I or the wars of the twentieth century. I write, rather, of war as a way of human-being in world as the world openingly revealed epistemologically metaphysically. I write of human-being-subject. Nor do I understand, as Jünger understood (if ambiguously), total mobilization to be a concept or an image, much less a concept or an image that I invented, coined, or applied. Certainly the opening-revealing sensibility of world as total mobilization orients human-being, gathers us, gives us to understanding in advance, and principally determines, though not necessarily fatefully, the concepts, images, and comprehensions of human-being-subjects. Unlike Jünger, I do not understand human-being-subject to have efficiently caused, invented, formulated, developed, applied, deployed, imposed, made, produced, implemented, constituted, etc. total mobilization. Total mobilization

is not, in origin or end, of the acting, doing, making, or inventing, etc., of human-beings. Total mobilization does essentially open-reveal world as the world for human-beings as human-being-subjects, orienting, gathering, directing, and always already involving human-beings in advance as human-being-subjects properly dispositioned in their *thēa- horáo* (*theōriā*), *praxis* (epistemologically metaphysically an efficiently consequent epiphenomenon of efficient *poiesis*), and *poiesis*. Upon the way of sense of world as totally mobilized and totally mobilizing, human-being-subject—totally mobilized and totally mobilizing as the total mobilizer—incessantly, laboriously, and endlessly strives toward the endless end-goals of totally mobilizing the subjectivity and objectivity that is the world, at its will, as means to its will to empower itself to will. In the opening-revealing of the world by and as epistemological metaphysics, total mobilization *is* the total mobilization of what and who epistemologically metaphysically exists and can exist, including of human-being-subject itself. To epistemologically metaphysically exist—actually, potentially, or possibly—is to be, in advance, efficiently totally mobilized by human-being-subject. Human-being-subject, the grounding-ground of what and who exists or can exist, is both totally mobilized and totally mobilizing as the total mobilizer. As Heidegger came to understand, particularly, it seems, after the 1930s, Jünger—similar to, but not as acutely attuned or faithful to the call of essential questioning as was Nietzsche before him—was sensitive to and able to articulate for his readers an aspect of what was, and is, essential of human-being-subject and epistemological metaphysics, namely total mobilization. Heidegger understood further, as Nietzsche and Jünger did not and, perhaps, could not have, even as they sensed and wrote of it so extraordinarily presciently, that they were sensing and writing of epistemological metaphysics opening-revealing and giving way to the coming-to-prevail of relativistic metaphysics. Relativistic metaphysics is, as epistemological metaphysics, an opening-revealing way of sense into and through world as *the* world proper to and revealed by and as the law of its coming reign. I, too, can not only hear this and see this in what Jünger writes, but can come to *look at* and *to listen to* it—that is, to *practice* with care in response to its ongoing arriving. Jünger writes: “We can now pursue the process by which the growing conversion of life into energy, the increasingly fleeting contents of all binding ties in deference to mobility, gives an ever-more radical character to the act of mobilization...[W]ar as armed combat merges into the more [extensive] gigantic labor process. In addition to the armies that meet on the battlefields, originate the modern armies of commerce and transport, foodstuffs, the manufacture of armaments—the army of labor in general. In the final phase, which was already hinted at toward the end of the last war, there is no longer any movement whatsoever—be it that of the homemaker at her sewing machine—without at least indirect use for the battlefield. In this unlimited marshaling of potential energies, which transforms the warring industrial countries into volcanic forges, we perhaps find the most striking sign of the dawn of the age of labor. [...] In order to deploy energies of such proportion, fitting one’s sword-arm no longer suffices; for this is a mobilization that requires extension to the deepest marrow, life’s finest nerve. Its realization is the task of total mobilization: an act which, as if through a single grasp of the control panel, conveys the extensively branched and densely veined power supply of modern life towards the great current of martial energy.” Jünger continues: “[Total mobilization’s] fullest possibilities have not yet been reached. Even limiting our scope to the technical side of the process, this can only occur when [such] martial operations [are] prescribed for conditions of peace. [...] We could cite many such examples. It suffices simply to consider our daily life, with its inexorability and merciless discipline, its smoking, glowing districts, the physics and metaphysics of its commerce, its motors, airplanes, and burgeoning cities. With a pleasure-tinged horror, we sense that here, not a single atom is not in motion—that we are profoundly inscribed in this raging process. Total [m]obilization is far less consummated than it consummates itself; in war and peace, it expresses the secret and inexorable claim to which our life in the age of masses and machines subjects us. It thus turns out that each individual life becomes, even more unambiguously, the life of a [laborer]; and that, following the wars of knights, kings, and citizens, we now have wars of [laborers]. [...] Total [m]obilization’s technical side is not decisive. Its basis—like that of all technology—lies deeper. We shall address it here as the *readiness* for mobilization.” Jünger, “Total Mobilization.”

¹¹⁰¹ My ongoing responding to the question of truth, though differing, has been guided influentially by Heidegger’s own faithful responding. There is much of his recorded thinking that I have not read. Here, among the little I have read as of present, is what has been most influential in regard to the question: Heidegger, “The Question Concerning Technology”; Heidegger, “Aletheia (Heraclitus, Fragment B 16)”; Heidegger, “Recapitulation [Recapitulations (1)- (3)]”; Heidegger, *Basic Questions of Philosophy. Selected “Problems of Logic.”*

¹¹⁰² Heidegger, “Recapitulation [Recapitulations (1)- (3)].”

¹¹⁰³ Heidegger, “Aletheia (Heraclitus, Fragment B 16)”; Heidegger, “Recapitulation [Recapitulations (1)- (3)]”; Heidegger, *Basic Questions of Philosophy. Selected “Problems of Logic.”*

¹¹⁰⁴ Heidegger, “Recapitulation [Recapitulations (1)- (3)].”

¹¹⁰⁵ Oxford University Press, “Direct, v.”; Skeat, “Direct”; Klein, “Direct, Tr. and Intr. v.”; Lewis and Short, “Dis”; Lewis and Short, “Rēgo”; Lewis, “Regō”; De Vaan, “Dis-”; De Vaan, “Regō, -Ere.”

¹¹⁰⁶ Friedrich Nietzsche, “How the ‘True World’ Finally Became a Fable. The History of an Error.,” from *Twilight of the Idols*, in *The Portable Nietzsche*, trans. Walter Kaufmann (New: Penguin Books, 1982), 485–86.

¹¹⁰⁷ Heidegger, “Recapitulation [Recapitulations (1)- (3)].”

¹¹⁰⁸ Lewis and Short, “Rēgo”; Lewis, “Regō”; Oxford University Press, “Regō”; De Vaan, “Regō, -Ere.”

¹¹⁰⁹ Preus, “Poicin, Poiēsis, Poiētikē.”

¹¹¹⁰ To define a word is to will to *determine*, regulate, and control its speaking, its saying, and the senses it gives us by willing to make them belong to us—as being not only *of* and *from* us originally and finally, and efficiently causally thereby grounded upon our technical ingenuity, but effectively by us *in order to* utilize the word and its senses—or operationalize it—at our will, as I will, for our purposes, and to achieve our goals. So determined efficiently by us, I am (and we are) left with a mere *term*. And insofar as I stockpile *terms* into *terminologies* standing by at our will ready for flexible deployment in the actualization-by-achievement of our end-goals, I am left with a graveyard of words that I have willfully terminated. Perhaps I fear the uncertainty of words’ senses, or the beauty, truth, and goodness of words speaking *of* themselves, *as they are* and *as they come* giving themselves to us that I (and we) may sense the world’s sensibility. Perhaps I fear the gentle, giving selectivity of words’ calling and gathering of us together, in familiar human communion, to sense the world’s sensibility in the first place and begin to respond together as I am existing here and now in the world. To define a word is to *terminate* its speaking, its saying, its telling, and therewith, its giving sense to the world’s sensibility. To terminate a word is annihilate is always giving gift of bringing us to our senses, to sensitivity, and to not only see but look toward, not on hear but listen to the possibilities sensibly given to presence before us as I fare along my way through the world. *To define a word is to silence it. To silence a word is an act. To silence a word is to terminate the word forcefully.* A modern dictionary, common or etymological, which comes to be made contemporarily from what I am epistemologically metaphysically given in advance to understand dictionaries to be, is a graveyard of terms—vastly ordered into columns and columns of terminologies. A contemporary dictionary’s value to us is not to be underestimated, nor is it to be doubted, much less resisted as a problem. A contemporary dictionary is very valuable. Indeed, I have made use of several as I respond thinkingly in this dissertation. Yet I understand that I am given lawfully to understanding in advance. These dictionaries are graveyards nonetheless, utterly awing yet dreadfully solemn in their sheer scholarly technicality and the immense labor necessary for their actualization by achievement. I walk carefully among the graves, as openingly and vulnerably as I am able, as sensitively as I have been given to sense. I walk mournfully among the terms in these dictionaries pages, always thankful for the dictionaries and their authors, but nonetheless I walk among the terms to learn what comes to us and what leaves us, now and here, as well as then and there, as well as what I am given to understand in advance. I do walk, and I am thankful. But I walk with the most sensitive regard, reverence, and, often enough, sorrow for the terminated grace and generosity of the words that we will to put up here terminally. Thankfully, again, I belong to the words speaking senses. Despite our efforts, the words and the sensibility of the world remains beautifully and truthfully awing before the belonging and wonder it blesses us with as I (and we) exist presencingly in and of it.

Bibliography

- Adams, Jonathan S. *The Future of the Wild: Radical Conservation for a Crowded World*. Boston: Beacon Press, 2006.
- Aguilar, Jesús H., and Andrei A. Buckareff, eds. *Causing Human Actions: New Perspectives on the Causal Theory of Action*. Cambridge, MA: The MIT Press, 2010.
- Albertos, Pedro, and Iven Mareels. *Feedback and Control for Everyone*. Berlin: Springer, 2010.
- Allan, J. David, and María M. Castillo. *Stream Ecology: Structure and Function of Running Waters*. Second. Dordrecht: Springer, 2007.
- Allee, W. C., Alfred E. Emerson, Orlando Park, Thomas Park, and Karl P. Schmidt. *Principles of Animal Ecology*. Philadelphia: W. B. Saunders Company, 1949.
- Allen, Garland E. "Mechanism, Vitalism and Organicism in Late Nineteenth and Twentieth-Century Biology: The Importance of Historical Context." *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, Mechanisms in biology, 36, no. 2 (June 1, 2005): 261–83. <https://doi.org/10.1016/j.shpsc.2005.03.003>.
- Allen, Timothy F.H., and Thomas W. Hoekstra. *Toward a Unified Ecology*. 2nd ed. New York: Columbia University Press, 2015.
- Andrewartha, H. G., and L. C. Birch. *The Distribution and Abundance of Animals*. Chicago: The University of Chicago Press, 1954.
- Angelo Coast Range Reserve. "Publications." Angelo Coast Range Reserve, University of California Natural Reserve System. Accessed January 25, 2019. <http://angelo.berkeley.edu/research/pub-database/>.
- Anscombe, G. E. M. *Intention*. 2nd ed. Cambridge, MA: Harvard University Press, 2000.
- Arend, Philip H. "The Impact of the Dos Rios Dam on the Wildlife Ecology of the Middle Fork Eel River, California." Sacramento: Wildlife Associates, June 1969.
- Arendt, Hannah. *The Human Condition*. Chicago: The University of Chicago Press, 1998.
- Aristotle. *Aristotle's Metaphysics*. Edited by W. D. Ross. Oxford, U.K.: Clarendon Press, 1924. <https://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0051%3Abook%3D7%3Asection%3D1029b>.
- . "Categories." In *The Complete Works of Aristotle*, translated by J. L. Ackrill, 3–24. Princeton: Princeton University Press, 1984.
- . *Nicomachean Ethics*. Translated by H. Rackham. Loeb Classical Library, Aristotle XIX. Cambridge, MA: Harvard University Press, 1934.
- . "The Categories." In *Aristotle*, translated by Harold P. Cooke, 12–109. Loeb Classical Library, LCL 325. Cambridge, MA: Harvard University Press, 1938.
- Arnāutu, Robert. "Early Modern Philosophy of Technology: Bacon and Descartes." Doctoral dissertation, Central European University, 2013.
- Arndt, William F., and F. Wilbur Gingrich. "Βάναθος, Ον." In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 131. Chicago: The University of Chicago Press, 1957.
- . "Διατίθημι." In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 188–89. Chicago: The University of Chicago Press, 1957.
- . "Πιάσχω." In *Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 639–40. Chicago: The University of Chicago Press, 1957.

- . “Ποιέω.” In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 687–89. Chicago: The University of Chicago Press, 1957.
- . “Ποίημα.” In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 689. Chicago: The University of Chicago Press, 1957.
- . “Ποιητής, Ου.” In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 689–90. Chicago: The University of Chicago Press, 1957.
- . “Πράγμα, Ατος, Τό.” In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 703–4. Chicago: The University of Chicago Press, 1957.
- . “Πράσσω.” In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 705. Chicago: The University of Chicago Press, 1957.
- . “Σοφός.” In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 767–77. Chicago: The University of Chicago Press, 1957.
- . “Φρονέω.” In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 874. Chicago: The University of Chicago Press, 1957.
- . “Φρόνησις, Εως.” In *A Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 874. Chicago: The University of Chicago Press, 1957.
- Ashby, W. Ross. *An Introduction to Cybernetics*. New York: John Wiley & Sons, Inc., 1956.
- Aspray, William F. “The Scientific Conceptualization of Information: A Survey.” *Annals of the History of Computing* 7, no. 2 (April 1985): 117–40.
<https://doi.org/10.1109/MAHC.1985.10018>.
- Åström, Karl Johan, and Richard M. Murray. *Feedback Systems: An Introduction for Scientists and Engineers*. Princeton, NJ: Princeton University Press, 2008.
- Augustine, Saint. *Confessions*. Translated by R. S. Pine-Coffin. Baltimore: Penguin Books, 1961.
- . *St. Augustine’s Confessions*. Translated by William Watts. Vol. I. II vols. New York: The MacMillan Company, 1912.
- Autenrieth, Georg. “Γίγνομαι.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Ἐν, Ἐνί, Εἰν, Εἰνί.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Ἐπί.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Ἴστημι.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Κι_νέω.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Λόγος.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Μετά.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Νοέω.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Νόος.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Οδός, Οὐδός.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.

- . “Πιάσχω.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Ποιέω.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Σύν, Ξύν.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Υπ-Ἄρχω.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Φαίνω.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Φρήν.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- . “Φρονέω.” In *A Homeric Dictionary for Schools and Colleges*. New York: Harper and Brothers, 1891.
- Baker, Herbert G., Jack Major, Edward C. Stone, and Paul J. Zinke. “Redwood Ecology Project - Annual Report.” University of California, Berkeley: Wildland Research Center, University of California and Division of Beaches and Parks, California Department of Natural Resources, 1960.
- . “Redwood Ecology Project - Annual Report.” University of California, Berkeley: Wildland Research Center, University of California and Division of Beaches and Parks, California Department of Natural Resources, 1961.
- . “Redwood Ecology Project - Annual Report.” University of California, Berkeley: Wildland Research Center, University of California and Division of Beaches and Parks, California Department of Natural Resources, 1962.
- . “Redwood Ecology Project - Annual Report.” University of California, Berkeley: Wildland Research Center, University of California and Division of Beaches and Parks, California Department of Natural Resources, 1964.
- Baker, John C. “The Evolution of Breeding Seasons.” In *Evolution: Essays on Aspects of Evolutionary Biology Presented to Professor E. S. Goodrich on His Seventieth Birthday*, edited by G. R. de Beer, 161–77. Oxford, U.K.: Oxford University Press, 1938.
- Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham: Duke University Press, 2007.
- Barker, Jessica L., Judith L. Bronstein, Maren L. Friesen, Emily I. Jones, H. Kern Reeve, Andrew G. Zink, and Megan E. Frederickson. “Synthesizing Perspectives on the Evolution of Cooperation within and between Species.” *Evolution* 71, no. 4 (2017): 814–25. <https://doi.org/10.1111/evo.13174>.
- Barrows, Cameron. “Cool Owls of the Old Forest.” *Pacific Discovery* 38, no. 2 (1985): 18–23.
- . “Habitat Relations of Winter Wrens in Northern California.” *Western Birds* 17 (1986): 17–20.
- Barrows, Cameron, and Katherine Balderston. “Roost Characteristics and Behavioral Thermoregulation in the Spotted Owl.” *Western Birds* 9, no. 1 (1978): 1–8.
- Barrows, Cameron W. “Diet Shifts in Breeding and Nonbreeding Spotted Owls.” *Journal of Raptor Research* 21, no. 3 (1987): 95–97.
- Basile, Pierfrancesco. *Leibniz, Whitehead and the Metaphysics of Causation*. New York: Palgrave Macmillan, 2009.

- Becking, Rudolf W. "The Ecology of the Coastal Redwood Forests of Northern California and the Impact of the 1964 Flood Upon Redwood Vegetation." Arcata, CA: Humboldt State College Foundation and the Redwood Research Institute, Inc., September 1, 1968.
- Beekes, Robert. "Βάνωσος, -Ον." In *Etymological Dictionary of Greek*, 199–200. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Γίγνομαι." In *Etymological Dictionary of Greek*, 272–73. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Γιγνώσκω." In *Etymological Dictionary of Greek*, 273. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Εἶδομαι." In *Etymological Dictionary of Greek*, 379–80. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Εν." In *Etymological Dictionary of Greek*, 419. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Ἐπί." In *Etymological Dictionary of Greek*, 440. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Ἐπι." In *Etymological Dictionary of Greek*, 440. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Ἐπίσταμαι." In *Etymological Dictionary of Greek*, 445. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Ἐπίσταμαι [v.]." In *Etymological Dictionary of Greek*, 1:445. Leiden Indo-European Etymological Dictionary Series. Leiden, The Netherlands: Brill, 2010.
- Beekes, Robert. "Ἰδέα." In *Etymological Dictionary of Greek*, 577. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- Beekes, Robert. "Ἰδεῖν." In *Etymological Dictionary of Greek*, 577. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Ἰστημι." In *Etymological Dictionary of Greek*, 601. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Ἰστημί." In *Etymological Dictionary of Greek*, 599. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Καρδιά." In *Etymological Dictionary of Greek*, 644. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Κεῖμαι." In *Etymological Dictionary of Greek*, 663–64. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Κῖνέω." In *Etymological Dictionary of Greek*, 700. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Κοννέω." In *Etymological Dictionary of Greek*, 747. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Λέγω." In *Etymological Dictionary of Greek*, 841. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Λόγος." In *Etymological Dictionary of Greek*, 868. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Μέτα, Μετά." In *Etymological Dictionary of Greek*, 936–37. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . "Νόος." In *Etymological Dictionary of Greek*, 1023. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.

- . “Ἔβν.” In *Etymological Dictionary of Greek*, 1038. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Ὀδός.” In *Etymological Dictionary of Greek*, 1046. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Οἶδᾶ.” In *Etymological Dictionary of Greek*, 1053. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Οἶκος.” In *Etymological Dictionary of Greek*, 1055–56. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Πάθος.” In *Etymological Dictionary of Greek*, 1142. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Πάσχω.” In *Etymological Dictionary of Greek*, 1156. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Πεῖρᾶ.” In *Etymological Dictionary of Greek*, 1162–63. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Ποιέω.” In *Etymological Dictionary of Greek*, 1216. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Πράσσω.” In *Etymological Dictionary of Greek*, 1229–30. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Σοφός.” In *Etymological Dictionary of Greek*, 1323–74. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Στάσις.” In *Etymological Dictionary of Greek*, 1390–91. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Σχίζω.” In *Etymological Dictionary of Greek*, 1437–38. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Ἦπο, Ὑπο.” In *Etymological Dictionary of Greek*, 1535. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Φαίνω, -ομαι.” In *Etymological Dictionary of Greek*, 1545–46. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Φίλος.” In *Etymological Dictionary of Greek*, 1573–74. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- . “Φρήν.” In *Etymological Dictionary of Greek*, 1590–91. Leiden Indo-European Etymological Dictionary Series 1. Leiden, The Netherlands: Brill, 2010.
- Belgrad, Daniel. *The Culture of Feedback: Ecological Thinking in Seventies America*. Chicago: The University of Chicago Press, 2019.
- Berkeley, George. “De Motu; or On the Principle and Nature of Motion, and on the Cause of the Communication of Motion.” In *De Motu and The Analyst. A Modern Edition, with Introductions and Commentary.*, edited and translated by Douglas M. Jesseph, 41:73–107. The New Synthese Historical Library. Texts and Studies in the History of Philosophy. Springer Science+Business Media, 1992.
- Berryman, Alan A. “The Conceptual Foundations of Ecological Dynamics.” *Bulletin of the Ecological Society of America* 70, no. 4 (1989): 230–36.
- Bersier, Louis-Félix. “A History of the Study of Ecological Networks.” In *Biological Networks*, edited by François Képès, 3:365–422. Complex Systems and Interdisciplinary Science. Hackensack, NJ: World Scientific Publishing Co. Pte. Ltd., 2007.
- . “Community Ecology.” Université de Fribourg, Department of Biology, Bersier Group, February 19, 2021. <https://www.unifr.ch/bio/en/groups/bersier/>.

- Biddle, John, Lieut. Col., U.S. Army Corps of Engineers. "Survey of Inland Waterway Between Humboldt Bay and Eel River, California." Washington, D.C.: Government Printing Office, September 24, 1909.
- Birch, L. C. "The Intrinsic Rate of Natural Increase of an Insect Population." *Journal of Animal Ecology* 17, no. 1 (1948): 15–26. <https://doi.org/10.2307/1605>.
- Blackburn, Simon. "Theory." In *A Dictionary of Philosophy*. Oxford, U.K.: Oxford University Press, 2016. <https://www.oxfordreference.com/view/10.1093/acref/9780198735304.001.0001/acref-9780198735304-e-3085>.
- Boas, Marie. "The Establishment of the Mechanical Philosophy." *Osiris* 10 (1952): 412–541.
- Bocking, Stephen. *Ecologists and Environmental Politics: A History of Contemporary Ecology*. 2nd ed. Morgantown: West Virginia University Press, 2017.
- Boltzmann, Ludwig. "ON THE METHODS OF THEORETICAL PHYSICS." *The Monist* 25, no. 2 (1915): 200–211.
- Boudri, J. Christiaan. *What Was Mechanical About Mechanics: The Concept of Force Between Metaphysics and Mechanics from Newton to Lagrange*. Translated by Sen McGlinn. Dordrecht, The Netherlands: Springer Science+Business Media, 2002.
- Bouma-Gregson, Keith. Bouma-Gregson on the Ecology of the Eel River of northern California. Interview by Robert Parks. Telephone interview, March 26, 2020.
- . "Keith Bouma-Gregson, PhD." USGS: science for a changing world. U.S. Department of the Interior., September 2022. <https://www.usgs.gov/staff-profiles/keith-bouma-gregson>.
- . "Lab People." Power Lab: Food Web Research. Department of Integrative Biology. University of California, Berkeley., September 2022. https://ib.berkeley.edu/labs/power/lab_people.html#gabe.
- . "The Ecology of Benthic Toxicogenic Anabaena and Phormidium (Cyanobacteria) in the Eel River, California." Doctoral dissertation, University of California, Berkeley, 2017.
- Boyd, Nora Mills, and James Bogen. "Theory and Observation in Science." *The Stanford Encyclopedia of Philosophy*, 2021. <https://plato.stanford.edu/archives/win2021/entries/science-theory-observation/>.
- Braibant, Sylvie, Giorgio Giacomelli, and Maurizio Spurio. *Particles and Fundamental Interactions: An Introduction to Particle Physics*. Dordrecht, The Netherlands: Springer Science+Business Media, 2012.
- Braun, Bruce. "Producing Vertical Territory: Geology and Governmentality in Late Victorian Canada." *Cultural Geographies* 7, no. 1 (2000): 7–46.
- . "THE 2013 ANTIPODE RGS-IBG LECTURE New Materialisms and Neoliberal Natures." *Antipode* 47, no. 1 (2015): 1–14. <https://doi.org/10.1111/anti.12121>.
- Bridgman, P. W. *The Logic of Modern Physics*. New York: The MacMillan Company, 1927.
- Bruno, John F., John J. Stachowicz, and Mark D. Bertness. "Inclusion of Facilitation into Ecological Theory." *Trends in Ecology & Evolution* 18, no. 3 (March 1, 2003): 119–25. [https://doi.org/10.1016/S0169-5347\(02\)00045-9](https://doi.org/10.1016/S0169-5347(02)00045-9).
- Bryant, William Harold. "Whole System, Whole Earth: The Convergence of Technology and Ecology in Twentieth-Century American Culture." Ph.D., The University of Iowa, 2006. <https://search.proquest.com/dissertations/docview/305339541/abstract/913E12632B6240A9PQ/1>.

- Cain, Michael L., William D. Bowman, and Sally D. Hacker. *Ecology*. Third. Sunderland, MA: Sinauer Associates, Inc., 2014.
- California Department of Fish and Game and California Department of Water Resources. "Bulletin No. 136. North Coastal Area Investigation - Appendix C: Fish and Wildlife." Sacramento, April 1965.
- California Department of Parks and Recreation. "Benbow State Recreation Area." California Department of Parks and Recreation - Benbow State Recreation Area, December 2020. https://www.parks.ca.gov/?page_id=426.
- California Department of Parks and Recreation and California Department of Water Resources. "Bulletin No. 136. North Coastal Area Investigation. Appendix B: Recreation." Sacramento, March 1965.
- California Department of Water Resources. "Branscomb Project Investigation." Sacramento: California Department of Water Resources, February 1965.
- . "Bulletin No. 136. North Coastal Area Investigation." Sacramento, September 1964.
- . "Bulletin No. 136. North Coastal Area Investigation. Appendix A: Watershed Management in the Eel River Basin." Sacramento, September 1966.
- . "Bulletin No. 136. North Coastal Area Investigation. A Summary of the Public Hearing Comments and Changes to the Preliminary Edition Dated September 1964." Sacramento, December 1964.
- . "Bulletin No. 136. North Coastal Area Investigation. Alternative Plans For Development." Sacramento, April 1965.
- . "Bulletin No. 136. North Coastal Area Investigation. Appendix E: Engineering Geology." Sacramento, August 1965.
- . "Bulletin No. 136. North Coastal Area Investigation. Appendix E: Engineering Geology." Sacramento, August 1965.
- . "Eel River Basin Environmental Studies - 1974 Progress Report." Sacramento: California Department of Water Resources, December 1974.
- . "Eel-Russian River Streamflow Augmentation Studies." Sacramento: California Department of Water Resources, February 1976.
- . "Flood! December 1964 - January 1965." California Department of Water Resources, January 1965.
- . "Land and Water Use in Eel River Hydrographic Unit." Sacramento: California Department of Water Resources, October 1963.
- . "North Coastal Area Investigation: South Fork Eel River Study." Sacramento: California Department of Water Resources, January 1968.
- . "Preview of Bulletin No. 136. North Coastal Area Investigation." Sacramento: California Department of Water Resources, September 1963.
- . "Upper Eel River Development - Alternative Plans." Bulletin No. 171 - Office Report. Sacramento: California Department of Water Resources, January 1968.
- . "Upper Eel River Development - Investigation of Alternative Conveyance Routes." Sacramento: California Department of Water Resources, August 1967.
- . "Views and Recommendations of State of California on Proposed Report of the Chief of Engineers, U.S. Army on Eel River, California, with Reference to Sandy Prairie Area Near Fortuna." Sacramento: California Department of Water Resources, November 1956.

- California Department of Water Resources, United States Army Corps of Engineers, United States Bureau of Reclamation, and United States Soil Conservation Service. "Eel and Mad River Basins Master Plan: Palm of Study." Sacramento, April 1968.
- California State Legislature. California Wild and Scenic Rivers Act, 5093.50-5093.71 Public Resources Code Division 5: Parks and Monuments, Chapter 1.4 § (1972).
https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=5.&title=&part=&chapter=1.4.&article.
- Callaway, Ragan M. "Positive Interactions among Plants." *Botanical Review* 61, no. 4 (1995): 306–49.
- Callaway, Ragan M. *Positive Interactions and Interdependence in Plant Communities*. Dordrecht, The Netherlands: Springer, 2007.
- Canguilhem, Georges. *Knowledge of Life*. Translated by Stefanos Geroulanos and Daniela Ginsburg. New York: Fordham University Press, 2008.
- Cannon, Walter B. *The Wisdom of the Body*. New York: W. W. Norton and Company, Inc., 1939.
- Capobianco, Richard. *Engaging Heidegger*. Toronto: University of Toronto Press, 2010.
- . "Heidegger's Being as Aletheia: 'Older' than the Human Being." *Kronos Philosophical Journal* VI (2017): 29–37.
- . *Heidegger's Being: The Shimmering Unfolding*. Toronto: University of Toronto Press, 2022.
- . *Heidegger's Way of Being*. Toronto: University of Toronto Press, 2014.
- Carranco, Lynwood, and John T. Labbe. *Logging the Redwoods*. Caldwell, Idaho: Caxton Printers, 1975.
- Carroll, Sean. "How Quantum Field Theory Becomes 'Effective.'" *SEAN CARROLL*. in *Truth, Only Atoms and the Void* (blog), June 20, 2013.
<https://www.preposterousuniverse.com/blog/2013/06/20/how-quantum-field-theory-becomes-effective/>.
- . *Something Deeply Hidden: Quantum Worlds and the Emergence of Spacetime*. London: Oneworld Publications, 2019.
- Carroll, Sean M. *Spacetime and Geometry: An Introduction to General Relativity*. New York: Cambridge University Press, 2019.
- . "The Quantum Field Theory on Which the Everyday World Supervenes." arXiv, January 19, 2021. <https://doi.org/10.48550/arXiv.2101.07884>.
- Cherrett, J. M., ed. *Ecological Concepts: The Contribution of Ecology to an Understanding of the Natural World*. Oxford, U.K.: Blackwell Scientific Publications, 1989.
- Cole, Lamont C. "The Population Consequences of Life History Phenomena." *The Quarterly Review of Biology* 29, no. 2 (1954): 103–37.
- Cooper, Gregory J. *The Science of the Struggle for Existence: On the Foundations of Ecology*. New York: Cambridge University Press, 2003.
- Courchamp, Franck, and Corey J. A. Bradshaw. "100 Articles Every Ecologist Should Read." *Nature Ecology & Evolution* 2, no. 2 (February 2018): 395–401.
<https://doi.org/10.1038/s41559-017-0370-9>.
- Craver, Carl F. "Role Functions, Mechanisms, and Hierarchy." *Philosophy of Science* 68, no. 1 (2001): 53–74.

- Craver, Carl, and James Tabery. "Mechanisms in Science." In *Mechanisms in Science*, edited by Edward N. Zalta. Stanford University, Stanford, CA, Summer 2019. <https://plato.stanford.edu/archives/sum2019/entries/science-mechanisms/>.
- Cross, F. L., and E. A. Livingstone, eds. "Actus Purus." In *The Oxford Dictionary of the Christian Church*. Oxford, U.K.: Oxford University Press, 2005. <https://www-oxfordreference-com.libproxy.berkeley.edu/view/10.1093/acref/9780192802903.001.0001/acref-9780192802903-e-66>.
- Darden, Lindley. "Thinking Again about Biological Mechanisms." *Philosophy of Science* 75, no. 5 (2008): 958–69. <https://doi.org/10.1086/594538>.
- Darwin, Charles. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. London: Penguin Books, 2009.
- . *The Origin of Species*. 6th ed. London: J. M. Dent & Sons Ltd., 1922.
- Darwin, Charles, and Alfred Wallace. "On the Tendency of Species to Form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection." *Journal of the Proceedings of the Linnean Society of London. Zoology* 3, no. 9 (August 1, 1858): 45–62. <https://doi.org/10.1111/j.1096-3642.1858.tb02500.x>.
- Davidson, Donald. "Actions, Reasons, and Causes." In *Essays on Actions and Events*, edited by Donald Davidson, 0. Oxford University Press, 2001. <https://doi.org/10.1093/0199246270.003.0001>.
- . *Essays on Actions and Events*. 2nd ed. New York: Oxford University Press, 2001.
- . "Truth and Meaning." In *Truth: Engagements Across Philosophical Traditions*, edited by José Medina and David Wood, 69–79. Malden, MA: Blackwell Publishing, 2005.
- Davies, P. C. W. "Particles Do Not Exist." In *Quantum Theory of Gravity: Essays in Honor of the 60th Birthday of Bryce S DeWitt*, edited by Steven M. Christensen, 66–77. Bristol: Adam Hilger Ltd., 1984.
- Davis, Bret W. "Heidegger's Releasement From the Technological Will." In *Heidegger on Technology*, edited by Aaron James Wendland, Christopher Merwin, and Christos Hadjioannou, 133–48. New York: Routledge, 2018.
- De Vaan, Michiel. "Ad." In *Etymological Dictionary of Latin and the Other Italic Languages*, 24. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . "Agō, -Ere." In *Etymological Dictionary of Latin and the Other Italic Languages*, 30. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . "Causa." In *Etymological Dictionary of Latin and the Other Italic Languages*, 100–101. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . "Cēdō, -Ere." In *Etymological Dictionary of Latin and the Other Italic Languages*, 103–4. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . "Cieō." In *Etymological Dictionary of Latin and the Other Italic Languages*, 113–14. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.

- . “Cor, Cordis.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 134–35. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Creō, -Āre.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 142–43. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Cūdō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 149. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Dīcō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 169–70. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Dis-.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 171–72. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Dūcō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 181. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Ex, ē, Ec-.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 195–96. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Faciō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 198–99. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Gerō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 259. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Gignō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 260–61. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Iūs, -Ris.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 316–17. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Legō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 332–33. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Lēx, Lēgis.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 337. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Moveō.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 390–91. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Nōscō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 413–14. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.

- . “Patiō, Patī.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 450. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Plānus.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 470. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “-Pleō.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 472. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Pōnō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 479. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Prae.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 485–86. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Prō.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 489–90. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Regō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 517–18. Leiden Indo-European Etymological Dictionary Series. Leiden, The Netherlands: Brill, 2008.
- . “Rēs, Reī.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 520. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Sciō, Scīre.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 545. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Secō, -Āre.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 550–51. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Sistō, Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 7:567. Leiden Indo-European Etymological Dictionary Series. Leiden, The Netherlands: Brill, 2008.
- . “Speciō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 578–79. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Stō, Stāre.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 589–90. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Sum, Esse.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 599. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Trahō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 626–27. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.

- . “Volō, Velle.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 687. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- Deacon, Terrence, and Spyridon Koutroufinis. “Complexity and Dynamical Depth.” *Information* 5, no. 3 (September 2014): 404–23. <https://doi.org/10.3390/info5030404>.
- Delancey, Craig. “Action, the Scientific Worldview, and Being-in-the-World.” In *A Companion to Phenomenology and Existentialism*, edited by Hubert L. Dreyfus and Mark A. Wrathall, 356–76. Malden, MA: Blackwell Publishing Ltd., 2006.
- Descartes, René. *Meditations of First Philosophy with Selections from the Objections and Replies*. Edited and translated by John Cottingham. New York: Cambridge University Press, 1996.
- DeWitt, Bryce S., and Neill Graham, eds. *The Many-Worlds Interpretation of Quantum Mechanics*. Princeton, NJ: Princeton University Press, 1973.
- Dexter, Ralph W. “History of the Ecologists’ Union: Spin-off from the ESA and Prototype of the Nature Conservancy.” *Bulletin of the Ecological Society of America* 59, no. 3 (1978): 146–47.
- Dice, Lee R. “What Is Ecology?” *The Scientific Monthly* 80, no. 6 (1955): 346–51.
- Dijksterhuis, E. J. “IV. The Evolution of Classical Science.” In *The Mechanization of the World Picture*, translated by C. Dikshoorn, 287–491. Oxford, U.K.: Clarendon Press, 1961.
- DiSalle, Robert. “Newton’s Philosophical Analysis of Space and Time.” In *The Cambridge Companion to Newton*, edited by Rob Iliffe and George E. Smith, 2nd ed., 34–60. New York: Cambridge University Press, 2016.
- . “Space and Time: Inertial Frames.” In *The Stanford Encyclopedia of Philosophy*. Stanford, CA: Stanford University, 2020. <https://plato.stanford.edu/archives/win2020/entries/spacetime-iframes/>.
- Donhauser, Justin. “Differentiating and Defusing Theoretical Ecology’s Criticisms: A Rejoinder to Sagoff’s Reply to Donhauser (2016).” *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 63 (June 1, 2017): 70–79. <https://doi.org/10.1016/j.shpsc.2017.03.008>.
- . “Theoretical Ecology as Etiological from the Start.” *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 60 (December 1, 2016): 67–76. <https://doi.org/10.1016/j.shpsc.2016.09.008>.
- Dreyfus, Herbert L., and Paul Rabinow. *Michel Foucault: Beyond Structuralism and Hermeneutics*. Second. Chicago: The University of Chicago Press, 1983.
- Dreyfus, Hubert, and Sean Dorrance Kelly. *All Things Shining: Reading the Western Classics to Find Meaning in a Secular Age*. New York: Free Press, 2011.
- Dreyfus, Hubert L. *Being-in-the-World: A Commentary on Heidegger’s Being and Time, Division I*. Cambridge, MA: The MIT Press, 1991.
- . “Forward to Time and Death (2005).” In *Background Practices: Essays on the Understanding of Being*, edited by Mark A. Wrathall, 45–74. Oxford, U.K.: Oxford University Press, 2017.
- Dreyfus, Hubert, and Mark Wrathall. “Martin Heidegger: An Introduction to His Thought, Work, and Life.” In *A Companion to Heidegger*, edited by Hubert L. Dreyfus and Mark A. Wrathall, 1–15. Malden, MA: Blackwell Publishing Ltd., 2005.

- Dubray, C. A. "Actus Primus." In *The Catholic Encyclopedia: An International Work of Reference on the Constitution, Doctrine, Discipline, and History of the Catholic Church*, 1:125. New York: Robert Appleton Company, 1907.
- . "Actus Purus." In *The Catholic Encyclopedia: An International Work of Reference on the Constitution, Doctrine, Discipline, and History of the Catholic Church*, 1:125–26. New York: Robert Appleton Company, 1907.
- Dukleth, Gordon W. "Progress Report on Additional Studies of Eel River Basin Development Alternatives." Monterey, California: California Department of Water Resources, August 1, 1969.
- Ecological Society of America. "About: The Ecological Society of America." ESA: The Ecological Society of America, 2022. <https://www.esa.org/about/>.
- . "What Is Ecology?" ESA: The Ecological Society of America, 2022. <https://www.esa.org/about/what-does-ecology-have-to-do-with-me/>.
- Edgar, Swift, ed. "Exodus 3:14." In *The Vulgate Bible*, 1-The Pentateuch:288–89. Cambridge, MA: Harvard University Press, 2010.
- Egerton, Frank N. "Changing Concepts of the Balance of Nature." *The Quarterly Review of Biology* 48, no. 2 (1973): 322–50.
- . "History of Ecological Sciences, Part 47: Ernst Haeckel's Ecology." *Bulletin of the Ecological Society of America* 94, no. 3 (2013): 222–44.
- . "Understanding Food Chains and Food Webs, 1700–1970." *The Bulletin of the Ecological Society of America* 88, no. 1 (January 1, 2007): 50–69. [https://doi.org/10.1890/0012-9623\(2007\)88\[50:UFCAFW\]2.0.CO;2](https://doi.org/10.1890/0012-9623(2007)88[50:UFCAFW]2.0.CO;2).
- Einstein, Albert. "Autobiographical Notes." In *Albert Einstein: Autobiographical Notes*, translated by Paul Arthur Schilpp, Centennial Edition. Chicago: Open Court Publishing Company, 1979.
- . "Maxwell's Influence on the Development of the Conception of Physical Reality." In *James Clerk Maxwell: A Commemoration Volume, 1831-1931*, 66–73. Cambridge, UK: Cambridge University Press, 1931.
- . "Notes for an Autobiography." *The Saturday Review of Literature*, 1949.
- . "On the Electrodynamics of Moving Bodies." In *The Principle of Relativity: A Collection of Original Memoirs on the Special and General Theory of Relativity*, translated by W. Perrett and G. B. Jeffery. Mineola, NY: Dover Publications, Inc., 1952.
- Elder Creek Ecologist, Anonymous. Anonymous Elder Creek Ecologist on the Ecology of the Eel River. Interview by Robert Parks. Videochat, March 27, 2020.
- Elton, Charles. *Animal Ecology*. New York: The MacMillan Company, 1927.
- Everett, Hugh. "'Relative State' Formulation of Quantum Mechanics." *Reviews of Modern Physics* 29, no. 3 (July 1, 1957): 454–62. <https://doi.org/10.1103/RevModPhys.29.454>.
- Federal Power Commission. "Evaluation Report - Water Resources Appraisal for Hydroelectric Licensing - Potter Valley Project - Project No. 77 - Owned by Pacific Gas and Electric Company - Eel and Russian River Basins, California." Washington, D.C.: United States Bureau of Power, 1972.
- Federal Water Pollution Control Administration. "English Ridge Project - Water Quality Control Study." San Francisco: United States Department of the Interior, August 1969.
- Feminella, Jack W., Mary E. Power, and Vincent H. Resh. "Periphyton Responses to Invertebrate Grazing and Riparian Canopy in Three Northern California Coastal

- Streams.” *Freshwater Biology* 22, no. 3 (1989): 445–57. <https://doi.org/10.1111/j.1365-2427.1989.tb01117.x>.
- Feynman, Richard. “Electrons and Their Interactions.” In *QED: The Strange Theory of Light and Matter*, 77–124. New York: Penguin Books, 1985.
- . “Seeking New Laws.” Presented at the The Messenger Lectures at Cornell University, Cornell University, Ithaca, NY, 1964.
<https://www.feynmanlectures.caltech.edu/messenger.html>.
- Feynman, Richard, Robert B. Leighton, and Matthew Sands. “Characteristics of Force.” In *The Feynman Lectures on Physics*, The New Millennium Edition. Vol. I: Mainly Mechanics, Radiation, and Heat. New York: Basic Books, 2010.
- . “Conservation of Energy.” In *The Feynman Lectures on Physics*, The New Millennium Edition. Vol. I: Mainly Mechanics, Radiation, and Heat. New York: Basic Books, 2010.
- Feynman, Richard P. “28. Self-Energy of the Electron.” In *The Theory of Fundamental Processes*, 139–44. Westview Press, 1998.
- . *The Theory of Fundamental Processes*. Westview Press, 1998.
- Feynman, Richard P., Robert B. Leighton, and Matthew Sands. *The Feynman Lectures on Physics*. The New Millennium Edition. Vol. I: Mainly Mechanics, Radiation, and Heat. New York: Basic Books, 2010.
- Fontana, Andrea, and James H. Frey. “The Interview: From Structured Questions to Negotiated Text.” In *Collecting and Interpreting Qualitative Materials*, edited by Norman K. Denzin and Yvonna S. Lincoln, 2nd ed., 61–106. Thousand Oaks, CA: SAGE Publications, n.d.
- Forbes, Stephen A. “The Lake as a Microcosm.” *Bulletin of the Natural History Survey of the State of Illinois* XV, no. IX (1887 1925): 537–50.
- Ford, Lawrence D., and Kenneth S. Norris. “The University of California Natural Reserve System: Progress and Prospects.” *BioScience* 38, no. 7 (August 1, 1988): 463–70.
<https://doi.org/10.2307/1310950>.
- . “The University of California Natural Reserve System: Progress and Prospects.” *BioScience* 38, no. 7 (August 1, 1988): 463–70. <https://doi.org/10.2307/1310950>.
- Ford, Lewis S. “NANCY FRANKENBERRY’S CONCEPTION OF THE POWER OF THE PAST.” *American Journal of Theology & Philosophy* 14, no. 3 (1993): 287–300.
- Foucault, Michel. *Discipline and Punish: The Birth of the Prison*. New York: Vintage Books, 1995.
- . “Nietzsche, Genealogy, History.” In *The Essential Foucault: Selections from the Essential Works of Foucault, 1954-1984*, edited by Paul Rabinow and Nikolas Rose, 351–69. New York: The New Press, 2003.
- . *Security, Territory, Population: Lectures at the Collège de France 1977-1978*. Translated by G. Burchell. New York: Picador, 2007.
- . *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*. Translated by G. Burchell. New York: Picador, 2008.
- . *The History of Sexuality: An Introduction*. Translated by Robert Hurley. New York: Vintage Books, 1990.
- . *The Order of Things: An Archaeology of the Human Sciences*. New York: Vintage Books, 2012.
- . “The Subject and Power.” *Critical Inquiry* 8, no. 4 (1982): 777–95.

- François, Charles. "Systemics and cybernetics in a historical perspective." *Systems Research and Behavioral Science* 16, no. 3 (May 1, 1999): 203–19. [https://doi.org/10.1002/\(SICI\)1099-1743\(199905/06\)16:3<203::AID-SRES210>3.0.CO;2-1](https://doi.org/10.1002/(SICI)1099-1743(199905/06)16:3<203::AID-SRES210>3.0.CO;2-1).
- Frautschi, Steven C., Richard P. Olenick, Tom M. Apostol, and David L. Goodstein. *The Mechanical Universe: Mechanics and Heat, Advanced Edition*. New York: Cambridge University Press, 2007.
- Freudenthal, Gideon. *Atom and Individual in the Age of Newton: On the Genesis of the Mechanistic World View*. Vol. 88. Boston Studies in the Philosophy of Science. D. Reidel Publishing Company: Boston, 1986.
- Friederichs, K. "A Definition of Ecology and Some Thoughts About Basic Concepts." *Ecology* 39, no. 1 (1958): 154–59. <https://doi.org/10.2307/1929981>.
- "Front Matter." *Ecology* 1, no. 1 (1920). <http://www.jstor.org/stable/1929249>.
- "Front Matter." *Ecology* 50, no. 1 (1969). <http://www.jstor.org/stable/1934656>.
- Gabbey, Alan. "New Doctrines of Motion." In *The Cambridge History of Seventeenth-Century Philosophy*, edited by Daniel Garber and Michael Ayers, 1:649–79. Cambridge: Cambridge University Press, 2000. <https://doi.org/10.1017/CHOL9780521307635.022>.
- Galili, Igal, and Michael Tseitlin. "Newton's First Law: Text, Translations, Interpretations and Physics Education." *Science & Education* 12, no. 1 (January 1, 2003): 45–73. <https://doi.org/10.1023/A:1022632600805>.
- Gardner, Mark R., and W. Ross Ashby. "Connectance of Large Dynamic (Cybernetic) Systems: Critical Values for Stability." *Nature* 228, no. 5273 (November 1970): 784–784. <https://doi.org/10.1038/228784a0>.
- Gause, G.F. *The Struggle for Existence*. Baltimore: The Williams & Wilkins Company, 1934.
- Georgakakos, Philip. "Lab People." Power Lab: Food Web Research. Department of Integrative Biology. University of California, Berkeley., September 2022. https://ib.berkeley.edu/labs/power/lab_people.html.
- . "Philip Georgakakos." Grantham Lab: Freshwater Science & Management. Department of Environmental Science, Policy, and Management. University of California, Berkeley., September 2022. <https://nature.berkeley.edu/granthamlab/people/philip-georgakakos/>.
- . Philip Georgakakos on the Ecology of the Eel River. Interview by Robert Parks. Telephone interview, March 26, 2020.
- . "Species Interactions Both Hinder and Help Salmon Recovery in the Eel River." Dissertation finishing talk presented at the Wildlife & Conservation Biology Seminar Series, Fall 2020, Department of Environmental Science, Policy, and Management of the University of California, Berkeley, December 11, 2020.
- Georgakakos, Philip Blythe. "Impacts of Native and Introduced Species on Native Vertebrates in a Salmon-Bearing River Under Contrasting Thermal and Hydrologic Regimes." Doctoral dissertation, University of California, Berkeley, 2020.
- Gier, Nick. "The Hypokeimenon Story." Nick Gier's Webpage. Professor Emeritus, Department of Philosophy, University of Idaho., n.d. <https://www.webpages.uidaho.edu/ngier/hypokeim.htm>.
- Gigerenzer, Gerg, Zeno Swijtink, Theodore Porter, Lorraine Daston, John Beatty, and Lorenz Krüger. "The Probabilistic Revolution in Physics." In *The Empire of Chance: How Probability Changed Science and Everyday Life*, 163–202. New York: Cambridge University Press, 1989.

- Glennan, Stuart S. "Mechanisms and the Nature of Causation." *Erkenntnis* (1975-) 44, no. 1 (1996): 49–71.
- Godfrey-Smith, Peter. *Philosophy of Biology*. Princeton University Press, 2013.
<http://muse.jhu.edu/book/36379/>.
- Goel, Narendra S., Samares C. Maitra, and Elliott W. Montroll. "On the Volterra and Other Nonlinear Models of Interacting Populations." *Reviews of Modern Physics* 43, no. 2 (April 1, 1971): 231–76. <https://doi.org/10.1103/RevModPhys.43.231>.
- Golley, Frank B. *A History of the Ecosystem Concept in Ecology: More than the Sum of Its Parts*. New Haven: Yale University Press, 1993.
- Grantham, Ted. "Ted Grantham. Associate Cooperative Extension Specialist and Adjunct Professor." Department of Environmental Science, Policy, and Management. University of California, Berkeley., September 2022.
<https://ourenvironment.berkeley.edu/people/theodore-grantham>.
- . "Ted Grantham. Associate Professor of Cooperative Extension." Grantham Lab: Freshwater Science & Management. Department of Environmental Science, Policy, and Management. University of California, Berkeley., September 2022.
<https://nature.berkeley.edu/granthamlab/people/ted-grantham/>.
- . Ted Grantham on the Ecology of Northwestern California Rivers. Interview by Robert Parks. Zoom (video chat) interview, March 6, 2020.
- Grantham, Theodore Evan William. "Stream Flows for Salmon and Society: Managing Water for Human and Ecosystem Needs in Mediterranean-Climate California." Doctoral dissertation, University of California, Berkeley, 2010.
- Grantham, Theodore (Ted). "Theodore (Ted) Grantham." Google Scholar, September 2022.
<https://scholar.google.com/citations?user=tw4TQr8AAAAJ&hl=en>.
- Gribbin, John. "Casimir Effect." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.
- . "Coupling Constant." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.
- . "CPT Conservation." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.
- . "Forces of Nature." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.
- . "Quantum Fluctuation." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.
- . "Quantum Vacuum." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.
- . "Renormalization." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin, 341–42. New York: The Free Press, 1998.
- . "Renormalization." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.
- . "Self-Interaction." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin, 360–61. New York: The Free Press, 1998.
- . "Vacuum." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.
- . "Vacuum Fluctuation." In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin. New York: The Free Press, 1998.

- . “Zero-Point Energy.” In *Q Is for Quantum: An Encyclopedia of Particle Physics*, edited by Mary Gribbin, 445. New York: The Free Press, 1998.
- Grimm, V., and Christian Wissel. “Babel, or the Ecological Stability Discussions: An Inventory and Analysis of Terminology and a Guide for Avoiding Confusion.” *Oecologia* 109, no. 3 (February 1, 1997): 323–34. <https://doi.org/10.1007/s004420050090>.
- Gross, Michael, and Mary Beth Averill. “Evolution and Patriarchal Myths of Scarcity and Competition.” In *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy of Science*, edited by Sandra Harding and Merrill B. Hintikka, 2nd ed., 71–95. Netherlands: Kluwer Academic Publishers, 2003.
- Gruber, Howard E. *Darwin on Man: A Psychological Study of Scientific Creativity*. Second. Chicago: The University of Chicago Press, 1981.
- Hacking, Ian. “Biopower and the Avalanche of Printed Numbers.” *Culture and History*, 1983, 279–95.
- . “Making Up People.” *London Review of Books* 28, no. 16 (August 17, 2006). <https://www.lrb.co.uk/the-paper/v28/n16/ian-hacking/making-up-people>.
- . *The Emergence of Probability: A Philosophical Study of Early Ideas About Probability Induction and Statistical Inference*. New York: Cambridge University Press, 2006.
- . *The Taming of Chance*. New York: Cambridge University Press, 1990.
- Haeckel, Ernst. *Generelle Morphologie Der Organismen. Allgemeine Grundzüge Der Organischen Formen-Wissenschaft, Mechanisch Begründet Durch Die von Charles Darwin Reformirte Descendenztheorie*. Vol. 2. 2 vols. Berlin: G. Reimer, 1866.
- . “Ueber Entwicklungsgang Und Aufgabe Der Zoologie. Vortrag, Gehalten Am 12. Januar 1869 Beim Eintritt in Die Philosophische Facultät Zu Jena.” In *Gemeinverständliche Vorträge Und Abhandlungen Aus Dem Gebiete Der Entwicklungslehre von Ernst Haeckel*, 2:1–29. Bonn, Germany: Verlag von Emil Straus, 1902.
- Hagen, Joel Bartholemew. *An Entangled Bank: The Origins of Ecosystem Ecology*. New Brunswick, N.J.: Rutgers University Press, 1992.
- Hairston, Nelson G., Frederick E. Smith, and Lawrence B. Slobodkin. “Community Structure, Population Control, and Competition.” *American Naturalist* 94, no. 879 (1960): 421–25.
- . “Community Structure, Population Control, and Competition.” *American Naturalist* 94, no. 879 (1960): 421–25.
- Hall, Marion, and Tim Halliday, eds. *Behaviour and Evolution*. Berlin: Springer-Verlag, 1998.
- Halliday, David, Robert Resnick, and Jearl Walker. *Fundamentals of Physics*. 7th ed. Hoboken, N.J.: John Wiley & Sons, Inc., 2005.
- Han, Lixin. “The New Vantage Point on Comments on James Mill.” In *Studies of the Paris Manuscripts: The Turning Point of Marx*, translated by Kaiyuan Hong, 187–216. Singapore: Springer, 2020. https://doi.org/10.1007/978-981-32-9618-3_9.
- Haraway, Donna. “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective.” *Feminist Studies* 14, no. 3 (1988): 575–99. <https://doi.org/10.2307/3178066>.
- Haraway, Donna Jeanne. “A Game of Cat’s Cradle: Science Studies, Feminist Theory, Cultural Studies.” *Configurations* 2, no. 1 (1994): 59–71. <https://doi.org/10.1353/con.1994.0009>.
- Hardin, Garrett. “The Competitive Exclusion Principle.” *Science* 131, no. 3409 (1960): 1292–97.

- Harman, Graham. "Whitehead and Schools X, Y, and Z." In *The Lure of Whitehead*, edited by Nicholas Gaskill and A. J. Nocek, 231–48. Minneapolis: University of Minnesota Press, 2014.
- Harman, P.H. *Energy, Force, and Matter: The Conceptual Development of Nineteenth-Century Physics*. New York: Cambridge University Press, 1982.
- Heidegger, Martin. "Aletheia (Heraclitus, Fragment B 16)." In *Early Greek Thinking*, translated by David Farrell Krell and Frank A. Capuzzi, 102–23. San Francisco: Harper and Row, 1984.
- . *Basic Questions of Philosophy. Selected "Problems of Logic."* Translated by Richard Rojcewicz and André Schuwer. Bloomington: Indiana University Press, 1994.
- . *Being and Time*. Translated by John MacQuarrie and Edward Robinson. New York: Harper & Row, Publishers, 1962.
- . "Letter on Humanism." In *Basic Writings from Being and Time (1927) to The Task of Thinking (1964)*, edited by David Farrell Krell, First Harper Perennial Modern Thought., 217–65. New York: Harper Perennial, 2008.
- . "Logos (Heraclitus, Fragment B 50)." In *Early Greek Thinking*, translated by David Farrell Krell and Frank A. Capuzzi, 59–78. San Francisco: Harper and Row, 1984.
- . "Modern Science, Metaphysics, and Mathematics." In *Basic Writings*, edited by David Farrell Krell, First Harper Perennial Modern Thought., 267–306. New York: HarperCollins Publishers, 2008.
- . *Nietzsche*. Edited by David Farrell Krell. Translated by Frank A. Capuzzi. Vol. IV: Nihilism. New York: HarperCollins Publishers, 1982.
- . "Phenomenology and Theology." In *Pathmarks*, translated by James G. Hart and John C. Maraldo, 39–62. New York: Cambridge University Press, 1998.
- . "Recapitulation [Recapitulations (1)- (3)]." In *Parmenides*, translated by André Schuwer and Richard Rojcewicz, 35–58. Bloomington: Indiana University Press, 1992.
- . "The Age of the World Picture." In *The Question Concerning Technology and Other Essays*, 115–54. New York: Harper Perennial, 2013.
- . "The End of Philosophy and the Task of Thinking." In *Basic Writings*, edited by David Farrell Krell, translated by Joan Stambaugh, 431–49. New York: HarperCollins Publishers, 1993.
- . "The Onto-Theo-Logical Constitution of Metaphysics." In *Identity and Difference*, translated by Joan Stambaugh, 42–74. New York: Harper & Row, Publishers, 1969.
- . "The Origin of the Work of Art." In *Basic Writings from Being and Time (1927) to The Task of Thinking (1964)*, edited by David Farrell Krell, First Harper Perennial Modern Thought., 143–212. New York: Harper Perennial, 2008.
- . "The Question Concerning Technology." In *The Question Concerning Technology and Other Essays*, translated by William Lovitt, 3–35. New York: Harper & Row, Publishers, 1977.
- . *The Questions Concerning Technology and Other Essays*. Translated by William Lovitt. New York: Harper Perennial, 1982.
- Henderson, Lawrence J. *The Fitness of the Environment: An Inquiry into the Biological Significance of the Properties of Matter*. New York: The MacMillan Company, 1913.
- Herrando-Pérez, Salvador, Steven Delean, Barry W. Brook, and Corey J. A. Bradshaw. "Density Dependence: An Ecological Tower of Babel." *Oecologia* 170, no. 3 (November 1, 2012): 585–603. <https://doi.org/10.1007/s00442-012-2347-3>.

- Hesse, Mary B. *Forces and Fields: The Concept of Action at a Distance in the History of Physics*. Mineola, NY: Dover Publications, Inc., 1962.
- Hill, Walter R., and Allen W. Knight. "Experimental Analysis of the Grazing Interaction Between a Mayfly and Stream Algae." *Ecology* 68, no. 6 (1987): 1955–65. <https://doi.org/10.2307/1939886>.
- Hixon, Mark A., Stephen W. Pacala, and Stuart A. Sandin. "Population Regulation: Historical Context and Contemporary Challenges of Open vs. Closed Systems." *Ecology* 83, no. 6 (2002): 1490–1508. <https://doi.org/10.2307/3071969>.
- Hofer, Carl, Nick Huggett, and James Read. "Absolute and Relational Space and Motion: Classical Theories." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta. Stanford, CA: Stanford University, 2022. <https://plato.stanford.edu/entries/spacetime-theories-classical/>.
- Holling, C S. "Resilience and Stability of Ecological Systems." *Annual Review of Ecology and Systematics* 4, no. 1 (November 1, 1973): 1–23. <https://doi.org/10.1146/annurev.es.04.110173.000245>.
- Hossenfelder, Sabine. *Existential Physics: A Scientist's Guide to Life's Biggest Questions*. New York: Viking, 2022.
- Hume, David. *An Enquiry Concerning Human Understanding*. Chicago: The Open Court Publishing Company, 1900.
- Hutchinson, G. E. "Homage to Santa Rosalia or Why Are There So Many Kinds of Animals?" *The American Naturalist* 93, no. 870 (1959): 145–59.
- Hutchinson, G. Evelyn. "Circular Causal Systems in Ecology." *Annals of the New York Academy of Sciences* 50, no. 4 (October 1, 1948): 221–46. <https://doi.org/10.1111/j.1749-6632.1948.tb39854.x>.
- . "Concluding Remarks." *Cold Spring Harbor Symposia on Quantitative Biology* 22 (January 1, 1957): 415–27. <https://doi.org/10.1101/SQB.1957.022.01.039>.
- Igoe, Jim, Katja Neves, and Dan Brockington. "A Spectacular Eco-Tour around the Historic Bloc: Theorising the Convergence of Biodiversity Conservation and Capitalist Expansion." *Antipode* 42, no. 3 (2010): 486–512. <https://doi.org/10.1111/j.1467-8330.2010.00761.x>.
- Inkpen, S. Andrew. "Are Humans Disturbing Conditions in Ecology?" *Biology & Philosophy* 32, no. 1 (January 1, 2017): 51–71. <https://doi.org/10.1007/s10539-016-9537-z>.
- "Issue Information." *Ecology* 100, no. 1 (2019). <https://doi.org/10.1002/ecy.2592>.
- Jacoby, Karl. *Crimes Against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation*. Berkeley: University of California Press, 2001.
- Jammer, Max. *Concepts of Force*. Cambridge, MA: Harvard University Press, 1957.
- . *Concepts of Space: The History of Theories of Space in Physics*. 3rd ed. New York: Dover Publications, Inc., 1993.
- Jensen, H.A. "A System of Classifying Vegetation in California." *California Fish and Game* 33, no. 4 (1947): 199–247.
- Bible Hub. "John 9:1-12," 2021. <https://biblehub.com/john/9.htm>.
- Brattleboro Reformer. "John W. MacArthur." January 10, 2017, sec. Obituaries.
- Johnson, Sharon Grace. "The Land-Use History of the Coast Range Preserve, Mendocino County, California." Master's Thesis, San Francisco State University, 1979.
- Jonas, Hans. "Technology and Responsibility: Reflections on the New Tasks of Ethics." *Social Research* 40, no. 1 (1973): 31–54.

- Jonas, Hans. "The Abyss of the Will: Philosophical Mediation on the Seventh Chapter of Paul's Epistle to the Romans." In *Philosophical Essays: From Ancient Creed to Technological Man*, 335–48. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1974.
- . "The Practical Uses of Theory." In *The Phenomenon of Life: Toward a Philosophical Biology*, 188–210. Evanston, IL: Northwestern University Press, 2001.
- Jünger, Ernst. "Total Mobilization." In *The Heidegger Controversy: A Critical Reader*, edited by Richard Wolin, 122–39. Cambridge, MA: The MIT Press, 1993.
- Kaiser Engineers. "Task Force Report on Upper Eel River Routing Studies - Final Edition." Oakland, CA: Prepared for Lake County Flood Control and Water Conservation District, February 1968.
- Kant, Immanuel. "On the Common Saying: 'This May Be True in Theory, but It Does Not Apply in Practice.'" In *Kant: Political Writings*, edited by Hans Reiss, translated by H. B. Nisbet, 61–92. New York: Cambridge University Press, 1991.
- . "Über Den Gemeinspruch: Das Mag in Der Theorie Richtig Sein, Taugt Aber Nicht Für Die Praxis." Edited by Heinrich Maier. *Berlinische Monatsschrift*, no. September (1793): 201–84.
- Keller, Evelyn Fox. "Ecosystems, Organisms, and Machines." *BioScience* 55, no. 12 (December 1, 2005): 1069–74. [https://doi.org/10.1641/0006-3568\(2005\)055\[1069:EOAM\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2005)055[1069:EOAM]2.0.CO;2).
- . "Organisms, Machines, and Thunderstorms: A History of Self-Organization, Part One." *HIST STUD NAT SCI* 38, no. 1 (February 1, 2008): 45–75. <https://doi.org/10.1525/hsns.2008.38.1.45>.
- . "Organisms, Machines, and Thunderstorms: A History of Self-Organization, Part Two. Complexity, Emergence, and Stable Attractors." *HIST STUD NAT SCI* 39, no. 1 (February 1, 2009): 1–31. <https://doi.org/10.1525/hsns.2009.39.1.1>.
- Kelly, Alice B. "Conservation Practice as Primitive Accumulation." *The Journal of Peasant Studies* 38, no. 4 (2011): 683–701.
- Kelson, Suzanne. Interview with Suzanne Kelson. Interview by Robert Parks. Telephone, February 14, 2020.
- Keter, Thomas S. "Environmental and Cultural History of the Eel River Basin." Three Rivers, CA: SolarArch.org, 1996 2017. <https://solararch.org/papers-on-the-north-fork-of-the-eel-river.html>.
- . "The Effects of Historic Land-Use Activities on the Streams and Aquatic Resources of the North Fork of the Eel River." Presented at the The Society for California Archaeology, Pasadena, California, April 26, 1992. <https://solararch.org/papers-on-the-north-fork-of-the-eel-river.html>.
- Kingsland, Sharon E. *Modeling Nature: Episodes in the History of Population Ecology*. Chicago: University of Chicago Press, 1995.
- . *The Evolution of American Ecology, 1890-2000*. Baltimore: The Johns Hopkins University Press, 2005.
- Klein, Ernest. "Accomplish, Tr. v." In *A Comprehensive Etymological Dictionary of the English Language*, 6. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . "Act, n." In *A Comprehensive Etymological Dictionary of the English Language*, 9. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . "Affect, Tr. v." In *A Comprehensive Etymological Dictionary of the English Language*, 16. Amsterdam, The Netherlands: Elsevier Science, 1971.

- . “Affection, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 16. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Agent, Adj. and n.” In *A Comprehensive Etymological Dictionary of the English Language*, 18. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Banausic.” In *A Comprehensive Etymological Dictionary of the English Language*, 69. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Belligerent, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 77. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Birth, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 83. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Born, Borne.” In *A Comprehensive Etymological Dictionary of the English Language*, 89. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Cause, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 120. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Cogitate, Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 147. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Compassion, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 153. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Compose, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 154. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Composition, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 154. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Conceive, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 155. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Conscious, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 159. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Courage, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 172. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Create, Tr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 175. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Destine, Tr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 206. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Direct, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 215. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Effect, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 238. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Efficient, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 239. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Epistemic, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 253. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Ex-.” In *A Comprehensive Etymological Dictionary of the English Language*, 263. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Exist, Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 266. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Experience, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 267. Amsterdam, The Netherlands: Elsevier Science, 1971.

- . “Experiment, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 267. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Explain, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 267. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Fact, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 271. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Fare, Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 273. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Genuine, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 308. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Glance, Intr. and Tr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 313. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Glance, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 313. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Glance, Tr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 313. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Glimmer, Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 314. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Glimpse, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 314. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Hold, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 349. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Identify, Tr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 365. Amsterdam, The Netherlands: Brill, 1971.
- . “Intelligent, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 382. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Judge, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 395. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Judicial.” In *A Comprehensive Etymological Dictionary of the English Language*, 395. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Just, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 397. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Justice, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 397. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Kinetic, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 402. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Know, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 404. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Law, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 413. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Legal, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 416. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Logos, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 428. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “-Logy.” In *A Comprehensive Etymological Dictionary of the English Language*, 428. Amsterdam, The Netherlands: Elsevier Science, 1971.

- . “Method, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 462. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Motion, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 478. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Motive, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 478. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Move, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 479. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Passion, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 539. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Passive, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 539. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Patient, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 540. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Perceive.” In *A Comprehensive Etymological Dictionary of the English Language*, 547. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Philosophy.” In *A Comprehensive Etymological Dictionary of the English Language*, 556. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Practical.” In *A Comprehensive Etymological Dictionary of the English Language*, 581–82. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Practice, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 582. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Pragmatic.” In *A Comprehensive Etymological Dictionary of the English Language*, 582. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Present, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 586. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Proceed, Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 590. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Produce, Tr. and Intr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 591. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Real, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 619. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Regulate, Tr. v.” In *A Comprehensive Etymological Dictionary of the English Language*, 626. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Right, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 639. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Rule, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 646. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Sacrifice, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 650. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Science, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 562. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Sympathy, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 737. Amsterdam, The Netherlands: Elsevier Science, 1971.
- . “Volition, n.” In *A Comprehensive Etymological Dictionary of the English Language*, 816. Amsterdam, The Netherlands: Elsevier Science, 1971.

- . “Wise, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 829. Amsterdam, The Netherlands: Elsevier Science, 1971.
- Klein, Ernet. “Abstract, Adj.” In *A Comprehensive Etymological Dictionary of the English Language*, 4. Amsterdam, The Netherlands: Elsevier Science, 1971.
- Kleppner, Daniel. “With Apologies to Casimir.” *Physics Today* 43, no. 10 (October 1990): 9–11. <https://doi.org/10.1063/1.2810709>.
- Kluge, Friedrich. “Er.” In *An Etymological Dictionary of the German Language*, translated by John Francis Davis, 74. London: George Bell & Sons, 1891.
- . “Fahren.” In *An Etymological Dictionary of the German Language*, translated by John Francis Davis, 78–79. London: George Bell & Sons, 1891.
- . “Lage.” In *An Etymological Dictionary of the German Language*, translated by John Francis Davis, 202. London: George Bell & Sons, 1891.
- . “Lesen, Vb.” In *An Etymological Dictionary of the German Language*, translated by John Francis Davis, 214. London: George Bell & Sons, 1891.
- . “Reich.” In *An Etymological Dictionary of the German Language*, translated by John Francis Davis, 282. London: George Bell & Sons, 1891.
- . “Säge.” In *An Etymological Dictionary of the German Language*, translated by John Francis Davis, 294. London: George Bell & Sons, 1891.
- . “Ur.” In *An Etymological Dictionary of the German Language*, translated by John Francis Davis, 374. London: George Bell & Sons, 1891.
- Kohler, Robert E. *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology*. Chicago: University of Chicago Press, 2002.
- Kosek, Jake. *Understories: The Political Life of Forests in Northern New Mexico*. Durham: Duke University Press, 2006.
- Koutroufinis, Spyridon. “Biological Neo-Teleologism vs Aristotle’s Genuine Telos.” *Biocosmology-Neo-Aristotelism* 6, no. 3–4 (2016): 414–26.
- Koutroufinis, Spyridon A., ed. *Life and Process: Towards a New Biophilosophy*. Berlin: Walter de Gruyter GmbH, 2014.
- Koyré, Alexandre. *From the Closed World to the Infinite Universe*. Baltimore: Johns Hopkins University Press, 1957.
- Krebs, Lord (John), Michael Hassell, and Sir Charles Godfray. “Lord Robert May of Oxford OM. 8 January 1936—28 April 2020.” *Biographical Memoirs of Fellows of the Royal Society* 71 (2021): 375–98. <https://doi.org/10.1098/rsbm.2021.0007>.
- Krell, David Farrell. “Letter on Humanism [Prefatory Remarks].” In *Basic Writings from Being and Time (1927) to The Task of Thinking (1964)*, First Harper Perennial Modern Thought., 214–16. New York: Harper Perennial, 2008.
- Kripke, Saul A. *Naming and Necessity*. Cambridge, MA: Harvard University Press, 1980.
- Kroonen, Guus. “*faran.” In *Etymological Dictionary of Proto-Germanic*, 128. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*kanjan.” In *Etymological Dictionary of Proto-Germanic*, 279. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*kannjan.” In *Etymological Dictionary of Proto-Germanic*, 279–80. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*kindi-.” In *Etymological Dictionary of Proto-Germanic*, 288. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.

- . “*lagjan.” In *Etymological Dictionary of Proto-Germanic*, 322. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*lesan-.” In *Etymological Dictionary of Proto-Germanic*, 331–32. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*rehta-.” In *Etymological Dictionary of Proto-Germanic*, 408. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*sagō-.” In *Etymological Dictionary of Proto-Germanic*, 421. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*sahsa-.” In *Etymological Dictionary of Proto-Germanic*, 421. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*uz.” In *Etymological Dictionary of Proto-Germanic*, 563. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- . “*witan-.” In *Etymological Dictionary of Proto-Germanic*, 589. Leiden Indo-European Etymological Dictionary Series 2. Leiden, The Netherlands: Brill, 2013.
- Lack, David. *The Regulation of Animal Numbers*. Oxford, U.K.: Oxford University Press, 1954.
- Lambeth, Morganna. “Rethinking the Structure of Events: Heidegger on Kant and the Concept of Cause.” PhD Dissertation, Northwestern University, 2018.
- Lamoreaux, Steve K. “Casimir Forces: Still Surprising after 60 Years.” *Physics Today* 60, no. 2 (February 2007): 40–45. <https://doi.org/10.1063/1.2711635>.
- Legg, Stephen. “Foucault’s Population Geographies: Classifications, Biopolitics and Governmental Spaces.” *Population, Space, and Place* 11 (2005): 137–56.
- Lemke, Thomas, Monica Casper, and Lisa Moore. *Biopolitics: An Advanced Introduction*. NYU Press, 2011. <https://muse.jhu.edu/book/11107>.
- Levins, Richard, and Richard Lewontin. *The Dialectical Biologist*. Cambridge, MA: Harvard University Press, 1985.
- Levitis, Daniel A., William Z. Lidicker, and Glenn Freund. “Behavioural Biologists Do Not Agree on What Constitutes Behaviour.” *Animal Behaviour* 78, no. 1 (July 1, 2009): 103–10. <https://doi.org/10.1016/j.anbehav.2009.03.018>.
- Lewis, Charlton T. “Abs - Trahō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Abs-Trāho.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Ad.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Adficiō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Agitō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Agō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Belliger.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Capiō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Causa.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Causor.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.

- . “Cēdō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Cieō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Compleō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Com-Pōnō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Concipiō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Cōnspiciō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Cor.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Creō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Cūdō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Dēstinō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Dīcō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Dūcō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Effectus.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Efficiēns.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Efficientia.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Ef-Fīciō.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Efficiō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Experior.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Explānō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Ex-Sistō or Existō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Faciō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
<http://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.04.0060:entry=facio>.
- . “Factum.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
<http://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.04.0060:entry=factum>.
- . “Iaciō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.

- . “Intellegō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Iūdex.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Iūdicīālis.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Iūdicō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Iūs.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Legō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Mōtiō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Moveō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Obiciō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Obiectus.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Patiēns.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Patiōr.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Percipiō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Perītus.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Plānus.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Pōnō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Prō-Cēdo.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Prō-Dūcō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Rēctus.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Regō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Rēs.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Scientia.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Sciō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Secō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.

- . “Sistō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Stō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Subiciō.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- . “Subiectus.” In *An Elementary Latin Dictionary*. New York: American Book Company, 1890.
- Lewis, Charlton T., and Charles Short. “Ad.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Af-Fīciō.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Āgīto.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Āgo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Bellīger.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Cāpio.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Causa.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Causor.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Cēdo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Cīēo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Com-Pātiōr.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Com-Plēo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Com-Pōno.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Con-Cīpio.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Con-Spīciō.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Cor.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Crēo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Cūdo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Dē-Stīno.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Dīco.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Dīs.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Dūco.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Effectus.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Efficiēns.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Efficiētīa.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Ef-Fīciō.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Ex-Pēriōr.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Ex-Plāno.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Ex-Sisto or Existo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Fāciō.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
<http://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.04.0059:entry=facio>.
- . “Factum.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
<http://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.04.0059:entry=factum>.
- . “Intellēgo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Jūs.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Lēgālis.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Lēgo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Mōtiō.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.

- . “Mōvēo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Ōbīcīo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Passīo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Passīvus.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Pātiens.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Pātiōr.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Per-Cīpiō.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Pēritus.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Plānus.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Plēo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Pōno.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Prō-Cēdo.” In *A Latin Dictionary*. Oxford, U.K.: 1879, n.d.
- . “Prō-Dūco.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Rēctus.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Rēgo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Rēs.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Sciētīa.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Sciō.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Sēco.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Sisto.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Sto.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- . “Sūb-Īcīo.” In *A Latin Dictionary*. Oxford, U.K.: Clarendon Press, 1879.
- Liddell, George Henry, and Robert Scott. “Ἐπίσταμαι.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ὀδός.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- Liddell, Henry George, and Robert Scott. “Βάνασος.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Βάνασος.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Γίγνομαι.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Γίγνομαι.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Διάθεσις.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Διάθεσις.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Διατίθημι.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Διατίθημι.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Εἶδον.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Εἶδω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ἐμπειρία.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ἐμπειρ-Ἰα.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ἐμπειρος.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ἐμπειρος.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.

- . “Ἐν.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ἐν.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ἐπί.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ἐπί.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ἐπίσταμαι.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ἐπίσταμαι.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ἐπιστήμη.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ἐπιστήμη.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Εὐδαιμονία.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Εὐδαιμον-Ἰα.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Εὐδαίμων.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Εὐδαίμ-Ων.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ἰδέα.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ἰδέα.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ἰστημι.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ἰστημι.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Καρδία.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Καρδί-α.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Κινέω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Κι_νέω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Κίνησις.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Κίνησις.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Λέγω (2).” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Λέγω (3).” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Λέγω (B).” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Λόγος.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Λόγος.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Μετά.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Μετά.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Νοέω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Νο-Ἐω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.

- . “Νόος.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Νόος.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Οδός.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Οἶδα.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πα[^]θ-Ητικός.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Πάθη.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πα[^]θ-η.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Παθητικός.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πάθος.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πάθος.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Πάσχω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πάσχω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Πεῖρα.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πεῖρα.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ποιέω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ποιέω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ποίημα.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ποί-Ημα.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ποίησις.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ποί-Ησις.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Ποιητής.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Ποι-Ητής.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Πρᾶγμα.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πρᾶγμα.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Πρακτικός.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πρακ-Τικός.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Πρᾶξις.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πρᾶξις.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Πράσσω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Πράσσω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.

- . “Σοφός.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Σοφός.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Στάσις.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Συμπάθεια.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Συμπάθ-Εια.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Συμπαθέω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Συμπαθ-Έω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Συμπαθής.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Συμπαθ-Ής.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Σύν.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Σύν.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Τροφή, ή.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
<http://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.04.0058:entry=trofh/>.
- . “Τροφικός, ή, Όν.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
<http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.04.0057%3Aentry%3Dtrofiko%2Fs>.
- . “Υπάρχω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Υπάρχω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Υπόκειμαι.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Υπόκειμαι.” In *A Greek-English Lexicon*. Oxford: Clarendon Press, 1940.
- . “Φαίνω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Φαίνω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Φι^λοσοφ-Ία.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Φίλος.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Φίλος.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Φιλοσοφία.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Φρήν.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Φρήν.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Φρονέω.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Φρον-Έω.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.
- . “Φρόνησις.” In *An Intermediate Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1889.
- . “Φρόν-Ησις.” In *A Greek-English Lexicon*. Oxford, U.K.: Clarendon Press, 1940.

- Lindeman, Raymond L. "The Trophic-Dynamic Aspect of Ecology." *Ecology* 23, no. 4 (October 1, 1942): 399–417. <https://doi.org/10.2307/1930126>.
- Linguistics Research Center. "Indo-European Lexicon. Pokorny Master PIE Etyma." Linguistics Research Center. The University of Texas at Austin, 2022. <https://lrc.la.utexas.edu/lex/master>.
- Lotka, Alfred J. *Elements of Physical Biology*. Baltimore: Williams & Wilkins Company, 1925.
- Louw, Johannes P., and Eugene A. Nida, eds. "24.78 Πάσχω; Πάθημα, Τος." In *Greek-English Lexicon of the New Testament Based on Semantic Domains*, 1:285. New York: United Bible Societies, 1988.
- , eds. "89.32 Ἐπεὶ; Ἐπειδὴ; Ἐπειδήπερ." In *Greek-English Lexicon of the New Testament Based on Semantic Domains*, 1:781. United Bible Societies, 1988.
- , eds. "90.66 Πάσχω." In *Greek-English Lexicon of the New Testament Based on Semantic Domains*, 1:807. New York: United Bible Societies, 1988.
- Luke, Timothy W. *Ecocritique: Contesting the Politics of Nature, Economy, and Culture*. Minneapolis: University of Minnesota Press, 1997.
- MacArthur, Robert. "Note on Mrs. Pielou's Comments." *Ecology* 47, no. 6 (1966): 1074–1074. <https://doi.org/10.2307/1935661>.
- MacArthur, John W. "Alpha-Particle Induced Pulses in Cadmium-Sulphide." Doctoral dissertation, Rensselaer Polytechnic Institute, 1953.
- MacArthur, Robert. "Fluctuations of Animal Populations and a Measure of Community Stability." *Ecology* 36, no. 3 (1955): 533–36. <https://doi.org/10.2307/1929601>.
- . "Strong, or Weak, Interactions?" In *Growth by Intussusception: Ecological Essays in Honor of G. Evelyn Hutchinson*, edited by E. S. Deevey, 44:177–88. Transactions of the Connecticut Academy of Arts and Sciences. New Haven: The Connecticut Academy of Arts and Sciences, 1972.
- MacArthur, Robert H. "On the Relative Abundance of Bird Species." *Proceedings of the National Academy of Sciences* 43, no. 3 (March 15, 1957): 293–95. <https://doi.org/10.1073/pnas.43.3.293>.
- MacArthur, Robert H., and John W. MacArthur. "On Bird Species Diversity." *Ecology* 42, no. 3 (1961): 594–98. <https://doi.org/10.2307/1932254>.
- MacArthur, Robert H., John W. MacArthur, and James Preer. "On Bird Species Diversity. II. Prediction of Bird Census from Habitat Measurements." *The American Naturalist* 96, no. 888 (1962): 167–74.
- Macfadyen, A. *Animal Ecology: Aims and Methods*. London: Sir Isaac Pitman & Sons LTD., 1957.
- Mach, Ernst. *The Analysis of Sensations and the Relation of the Physical to the Psychical*. Edited by Sydney Waterlow. Translated by C. M. Williams. Chicago: The Open Court Publishing Company, 1914.
- . "The Analysis of the Sensations. Antimetaphysical." *The Monist* 1, no. 1 (1890): 48–68.
- . "The Guiding Principles of My Scientific Theory of Knowledge and Its Reception by My Contemporaries." In *Physical Reality: Philosophical Essays on Twentieth-Century Physics*, edited by Stephen Toulmin, 28–43. New York: Harper & Row, Publishers, 1970.
- . *The Science of Mechanics: A Critical and Historical Account of Its Development*. Translated by Thomas J. McCormack. 4th ed. Chicago: The Open Court Publishing Company, 1919.

- Machamer, Peter, Lindley Darden, and Carl F. Craver. "Thinking about Mechanisms." *Philosophy of Science* 67, no. 1 (2000): 1–25.
- Mangel, Marc, and Colin W. Clark. *Dynamic Modeling in Behavioral Ecology*. Princeton, NJ: Princeton University Press, 1988.
- Margalef, Ramón. *Perspectives in Ecological Theory*. Chicago: The University of Chicago Press, 1968.
- Marx, Karl. "Comments on James Mill, *Éléments d'économie Politique*." In *Marx & Engels: Collected Works*, translated by J. T. Parisot, 3:211–28. London: Lawrence and Wishart, 2010.
- . "Thesen Über Feuerbach." Wikisource, 2022.
https://de.wikisource.org/wiki/Thesen_%C3%BCber_Feuerbach.
- . "Theses on Feuerbach." Marx Engels Archive, 1845.
<https://www.marxists.org/archive/marx/works/1845/theses/theses.htm>.
- Matthews, William J., Mary E. Power, and Arthur J. Stewart. "Depth Distribution of *Campostoma* Grazing Scars in an Ozark Stream." *Environmental Biology of Fishes* 17, no. 4 (December 1, 1986): 291–97. <https://doi.org/10.1007/BF00001495>.
- Maxwell, James Clerk. *A Treatise on Electricity and Magnetism*. 3rd ed. Vol. 2. 2 vols. New York: Dover Publications, Inc., 1954.
- May, R. M. "11. Levels of Organization in Ecology." In *Ecological Concepts: The Contribution of Ecology to an Understanding of the Natural World*, edited by J. M. Cherrett, 339–63. Oxford, U.K.: Blackwell Scientific Publications, 1989.
- May, Robert M. "Limit Cycles in Predator-Prey Communities." *Science* 177, no. 4052 (1972): 900–902.
- . "Stability in Multispecies Community Models." *Mathematical Biosciences* 12, no. 1 (October 1, 1971): 59–79. [https://doi.org/10.1016/0025-5564\(71\)90074-5](https://doi.org/10.1016/0025-5564(71)90074-5).
- . "Will a Large Complex System Be Stable?" *Nature* 238, no. 5364 (August 1972): 413–14. <https://doi.org/10.1038/238413a0>.
- May, Robert M., and Robert H. MacArthur. "Niche Overlap as a Function of Environmental Variability." *Proceedings of the National Academy of Sciences of the United States of America* 69, no. 5 (1972): 1109–13.
- May, Robert McCredie. "Investigations towards an Understanding of Superconductivity." Doctoral dissertation, University of Sydney, 1959.
- May, Robert M. *Stability and Complexity in Model Ecosystems*. Princeton, NJ: Princeton Univ. Press, 1973.
- . *Stability and Complexity in Model Ecosystems*. Princeton, NJ: Princeton University Press, 1973.
- Mayr, Ernst. "Cause and Effect in Biology." *Science* 134, no. 3489 (1961): 1501–6.
- Mayr, Otto. "Adam Smith and the Concept of the Feedback System: Economic Thought and Technology in 18th-Century Britain." *Technology and Culture* 12, no. 1 (1971): 1–22. <https://doi.org/10.2307/3102276>.
- . *Authority, Liberty & Automatic Machinery in Early Modern Europe*. Baltimore: The Johns Hopkins University Press, 1989.
- . "Maxwell and the Origins of Cybernetics." *Isis* 62, no. 4 (December 1, 1971): 425–44. <https://doi.org/10.1086/350788>.
- McIntosh, Robert P. *The Background of Ecology: Concept and Theory*. New York: Cambridge University Press, 1985.

- McNaughton, S. J. "Diversity and Stability of Ecological Communities: A Comment on the Role of Empiricism in Ecology." *The American Naturalist* 111, no. 979 (1977): 515–25.
- Merchant, Carolyn. *Radical Ecology: The Search for a Livable World*. New York: Routledge, 1992.
- . *The Death of Nature: Women, Ecology, and the Scientific Revolution*. San Francisco: Harper & Row, Publishers, 1980.
- Milonni, P. W., and M. -L. Shih. "Zero-point Energy in Early Quantum Theory." *American Journal of Physics* 59, no. 8 (August 1991): 684–98. <https://doi.org/10.1119/1.16772>.
- Milonni, Peter W. *The Quantum Vacuum: An Introduction to Quantum Electrodynamics*. New York: Academic Press, Inc., 1994.
- . "Zero-Point Energy." In *Compendium of Quantum Physics: Concepts, Experiments, History and Philosophy*, edited by Daniel Greenberger, Klaus Hentschel, and Friedel Weinert, 864–66. Berlin: Springer-Verlag Berlin, 2009.
- Milonni, Peter W., Larry Spruch, and Daniel Kleppner. "Vacuums, Retardation and Casimir Interactions." *Physics Today* 44, no. 6 (June 1991): 13–15. <https://doi.org/10.1063/1.2810131>.
- Mir, Amene. "Whitehead and Efficient Causation: The Physical as Conceptual Realization." *Process Studies* 46, no. 1 (Spring/Summer //Spring/Summer2017 2017): 87–114. <https://doi.org/10.5840/process20174615>.
- Mitcham, Carl. "Philosophy and the History of Technology." In *The History and Philosophy of Technology*, edited by George Bugliarello and Dean B. Donner, 163–201. Urbana, IL: The University of Illinois Press, 1979.
- Mittman, Gregg. *The State of Nature: Ecology, Community, and American Social Thought, 1900-1950*. Chicago: University of Chicago Press, 1992.
- Moidu, Hana. Interview with Hana Moidu. Interview by Robert Parks. Videochat, February 18, 2020.
- Moore, Barrington. "The Scope of Ecology." *Ecology* 1, no. 1 (1920): 3–5. <https://doi.org/10.2307/1929251>.
- Morrison, James C. "Philosophy and History in Bacon." *Journal of the History of Ideas* 38, no. 4 (1977): 585–606. <https://doi.org/10.2307/2708689>.
- Munday, Jeremy N. "A New Twist on the Quantum Vacuum." *Physics Today* 72, no. 10 (October 2019): 74–75. <https://doi.org/10.1063/PT.3.4327>.
- Murphy, Michelle. *The Economization of Life*. Durham: Duke University Press, 2017.
- Myers, Natasha. *Rendering Life Molecular: Models, Modelers, and Excitably Matter*. Durham: Duke University Press, 2015.
- n.a. "What Is a Theory?" American Museum of Natural History, 2006. <https://www.amnh.org/exhibitions/darwin/evolution-today/what-is-a-theory>.
- Nelson, Valerie J. "Richard H. Goodwin, 96, Leader in Land Conservation." *Los Angeles Times*. July 23, 2007, sec. Obituaries. <http://articles.latimes.com/2007/jul/23/local/me-goodwin23>.
- Newton, Isaac. *Newton's Principia. The Mathematical Principles of Natural Philosophy*. Translated by Andrew Motte. New York: Daniel Adee. 45 Liberty Street, 1846.
- . *PHILOSOPHIÆ NATURALIS PRINCIPIA MATHEMATICA*. 1st ed. London: S. PEPYS, Reg. Soc. PRÆSES., 1686.
- . *The Mathematical Principles of Natural Philosophy*. Translated by Andrew Motte. 2 vols. London: Benjamin Motte, at the Middle-Temple-Gate, in Fleet Street, 1729.

- Nicholson, Daniel J. “The Concept of Mechanism in Biology.” *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, Data-Driven Research in the Biological and Biomedical Sciences, 43, no. 1 (March 1, 2012): 152–63. <https://doi.org/10.1016/j.shpsc.2011.05.014>.
- Niermeyer, J. F. “1. Causa.” In *Mediae Latinitatis Lexicon Minus*, 159–60. Leiden, The Netherlands: Brill, 1984.
- . “Passio.” In *Mediae Latinitatis Lexicon Minus*, 769. Leiden, The Netherlands: E. J. Brill, 1984.
- . “Passivus.” In *Mediae Latinitatis Lexicon Minus*, 769. Leiden, The Netherlands: E. J. Brill, 1984.
- . “Pati.” In *Mediae Latinitatis Lexicon Minus*, 773. Leiden, The Netherlands: E. J. Brill, 1984.
- . “Patiens.” In *Mediae Latinitatis Lexicon Minus*, 773. Leiden, The Netherlands: E. J. Brill, 1984.
- . “Planare.” In *Mediae Latinitatis Lexicon Minus*, 805. Leiden, The Netherlands: E. J. Brill, 1984.
- . “Res.” In *Mediae Latinitatis Lexicon Minus*, 912. Leiden, The Netherlands: Brill, 1984.
- Nietzsche, Friedrich. “How the ‘True World’ Finally Became a Fable. The History of an Error.” In *Twilight of the Idols, The Portable Nietzsche*, translated by Walter Kaufmann, 485–86. New: Penguin Books, 1982.
- Nobo, Jorge Luis. “Transition in Whitehead: A Creative Process Distinct from Concrecence.” *International Philosophical Quarterly* 19, no. 3 (August 1, 1979): 265–83. <https://doi.org/10.5840/ipq197919324>.
- Norris, Kenneth S. “California’s Natural Land and Water Reserve System.” *BioScience* 18, no. 5 (May 1, 1968): 415–17. <https://doi.org/10.2307/1294124>.
- Oates, David. *Earth Rising: Ecological Belief in an Age of Science*. Corvallis, OR: Oregon State University Press, 1989.
- Odum, Eugene P. *Fundamentals of Ecology*. Second. Philadelphia: W. B. Saunders Company, 1959.
- Ohanian, Hans C., and John T. Markert. *Physics for Engineers and Scientists*. 3rd ed. Vol. 1. New York: W. W. Norton and Company, 2007.
- . *Physics for Engineers and Scientists*. 3rd ed. Vol. 3. New York: W. W. Norton and Company, 2007.
- Oksanen, L., S. D. Fretwell, J. Arruda, and P. Niemela. “Exploitation Ecosystems in Gradients of Primary Productivity.” *American Naturalist* 118, no. 2 (1981): 240–61.
- Oxford University Press. “Abstract, v.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/759?rskey=IqJhkw&result=2&isAdvanced=false>.
- . “Abstrahō.” In *Oxford Latin Dictionary*, 13. Oxford, U.K.: Oxford University Press, 1968.
- . “Accomplish, v.” Oxford English Dictionary, December 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/1157?redirectedFrom=accomplish>.
- . “Act, v.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/1889?rskey=Ap7tXM&result=5&isAdvanced=false>.
- . “Ad.” In *Oxford Latin Dictionary*, 32–35. Oxford, U.K.: Oxford University Press, 1968.

- . “Affect, n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/3321?rskey=fZAvik&result=1&isAdvanced=false>.
- . “Affect, v.1.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/3323>.
- . “Affect, v.2.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/3324?rskey=fZAvik&result=4&isAdvanced=false>.
- . “Affection, n.1.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/3344>.
- . “Afficiō.” In *Oxford Latin Dictionary*, 78–79. Oxford, U.K.: Oxford University Press, 1968.
- . “Agens.” In *Oxford Latin Dictionary*, 82. Oxford, U.K.: Oxford University Press, 1968.
- . “Agent, n.1 and Adj.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/3859?rskey=LdqmWu&result=1&isAdvanced=false>.
- . “Agitō.” In *Oxford Latin Dictionary*, 85. Oxford: Oxford University Press, 1968.
- . “Agō.” In *Oxford Latin Dictionary*, 87–90. Oxford, U.K.: Oxford University Press, 1968.
- . “Banausic, Adj.” Oxford English Dictionary, 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/15105?redirectedFrom=banausic>.
- . “Bear, v.1.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/16543>.
- . “Belligerate, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/17445?>
- . “Belligero.” In *Oxford Latin Dictionary*, 228. Oxford, U.K.: Oxford University Press, 1968.
- . “Birde, n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/21673>.
- . “Birth, n.1.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/21673>.
- . “Born, v.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/21673>.
- . “Causa.” In *Oxford Latin Dictionary*, 289–90. Oxford, U.K.: Oxford University Press, 1968.
- . “Cause, n.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/29147?rskey=ooH0bI&result=1&isAdvanced=false>.
- . “Cause, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/29147?rskey=i8yIkI&result=1&isAdvanced=false>.
- . “Cause, v.1.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/29148>.
- . “Cēdō.” In *Oxford Latin Dictionary*, 292–93. Oxford, U.K.: Oxford University Press, 1968.

- . “Cieō.” In *Oxford Latin Dictionary*, 313–14. Oxford, U.K.: Oxford University Press, 1968.
- . “Cogitate, v.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/35859?redirectedFrom=cogitate>.
- . “Cōgitō.” In *Oxford Latin Dictionary*, 344. Oxford, U.K.: Oxford University Press, 1968.
- . “Com-, Prefix.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/36719>.
- . “Compassion, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/37475?rskey=jUJ9Mc&result=1&isAdvanced=false>.
- . “Compleō.” In *Oxford Latin Dictionary*. Oxford, U.K.: Oxford University Press, 1968.
- . “Compōnō.” In *Oxford Latin Dictionary*, 379–80. Oxford, U.K.: Oxford University Press, 1968.
- . “Compose, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/37781?rskey=p9uzXL&result=2&isAdvanced=false>.
- . “Compositiō.” In *Oxford Latin Dictionary*, 380. Oxford, U.K.: Oxford University Press, 1968.
- . “Composition, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/37795?redirectedFrom=composition>.
- . “Con-, Prefix.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/38013?isAdvanced=false&result=12&rskey=fy9cZG&>.
- . “Conceive, v.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/38089?redirectedFrom=conceive>.
- . “Concipiō.” In *Oxford Latin Dictionary*, 388. Oxford, U.K.: Oxford University Press, 1968.
- . “Conscience, n.” Oxford English Dictionary, September 2022. Cum- speaks the same sense as with.
- . “Consciō.” In *Oxford Latin Dictionary*, 411. Oxford, U.K.: Oxford University Press, 1968.
- . “Conscious, Adj. and n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/39475?redirectedFrom=conscious>.
- . “Conspiciō.” In *Oxford Latin Dictionary*, 418. Oxford, U.K.: Oxford University Press, 1968.
- . “Cor.” In *Oxford Latin Dictionary*, 444. Oxford, U.K.: Oxford University Press, 1968.
- . “Courage, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/43146?rskey=YVPIp8&result=1&isAdvanced=false>.
- . “Create, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/44061?rskey=Tby0vv&result=2&isAdvanced=false>.
- . “Creō.” In *Oxford Latin Dictionary*, 456–57. Oxford, U.K.: Oxford University Press, 1968.
- . “Cūdō.” In *Oxford Latin Dictionary*, 465. Oxford, U.K.: Oxford University Press, 1968.

- . “Destine, v.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/51076?rskey=7I4iwW&result=2&isAdvanced=false>.
- . “Dīcō.” In *Oxford Latin Dictionary*, 537. Oxford, U.K.: Oxford University Press, 1968.
- . “Diction, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/52321?redirectedFrom=diction>.
- . “Direct, v.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/53294?rskey=gpBEAE&result=3&isAdvanced=false>.
- . “Dūcō.” In *Oxford Latin Dictionary*, 576–77. Oxford, U.K.: Oxford University Press, 1968.
- . “Effect, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/59664>.
- . “Effect, v.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/59665?rskey=lHeic4&result=2&isAdvanced=false>.
- . “Effect, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/59665>.
- . “Efficiency, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/59739>.
- . “Efficiens.” In *Oxford Latin Dictionary*, 590. Oxford, U.K.: Oxford University Press, 1968.
- . “Efficientia.” In *Oxford Latin Dictionary*, 590. Oxford, U.K.: Oxford University Press, 1968.
- . “Efficiō.” In *Oxford Latin Dictionary*, 590–91. Oxford, U.K.: Oxford University Press, 1968.
- . “Episteme, n.” Oxford English Dictionary, 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/63540?redirectedFrom=episteme>.
- . “Ex, ē.” In *Oxford Latin Dictionary*, 628–30. Oxford, U.K.: Oxford University Press, 1968.
- . “Ex, ē.” In *Oxford Latin Dictionary*, 628–30. Oxford, U.K.: Oxford University Press, 1968.
- . “Ex-, Prefix 1.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/65505>.
- . “Exist, v.” Oxford English Dictionary, 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/66261?redirectedFrom=exist>.
- . “Experience, n.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/66520>.
- . “Experientia.” In *Oxford Latin Dictionary*, 649. Oxford, U.K.: Oxford University Press, 1969.
- . “Experiment, n.” Oxford English Dictionary, September 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/66530?rskey=B9ELID&result=1&isAdvanced=false#eid>.
- . “Experimentum.” In *Oxford Latin Dictionary*, 649. Oxford, U.K.: Oxford University Press, 1968.

- . “Experior.” In *Oxford Latin Dictionary*, 649. Oxford, U.K.: Oxford University Press, 1968.
- . “Explain, v.” Oxford English Dictionary, September 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/66595?redirectedFrom=explain#eid>.
- . “Explānō.” In *Oxford Latin Dictionary*, 650. Oxford, U.K.: Oxford University Press, 1968.
- . “Ex(s)Istō, ~ere.” In *Oxford Latin Dictionary*, 656. Oxford, U.K.: Oxford University Press, 1968.
- . “Faciō.” In *Oxford Latin Dictionary*, 668–70. Oxford, U.K.: Oxford University Press, 1968.
- . “Fact, n., Int., and Adv.” Oxford English Dictionary, June 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/67478?rskey=e2hRdg&result=1&isAdvanced=false#eid>.
- . “Fare, v.1.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/68196?rskey=9LTSm9&result=5&isAdvanced=false>.
- . “-Fic (Suffix).” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/69793>.
- . “-Ficus.” In *Oxford Latin Dictionary*, 696. Oxford, U.K.: Oxford University Press, 1968.
- . “-Fy, Suffix.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/75882>.
- . “Genuine, Adj.1.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/77712?rskey=3sV9Cq&result=1&isAdvanced=false>.
- . “Glance, v. 1.” Oxford English Dictionary, December 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/78698>.
- . “Glance, v. 2.” Oxford English Dictionary, December 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/78699?rskey=VrrHsI&result=4&isAdvanced=false>.
- . “Glimpse, v.” Oxford English Dictionary, December 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/78957?rskey=TIMKX3&result=2&isAdvanced=false>.
- . “Hold, v.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/87689>.
- . “Identify, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/90999?redirectedFrom=identify+>.
- . “Intellegō.” In *Oxford Latin Dictionary*, 936. Oxford, U.K.: Oxford University Press, 1968.
- . “Intelligence, n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/97396?rskey=mJGfeJ&result=1&isAdvanced=false>.
- . “Iūdex.” In *Oxford Latin Dictionary*, 977–78. Oxford, U.K.: Oxford University Press, 1968.
- . “Iūdiālis.” In *Oxford Latin Dictionary*, 978. Oxford, U.K.: Oxford University Press, 1968.

- . “Iūdicium.” In *Oxford Latin Dictionary*, 978–79. Oxford, U.K.: Oxford University Press, 1968.
- . “Iūdicō.” In *Oxford Latin Dictionary*, 979–80. Oxford, U.K.: Oxford University Press, 1968.
- . “Iūs.” In *Oxford Latin Dictionary*, 984–86. Oxford, U.K.: Oxford University Press, 1968.
- . “Judge, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/101887>.
- . “Judge, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/101888?rskey=REN6qj&result=2&isAdvanced=false>.
- . “Judicial, Adj. and n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/101916?redirectedFrom=judicial>.
- . “Jure, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/102141>?
- . “Just, Adj.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/102198?rskey=4lZtBW&result=1&isAdvanced=false>.
- . “Justice, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/102198?rskey=4lZtBW&result=1&isAdvanced=false>.
- . “Kinesis, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/103496>.
- . “Kinetic, Adj. and n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/103498>.
- . “Know, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/104157?rskey=6uGWhC&result=2&isAdvanced=false>.
- . “Law, n.1.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/106405?rskey=dAbSRA&result=1&isAdvanced=false>.
- . “Legal, Adj. and n.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/107008?redirectedFrom=legal>.
- . “Lēgālis.” In *Oxford Latin Dictionary*, 1013. Oxford, U.K.: Oxford University Press, 1968.
- . “Legō.” In *Oxford Latin Dictionary*, 1014. Oxford, U.K.: Oxford University Press, 1968.
- . “Logos, n.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/109857?rskey=65GHID&result=2&isAdvanced=false>.
- . “Method, n.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/117560?rskey=1OTlbt&result=1&isAdvanced=false>.
- . “Mōtiō.” In *Oxford Latin Dictionary*, 1137. Oxford, U.K.: Oxford University Press, 1969.

- . “Motion, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/122693?rskey=tCO7MB&result=1&isAdvanced=false>.
- . “Motive, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/122712>.
- . “Moueō.” In *Oxford Latin Dictionary*, 1138–39. Oxford, U.K.: Oxford University Press, 1968.
- . “Move, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/123027>.
- . “Noscō.” In *Oxford Latin Dictionary*, 1190–91. Oxford, U.K.: Oxford University Press, 1968.
- . “Obiciō.” In *Oxford Latin Dictionary*, 1212–13. Oxford, U.K.: Oxford University Press, 1968.
- . “Obiectō.” In *Oxford Latin Dictionary*, 1213. Oxford, U.K.: Oxford University Press, 1968.
- . “Obiectum.” In *Oxford Latin Dictionary*, 1213. Oxford, U.K.: Oxford University Press, 1968.
- . “Obiectus.” In *Oxford Latin Dictionary*, 1213. Oxford, U.K.: Oxford University Press, 1968.
- . “Passiō.” In *Oxford Latin Dictionary*, 1305. Oxford, U.K.: Oxford University Press, 1968.
- . “Passion, n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/138504?rskey=s8mq7x&result=1&isAdvanced=false>.
- . “Passiūs (2).” In *Oxford Latin Dictionary*, 1305. Oxford, U.K.: Oxford University Press, 1968.
- . “Passive, Adj. and n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/138533?redirectedFrom=passive>.
- . “Patiens.” In *Oxford Latin Dictionary*, 1308–9. Oxford, U.K.: Oxford University Press, 1968.
- . “Patient, Adj. and n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/138820>.
- . “Patientia.” In *Oxford Latin Dictionary*, 1309. Oxford, U.K.: Oxford University Press, 1968.
- . “Patiōr.” In *Oxford Latin Dictionary*, 1309–10. Oxford, U.K.: Oxford University Press, 1968.
- . “Perceive, v.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/140537?redirectedFrom=perceive>.
- . “Percipiō.” In *Oxford Latin Dictionary*, 1330. Oxford, U.K.: Oxford University Press, 1968.
- . “Perītus.” In *Oxford Latin Dictionary*, 1343. Oxford, U.K.: Oxford University Press, 1968.
- . “Philosophy, n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/142505?rskey=nQecOK&result=1&isAdvanced=false>.

- . “Plānus.” In *Oxford Latin Dictionary*, 1388. Oxford, U.K.: Oxford University Press, 1968.
- . “Pleō.” In *Oxford Latin Dictionary*. Oxford, U.K.: Oxford University Press, 1968.
- . “Pōnō.” In *Oxford Latin Dictionary*, 1401–2. Oxford, U.K.: Oxford University Press, 1968.
- . “Practic, Adj. and n.2.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/149214>.
- . “Prae-.” In *Oxford Latin Dictionary*, 1420. Oxford, U.K.: Oxford University Press, 1968.
- . “Pragmatic, Adj. and n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/149289?rskey=UO3CQ3&result=1&isAdvanced=false>.
- . “Presence, n.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/150669?redirectedFrom=presence>.
- . “Prō-.” In *Oxford Latin Dictionary*, 1462–63. Oxford, U.K.: Oxford University Press, 1968.
- . “Prōcēdō.” In *Oxford Latin Dictionary*, 1466–67. Oxford, U.K.: Oxford University Press, 1968.
- . “Proceed, v.” Oxford English Dictionary, June 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/151777>.
- . “Produce, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/151978?rskey=q7niSu&result=2&isAdvanced=false>.
- . “Prōdūcō.” In *Oxford Latin Dictionary*, 1473. Oxford, U.K.: Oxford University Press, 1968.
- . “Real, Adj.2, n.2, and Adv.” Oxford English Dictionary, June 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/158926?rskey=voeNhA&result=3&isAdvanced=false#eid>.
- . “Rectus.” In *Oxford Latin Dictionary*, 1586–87. Oxford, U.K.: Oxford University Press, 1968.
- . “Regō.” In *Oxford Latin Dictionary*, 1601. Oxford, U.K.: Oxford University Press, 1968.
- . “Regulate, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/161422?rskey=sfeeRv&result=2&isAdvanced=false>.
- . “Rēs.” In *Oxford Latin Dictionary*, 1625–26. Oxford, U.K.: Oxford University Press, 1968.
- . “Right, Adj. and Int.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/165855>.
- . “Right, n.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/165853?rskey=1rjIVD&result=1&isAdvanced=false>.
- . “Rule, n.1.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/168717?rskey=zRMVxH&result=1&isAdvanced=false>.

- . “Rule, v.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/168718>.
- . “Sacrific, Adj.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/69793>.
- . “Sacrifice, n.” Oxford English Dictionary, March 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/169571>.
- . “Sacrificō, ~āre.” In *Oxford Latin Dictionary*, 1675. Oxford, U.K.: Oxford University Press, 1968.
- . “Science, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/172672>.
- . “Sciens.” In *Oxford Latin Dictionary*, 1703. Oxford, U.K.: Oxford University Press, 1968.
- . “Sciō.” In *Oxford Latin Dictionary*, 1704–6. Oxford, U.K.: Clarendon Press, 1968.
- . “Secō.” In *Oxford Latin Dictionary*, 1717. Oxford, U.K.: Oxford University Press, 1968.
- . “Sistō, ~ere.” In *Oxford Latin Dictionary*, 1773–74. Oxford, U.K.: Oxford University Press, 1968.
- . “Stō.” In *Oxford Latin Dictionary*, 1823–24. Oxford, U.K.: Oxford University Press, 1968.
- . “Sūbiciō.” In *Oxford Latin Dictionary*, 1839–40. Oxford, U.K.: Oxford University Press, 1968.
- . “Subiectūus.” In *Oxford Latin Dictionary*, 1840. Oxford, U.K.: Oxford University Press, 1968.
- . “Subiectō.” In *Oxford Latin Dictionary*, 1840. Oxford, U.K.: Oxford University Press, 1968.
- . “Sum.” In *Oxford Latin Dictionary*, 1865–67. Oxford, U.K.: Oxford University Press, 1968.
- . “Sympathy, n.” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/196271?rskey=FBsYwe&result=1&isAdvanced=false>.
- . “Theory, n.” Oxford English Dictionary, December 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/200431?redirectedFrom=theory>.
- . “Uoluntārius.” In *Oxford Latin Dictionary*, 2101. Oxford, U.K.: Oxford University Press, 1968.
- . “Uoluō.” In *Oxford Latin Dictionary*, 2101–2. Oxford, U.K.: Oxford University Press, 1968.
- . “Volition, n.” Oxford English Dictionary, September 2021. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/224457?redirectedFrom=volition#eid>.
- . “Wise, Adj. (n.3 and Adv.)” Oxford English Dictionary, September 2022. <https://www-oed-com.libproxy.berkeley.edu/view/Entry/229495?rskey=pFbbL7&result=3&isAdvanced=false>.
- Paine, R. T. “A Note on Trophic Complexity and Community Stability.” *The American Naturalist* 103, no. 929 (1969): 91–93.
- . “Address of the Past President: Bloomington, Indiana; August 1981: Truth in Ecology.” *Bulletin of the Ecological Society of America* 62, no. 4 (1981): 256–58.

- . “Food Webs: Linkage, Interaction Strength and Community Infrastructure.” *Journal of Animal Ecology* 49, no. 3 (1980): 667–85. <https://doi.org/10.2307/4220>.
- . “Food Webs: Road Maps of Interactions or Grist for Theoretical Development?” *Ecology* 69, no. 6 (1988): 1648–54. <https://doi.org/10.2307/1941141>.
- . “Food-Web Analysis through Field Measurement of per Capita Interaction Strength.” *Nature* 355 (January 2, 1992): 73–75.
- . “Intertidal Community Structure. Experimental Studies on the Relationship between a Dominant Competitor and Its Principal Predator.” *Oecologia* 15, no. 2 (1974): 93–120.
- Paine, Robert T. “Food Web Complexity and Species Diversity.” *The American Naturalist* 100, no. 910 (1966): 65–75.
- . “Frederick Edward Smith: 1920–2012.” *The Bulletin of the Ecological Society of America* 94, no. 1 (2013): 20–23. <https://doi.org/10.1890/0012-9623-94.1.20>.
- Paine, Robert T. “Food Webs: Linkage, Interaction Strength, and Community Infrastructure.” *Journal of Animal Ecology* 49, no. 3 (1980): 666–85.
- Pais, Abraham. “*Subtle Is the Lord...*”: *The Science and the Life of Albert Einstein*. New York: Oxford University Press, 2005.
- Pancaldi, Giuliano. “Darwin’s Technology of Life.” *Isis* 110, no. 4 (December 1, 2019): 680–700. <https://doi.org/10.1086/706483>.
- Park, Thomas. “An Ecologist’s View.” *The Bulletin of the Ecological Society of America* 42, no. 1 (March 1, 1961): 4–10. <https://doi.org/10.2307/20165548>.
- . “Analytical Population Studies in Relation to General Ecology.” *The American Midland Naturalist* 21, no. 1 (1939): 235–55. <https://doi.org/10.2307/2420382>.
- . “Experimental Studies of Interspecies Competition II. Temperature, Humidity, and Competition in Two Species of *Tribolium*.” *Physiological Zoology* 27, no. 3 (1954): 177–238.
- Parry, Richard. “Episteme and Techne.” In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta, 2003. <https://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=episteme-techne>.
- Paul, L. A., and Ned Hall. *Causation: A User’s Guide*. Oxford, U.K.: Oxford University Press, 2013.
- Peluso, Nancy Lee. “Coercing Conservation?: The Politics of State Resource Control.” *Global Environmental Change* 3, no. 2 (June 1, 1993): 199–217. [https://doi.org/10.1016/0959-3780\(93\)90006-7](https://doi.org/10.1016/0959-3780(93)90006-7).
- Penrose, Roger. *The Road to Reality: A Complete Guide to the Laws of the Universe*. London: Jonathan Cape, 2004.
- Peters, Robert Henry. *A Critique for Ecology*. New York: Cambridge University Press, 1991.
- . “Some General Problems for Ecology Illustrated by Food Web Theory.” *Ecology* 69, no. 6 (1988): 1673–76. <https://doi.org/10.2307/1941145>.
- Piaget, Jean. *Behaviour and Evolution*. Translated by Donald Nicholson-Smith. London: Routledge, 2006.
- Pianka, Eric R. *Evolutionary Ecology*. 7th-Google eBook ed. Eric R. Pianka, 2011.
- Plato. “Plato’s Theaetetus.” Translated by David Horan. *The Dialogues of Plato. A New Translation by David Horan.*, March 2021. <https://www.platonicfoundation.org/theaetetus/>.
- . “Plato’s Timaeus.” *The Dialogues of Plato. A New Translation by David Horan.*, 2021. <https://www.platonicfoundation.org/platos-timaeus/>.

- . “Theaetetus.” In *Plato in Twelve Volumes*, translated by Harold N. Fowler, Vol. 12. Cambridge, MA: Harvard University Press, 1921.
- . “Timaeus.” In *Plato*, translated by R. G. Bury, Vol. IX. Loeb Classical Library, LCL 234. Cambridge, MA: Harvard University Press, 1929.
- . “Θεαίτητος (Theaetetus).” In *Platonis Opera*, edited by John Burnet. Oxford, U.K.: Oxford University Press, 1903.
- . “Τίμαιος (Timaeus).” In *Platonis Opera*, edited by John Burnet. Oxford, U.K.: Oxford University Press, 1903.
- Pokorny, Julius. “1. Ĝhei-, Ĝhēi-.” In *Indogermanisches Etymologisches Wörterbuch*, 424–25. Bern: A. Francke Verlag, 1959.
- . “1. Reg-.” In *Indogermanisches Etymologisches Wörterbuch*, 854–57. Bern: A. Francke Verlag, 1959.
- . “2. Ĵeu-, Ĵeu̯ə-, Ĵeu-g-.” In *Indogermanisches Etymologisches Wörterbuch*, 508–10. Bern: A. Francke Verlag, 1959.
- . “2. Meū-, Meū̯ə-.” In *Indogermanisches Etymologisches Wörterbuch*, 743. Bern: A. Francke Verlag, 1959.
- . “Aĝ-.” In *Indogermanisches Etymologisches Wörterbuch*, 4–6. Bern: A. Francke Verlag, 1959.
- . “Ĝen-, Ĝenə-, Ĝnē-, Ĝnō-.” In *Indogermanisches Etymologisches Wörterbuch*, 3:376–78. Bern: A. Francke Verlag, 1959.
- . “Ĵeuos-.” In *Indogermanisches Etymologisches Wörterbuch*, 512. Bern: A. Francke Verlag, 1959.
- . “Kēi-.” In *Indogermanisches Etymologisches Wörterbuch*, 538–39. Bern: A. Francke Verlag, 1959.
- . “Legh-.” In *Indogermanisches Etymologisches Wörterbuch*, 658–59. Bern: A. Francke Verlag, 1959.
- . “Sĕk-.” In *Indogermanisches Etymologisches Wörterbuch*, 3:895–96. Bern, German: A. Francke Verlag, 1959.
- . “Skēi-.” In *Indogermanisches Etymologisches Wörterbuch*, 3:919–22. Bern: A. Francke Verlag, 1959.
- . “(S)k(h)Ed-, (s)k(h)e-n-d-.” In *Indogermanisches Etymologisches Wörterbuch*, 3:918–19. Bern: A. Francke Verlag, 1959.
- . “Ueĝh-.” In *Indogermanisches Etymologisches Wörterbuch*, 1118–20. Bern: A. Francke Verlag, 1959.
- . “U̯(e)Id-.” In *Indogermanisches Etymologisches Wörterbuch*, 3:1125–27. Bern: A. Francke Verlag, 1959.
- Porter, Theodore M. *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*. Princeton: Princeton University Press, 1995.
- Potter Valley Irrigation District. “History of Potter Valley Project,” December 29, 2018. <http://www.pottervalleywater.org/history.html>.
- Pouvreau, David, and Manfred Drack. “On the History of Ludwig von Bertalanffy’s ‘General Systemology’, and on Its Relationship to Cybernetics.” *International Journal of General Systems* 36, no. 3 (June 1, 2007): 281–337. <https://doi.org/10.1080/03081070601127961>.
- Power, Mary. “Drought, Floods, and Alternative States of Algal-Based River Food Webs: The Thirsty Eel.” Plenary Session presented at the 34th Annual Salmonid Restoration

- Conference - Salmonid Restoration Federation, Fortuna, California, April 2016.
<https://vimeo.com/showcase/3927072>.
- Power, Mary E. “Aug 23: Introduction, Overview and Approaches to Ecology.” Undergraduate course Integrative Biology 153: Population and Community Ecology, University of California, Berkeley, August 23, 2018.
- . “Curriculum Vitae: Mary Eleanor Power,” 2018.
https://ib.berkeley.edu/labs/power/mary_power_cv.html.
- . “Effects of Fish in River Food Webs.” *Science* 250, no. 4982 (1990): 811–14.
- . “Eyes on the Eel: Synoptic Summer Surveys of Food Web Biomass in the South Fork and Mainstem Eel River.” Angelo Coast Range Reserve, University of California Natural Reserve System, 2022. <https://angelo.berkeley.edu/eyes-on-the-eel/>.
- . “Food Webs in River Networks: Algal Mediated Linkages of Rivers to Watershed and Near-Shore Marine Ecosystems.” Harvard University, April 22, 2010.
<https://www.youtube.com/watch?v=DRjfe6gsU14>.
- . “Habitat Heterogeneity and The Functional Significance of Fish in River Food Webs.” *Ecology* 73, no. 5 (1992): 1675–88. <https://doi.org/10.2307/1940019>.
- . “Habitat Quality and the Distribution of Algae-Grazing Catfish in a Panamanian Stream.” *Journal of Animal Ecology* 53, no. 2 (1984): 357–74.
<https://doi.org/10.2307/4521>.
- . “Hydrologic and Trophic Controls of Seasonal Algal Blooms in Northern California Rivers.” *Archiv Für Hydrobiologie* 125, no. 4 (1992): 385–410.
- . “Introduction.” Undergraduate course Integrative Biology 153: Population and Community Ecology, University of California, Berkeley, August 23, 2018.
- . “Oct 23: Trophic Cascades and Trophic Downgrading.” Undergraduate course Integrative Biology 153: Population and Community Ecology, University of California, Berkeley, October 23, 2018.
- . “Oct 30: Interaction Strengths, Context Dependence.” Undergraduate course Integrative Biology 153: Population and Community Ecology, University of California, Berkeley, Fall 2018.
- . “Top-Down and Bottom-Up Forces in Food Webs: Do Plants Have Primacy.” *Ecology* 73, no. 3 (1992): 733–46. <https://doi.org/10.2307/1940153>.
- . “Trophic Cascades in Rivers.” Presented at the HHMI 2016 Holiday Lecture Series: Ecology of Rivers and Coasts: Food Webs and Human Impacts, HHMI, October 13, 2016. <https://www.biointeractive.org/professional-learning/science-talks/trophic-cascades-rivers>.
- Power, Mary E. “What Enables Trophic Cascades? Commentary on Polis et Al.” *Trends in Ecology & Evolution* 15, no. 11 (November 1, 2000): 443–44.
[https://doi.org/10.1016/S0169-5347\(00\)01992-3](https://doi.org/10.1016/S0169-5347(00)01992-3).
- Power, Mary E., William E. Dietrich, and Jacques C. Finlay. “Dams and Downstream Aquatic Biodiversity: Potential Food Web Consequences of Hydrologic and Geomorphic Change.” *Environmental Management* 20, no. 6 (November 1, 1996): 887–95.
<https://doi.org/10.1007/BF01205969>.
- Power, Mary E., William E. Dietrich, and Kathleen O’ Sullivan. “Experimentation, Observation, and Inference in River and Watershed Investigations,” n.d.

- Power, Mary E., William E. Dietrich, and Kathleen O. O'Sullivan. "Experimentation, Observation, and Inference in Rivers and Watershed Investigations." In *Experimental Ecology: Issues and Perspectives*, 113–32. New York: Oxford University Press, 1998.
- Power, Mary E., Jane C. Marks, and Michael S. Parker. "Variation in the Vulnerability of Prey to Different Predators: Community-Level Consequences." *Ecology* 73, no. 6 (1992): 2218–23. <https://doi.org/10.2307/1941469>.
- Power, Mary E., William J. Matthews, and Arthur J. Stewart. "Grazing Minnows, Piscivorous Bass, and Stream Algae: Dynamics of a Strong Interaction." *Ecology* 66, no. 5 (1985): 1448–56. <https://doi.org/10.2307/1938007>.
- Power, Mary E., Michael S. Parker, and William E. Dietrich. "Seasonal Reassembly of a River Food Web: Floods, Droughts, and Impacts of Fish." *Ecological Monographs* 78, no. 2 (May 1, 2008): 263–82. <https://doi.org/10.1890/06-0902.1>.
- Power, Mary E., Michael S. Parker, and Timothy J. Wootton. "Disturbance and Food Chain Length in Rivers." In *Food Webs: Integration of Patterns and Dynamics*, edited by Gary A. Polis and Kirk O. Winemiller, 289–97. New York: Chapman & Hall, 1996.
- Power, Mary E., and Arthur J. Stewart. "Disturbance and Recovery of an Algal Assemblage Following Flooding in an Oklahoma Stream." *The American Midland Naturalist* 117, no. 2 (1987): 333–45. <https://doi.org/10.2307/2425975>.
- Power, Mary E., Arthur J. Stewart, and William J. Matthews. "Grazer Control of Algae in an Ozark Mountain Stream: Effects of Short-Term Exclusion." *Ecology* 69, no. 6 (1988): 1894–98. <https://doi.org/10.2307/1941166>.
- Power, Mary E., Adrian Sun, Gary Parker, William E. Dietrich, and J. Timothy Wootton. "Hydraulic Food-Chain Models." *BioScience* 45, no. 3 (1995): 159–67. <https://doi.org/10.2307/1312555>.
- Power, Mary E., David Tilman, James A. Estes, Bruce A. Menge, William J. Bond, L. Scott Mills, Gretchen Daily, Juan Carlos Castilla, Jane Lubchenco, and Robert T. Paine. "Challenges in the Quest for Keystones." *BioScience* 46, no. 8 (1996): 609–20. <https://doi.org/10.2307/1312990>.
- Power, Mary Eleanor, and William Eric Dietrich. "Food Webs in River Networks." *Ecological Research* 17, no. 4 (July 1, 2002): 451–71. <https://doi.org/10.1046/j.1440-1703.2002.00503.x>.
- Power, Mary, Joseph Holomuzki, and Rex Lowe. "Food Webs in Mediterranean Rivers." *Hydrobiologia* 719, no. 1 (November 15, 2013): 119–36. <https://doi.org/10.1007/s10750-013-1510-0>.
- Power, M.E., and W.E. Rainey. "Food Webs and Resource Sheds: Towards Spatially Delimiting Trophic Interactions." In *Ecological Consequences of Habitat Heterogeneity*, edited by M.J. Hutchings, E.A. John, and A.J.A. Stewart, 291–314. Oxford, U.K.: Blackwell Scientific, 2000.
- Preus, Anthony. "EPISTĒMĒ." In *Historical Dictionary of Ancient Greek Philosophy*, 150–51. New York: Rowman & Littlefield, 2015.
- . "GNŌSIS. Γνώσις." In *Historical Dictionary of Ancient Greek Philosophy*, 174–75. New York: Rowman & Littlefield, 2015.
- . "KINĒSIS." In *Historical Dictionary of Ancient Greek Philosophy*, 219. New York: Rowman & Littlefield, 2015.
- . "PASCHEIN." In *Historical Dictionary of Ancient Greek Philosophy*, 289–90. New York: Rowman & Littlefield, 2015.

- . “PASSION.” In *Historical Dictionary of Ancient Greek Philosophy*, 290. New York: Rowman & Littlefield, 2015.
- . “PATHOS, PATHĒ.” In *Historical Dictionary of Ancient Greek Philosophy*, 290–91. New York: Rowman & Littlefield, 2015.
- . “Phronēsis.” In *Historical Dictionary of Ancient Greek Philosophy*, 301–2. New York: Rowman & Littlefield, 2015.
- . “Poiein, Poiēsis, Poiētikē.” In *Historical Dictionary of Ancient Greek Philosophy*, 314. New York: Rowman & Littlefield, 2015.
- . “Pragma. Πράγμα.” In *Historical Dictionary of Ancient Greek Philosophy*, 321. New York: Rowman & Littlefield, 2015.
- . “Praxis, Praktikē.” In *Historical Dictionary of Ancient Greek Philosophy*, 322. New York: Rowman & Littlefield, 2015.
- . “PRAXIS, PRAKTIKĒ. Πράξις, Πρακτική.” In *Historical Dictionary of Ancient Greek Philosophy*, 322. New York: Rowman & Littlefield, 2015.
- . “Sophos, Sophoi, Sophia.” In *Historical Dictionary of Ancient Greek Philosophy*, 359–61. New York: Rowman & Littlefield, 2015.
- . “STASIS.” In *Historical Dictionary of Ancient Greek Philosophy*, 365. New York: Rowman & Littlefield, 2015.
- Putnam, Hilary. “The Meaning of ‘Meaning.’” In *Language, Mind, and Knowledge*, edited by Keith Gunderson, 7:131–93. Minnesota Studies in the Philosophy of Science. Minneapolis: University of Minnesota Press, 1975.
- Pyle, Stuart T. Acting chairman, Work Group No. 2, California State-Federal Interagency Group. “Interagency Planning Coordination on the Upper Eel River Development.” Presented at the Public Hearings of the U.S. Corps of Engineers on Flood Control and Allied Purposes on Eel River, Willits, California, November 24, 1964.
- Quine, W. V. “Main Trends in Recent Philosophy: Two Dogmas of Empiricism.” *The Philosophical Review* 60, no. 1 (1951): 20–43. <https://doi.org/10.2307/2181906>.
- Rabinow, Paul. *French Modern: Norms and Forms of the Social Environment*. Chicago: University of Chicago Press, 1989.
- Rabinow, Paul, and Nikolas Rose. “Introduction: Foucault Today.” In *The Essential Foucault: Selections from Essential Works of Foucault, 1954-1984*, edited by Paul Rabinow and Nikolas Rose, vii–xxxii. New York: The New Press, 2003.
- Ragin, Charles C., and Lisa A. Amoroso. *Constructing Social Research: The Unity and Diversity of Method*. 2nd ed. Los Angeles: SAGE Publications, Inc., 2011.
- Rees, Thomas H. and U.S. Army Corps of Engineers. “Eel River, Cal. Letter from the Secretary of War, Transmitting, with a Letter from the Chief of Engineers, Report on Preliminary Examination of Eel River, Cal. February 28, 1917.” no. Serial Set Vol. No. 7148, Session Vol. No.22. 64th Congress, 2nd Session. H.Doc. 2100 (February 28, 1917). https://docs.newsbank.com/openurl?ctx_ver=z39.88-2004&rft_id=info:sid/iw.newsbank.com:SERIAL&rft_val_format=info:ofi/fmt:kev:mtx:ctx&rft_dat=11A7E4B63A66B2E8&svc_dat=Digital:ssetdoc&req_dat=0D0CB57AB53DF815.
- Reiners, William A., and Jeffrey A. Lockwood. *Philosophical Foundations for the Practices of Ecology*. New York: Cambridge University Press, 2010.
- Reisner, Marc. *Cadillac Desert: The American West and Its Disappearing Water*. Rev. and Updated. New York, N.Y., U.S.A: Penguin Books, 1993.

- Rennie, Richard, and Jonathan Law, eds. "Casimir Effect." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- , eds. "Energy." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- , eds. "Fundamental Interactions." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- , eds. "Potential." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- , eds. "Power." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- , eds. "Renormalization." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- , eds. "Vacuum State." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- , eds. "Work." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- , eds. "Zero-Point Energy." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- Angelo Coast Range Reserve, University of California Natural Reserve System. "Reserve History | Angelo Coast Range Reserve." Accessed December 12, 2017. <http://angelo.berkeley.edu/about-angelo/history/>.
- Richards, Darwin L. "Pilot Calibration of the Elder Creek Watershed." Master's Thesis, Humboldt State College, 1967. Humboldt State University Library.
- Richardson, George P. *Feedback Thought: Social Science and Systems Theory*. Philadelphia: The University of Pennsylvania Press, 1991.
- Ricklefs, Robert E. *Ecology*. Newton, MA: Chiron Press, 1973.
- Ringe, Don, and Ann Taylor. "PGmc *haldana." In *The Development of Old English*. Oxford, U.K.: Oxford University Press, 2014.
- Rinnie, Richard, and Jonathan Law, eds. "Work." In *A Dictionary of Physics*. Oxford, U.K.: Oxford University Press, 2019.
- Riskin, Jessica. *The Restless Clock: A History of the Centuries-Long Argument over What Makes Living Things Tick*. Chicago: The University of Chicago Press, 2016.
- Riverine Food Webs: How Flow Rates Affect Biomass*. HHMI Biointeractive, 2017. <https://www.biointeractive.org/classroom-resources/riverine-food-webs-how-flow-rates-affect-biomass>.
- Rose, Nikolas. "The Politics of Life Itself." *Theory, Culture & Society* 18, no. 6 (2001): 1–30.
- Rubenstein, Dustin R., and John Alcock. *Animal Behavior*. 11th ed. New York: Oxford University Press, 2019.
- Ruhi, Albert. Albert Ruhi on the ecology of the rivers of coastal northern California. Interview by Robert Parks. Videochat, March 3, 2020.
- Rynasiewicz, Robert. "Newton's Views on Space, Time, and Motion." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta. Stanford, CA: Stanford University, 2022. <<https://plato.stanford.edu/archives/spr2022/entries/newton-stm/>>.
- Sagoff, Mark. "Are There General Causal Forces in Ecology?" *Synthese* 193, no. 9 (September 1, 2016): 3003–24. <https://doi.org/10.1007/s11229-015-0907-x>.
- . "On the Definition of Ecology." *Biological Theory* 12, no. 2 (June 1, 2017): 85–98. <https://doi.org/10.1007/s13752-017-0263-9>.

- . “The Plaza and the Pendulum: Two Concepts of Ecological Science.” *Biology and Philosophy* 18, no. 4 (September 1, 2003): 529–52.
<https://doi.org/10.1023/A:1025566804906>.
- . “Theoretical Ecology Has Never Been Etiological: A Reply to Donhauser.” *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 63 (June 1, 2017): 64–69.
<https://doi.org/10.1016/j.shpsc.2017.03.007>.
- Schadewaldt, Wolfgang. “The Concepts of ‘Nature’ and ‘Technique’ According to the Greeks.” Translated by William Carroll. *Research in Philosophy and Technology* 2 (1979): 159–71.
- Schmaltz, Tad M., ed. *Efficient Causation: A History*. New York: Oxford University Press, 2014.
- Schweber, Silvan S. “The Origin of the ‘Origin’ Revisited.” *Journal of the History of Biology* 10, no. 2 (1977): 229–316.
- Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press, 1999.
- Sculley, John B., Rex L. Lowe, Charles A. Nittrouer, Tina M. Drexler, and Mary E. Power. “Eighty Years of Food-Web Response to Interannual Variation in Discharge Recorded in River Diatom Frustules from an Ocean Sediment Core.” *Proceedings of the National Academy of Sciences* 114, no. 38 (September 19, 2017): 10155–59.
<https://doi.org/10.1073/pnas.1611884114>.
- Shannon, Claude E., and Warren Weaver. *The Mathematical Theory of Communication*. Urbana, IL: The University of Illinois Press, 1949.
- Shapovalov, Leo, and Elden Hall Vestal. “Report on the 1938 Eel River Survey, Conducted by the Division of Fish and Game.” Sacramento: State of California Division of Fish and Game, 1939.
- Sheehan, Thomas. “Heidegger and the Right Heideggerians: Phenomenology vs. Crypto-Metaphysics.” *Kronos Philosophical Journal* VI (2017): 78–90.
- Shelford, V. E. “Faith in the Results of Controlled Laboratory Experiments as Applied in Nature.” *Ecological Monographs* 4, no. 4 (1934): 491–98.
<https://doi.org/10.2307/1961653>.
- . “The Organization of the Ecological Society of America 1914-19.” *Ecology* 19, no. 1 (1938): 164–66. <https://doi.org/10.2307/1930382>.
- . “Twenty-Five-Year Effort at Saving Nature for Scientific Purposes.” *Science* 98, no. 2543 (September 24, 1943): 280–81. <https://doi.org/10.1126/science.98.2543.280>.
- Shelford, Victor E. “Ecological Succession. I. Stream Fishes and the Method of Physiographic Analysis.” *Biological Bulletin* 21 (1911): 9–35.
- . *Laboratory and Field Ecology: The Responses of Animals as Indicators of Correct Working Methods*. Baltimore: The Williams & Wilkins Company, 1929.
- Shelford, Victor E., and Edwin B. Powers. “An Experimental Study of the Movements of Herring and Other Marine Fishes.” *Biological Bulletin* 28, no. 5 (1915): 315–34.
- Simberloff, Daniel. “A Succession of Paradigms in Ecology: Essentialism to Materialism and Probabilism.” *Synthese* 43 (1980): 3–39.
- Simon, Ted. *The River Stops Here: Saving Round Valley, A Pivotal Chapter in California’s Water Wars*. Berkeley: University of California Press, 1994.

- Sims, Hank. "Going Nowhere: Has the Northwestern Pacific Railroad Reached the End of the Line?" *North Coast Journal*, May 29, 2003.
<https://www.northcoastjournal.com/052903/cover0529.html>.
- Skeat, Walter. "Hold." In *A Concise Etymological Dictionary of the English Language*, 244. Oxford, U.K.: Clarendon Press, 1882.
- Skeat, Walter J. "Compassion." In *A Concise Etymological Dictionary of the English Language*, 102. Oxford, U.K.: Clarendon Press, 1882.
- Skeat, Walter W. "Abstract." In *A Concise Etymological Dictionary of the English Language*, 3. Oxford, U.K.: Clarendon Press, 1882.
- . "Accomplish." In *A Concise Etymological Dictionary of the English Language*, 4. Oxford, U.K.: Clarendon Press, 1882.
- . "Act." In *A Concise Etymological Dictionary of the English Language*, 5. Oxford, U.K.: Clarendon Press, 1882.
- . "Affect." In *A Concise Etymological Dictionary of the English Language*, 7. Oxford, U.K.: Clarendon Press, 1882.
- . "Agent." In *A Concise Etymological Dictionary of the English Language*, 9. Oxford, U.K.: Clarendon Press, 1882.
- . "Belligerent." In *A Concise Etymological Dictionary of the English Language*, 45. Oxford, U.K.: Clarendon Press, 1882.
- . "Cause." In *A Concise Etymological Dictionary of the English Language*, 81. Oxford, U.K.: Clarendon Press, 1882.
- . "Compose." In *A Concise Etymological Dictionary of the English Language*, 103. Oxford, U.K.: Clarendon Press, 1882.
- . "Composition." In *A Concise Etymological Dictionary of the English Language*, 103. Oxford, U.K.: Clarendon Press, 1882.
- . "Conscience." In *A Concise Etymological Dictionary of the English Language*, 107. Oxford, U.K.: Clarendon Press, 1882.
- . "Conscious." In *A Concise Etymological Dictionary of the English Language*, 107. Oxford, U.K.: Clarendon Press, 1882.
- . "Courage." In *A Concise Etymological Dictionary of the English Language*, 116. Oxford, U.K.: Clarendon Press, 1882.
- . "Create." In *A Concise Etymological Dictionary of the English Language*. Oxford, U.K.: Clarendon Press, 1882.
- . "Destine." In *A Concise Etymological Dictionary of the English Language*, 138. Oxford, U.K.: Clarendon Press, 1882.
- . "Direct." In *A Concise Etymological Dictionary of the English Language*, 143. Oxford, U.K.: Clarendon Press, 1882.
- . "Effect." In *A Concise Etymological Dictionary of the English Language*, 159. Oxford, U.K.: Clarendon Press, 1882.
- . "Effect." In *A Concise Etymological Dictionary of the English Language*, 159. Oxford, U.K.: Clarendon Press, 1882.
- . "Efficient." In *A Concise Etymological Dictionary of the English Language*, 159. Oxford, U.K.: Clarendon Press, 1882.
- . "Ex-, E, Prefix." In *A Concise Etymological Dictionary of the English Language*, 173. Oxford, U.K.: Clarendon Press, 1882.

- . “Exist.” In *A Concise Etymological Dictionary of the English Language*, 175. Oxford, U.K.: Clarendon Press, 1882.
- . “Explain.” In *A Concise Etymological Dictionary of the English Language*, 176. Oxford, U.K.: Clarendon Press, 1882.
- . “Fact.” In *A Concise Etymological Dictionary of the English Language*, 178. Oxford, U.K.: Clarendon Press, 1882.
- . “Fare.” In *A Concise Etymological Dictionary of the English Language*, 180. Oxford, U.K.: Clarendon Press, 1882.
- . “Genuine.” In *A Concise Etymological Dictionary of the English Language*, 210. Oxford, U.K.: Oxford University Press, 1882.
- . “Glance.” In *A Concise Etymological Dictionary of the English Language*, 214. Oxford, U.K.: Clarendon Press, 1882.
- . “Glimmer.” In *A Concise Etymological Dictionary of the English Language*. Oxford, U.K.: Clarendon Press, 1882.
- . “Glimpse.” In *A Concise Etymological Dictionary of the English Language*, 214. Oxford, U.K.: Clarendon Press, 1882.
- . “Intellect.” In *A Concise Etymological Dictionary of the English Language*, 264. Oxford, U.K.: Clarendon Press, 1882.
- . “Judge.” In *A Concise Etymological Dictionary of the English Language*, 274. Oxford, U.K.: Clarendon Press, 1882.
- . “Judicial.” In *A Concise Etymological Dictionary of the English Language*, 274. Oxford, U.K.: Clarendon Press, 1882.
- . “Just.” In *A Concise Etymological Dictionary of the English Language*, 275. Oxford, U.K.: Clarendon Press, 1882.
- . “Justice.” In *A Concise Etymological Dictionary of the English Language*, 275. Oxford, U.K.: Clarendon Press, 1882.
- . “Know.” In *A Concise Etymological Dictionary of the English Language*, 280. Oxford, U.K.: Clarendon Press, 1882.
- . “Law.” In *A Concise Etymological Dictionary of the English Language*, 286–87. Oxford, U.K.: Clarendon Press, 1882.
- . “Legal.” In *A Concise Etymological Dictionary of the English Language*, 289–90. Oxford, U.K.: Clarendon Press, 1882.
- . “Logic.” In *A Concise Etymological Dictionary of the English Language*, 300. Oxford, U.K.: Clarendon Press, 1882.
- . “Method.” In *A Concise Etymological Dictionary of the English Language*, 325. Oxford, U.K.: Clarendon Press, 1882.
- . “Motion.” In *A Concise Etymological Dictionary of the English Language*, 337. Oxford, U.K.: Clarendon Press, 1882.
- . “Motive.” In *A Concise Etymological Dictionary of the English Language*, 337. Oxford, U.K.: Clarendon Press, 1882.
- . “Move.” In *A Concise Etymological Dictionary of the English Language*, 338. Oxford, U.K.: Clarendon Press, 1882.
- . “Passion.” In *A Concise Etymological Dictionary of the English Language*, 375. Oxford, U.K.: Clarendon Press, 1882.
- . “Passive.” In *A Concise Etymological Dictionary of the English Language*, 375. Oxford, U.K.: Clarendon Press, 1882.

- . “Patient.” In *A Concise Etymological Dictionary of the English Language*, 376. Oxford, U.K.: Clarendon Press, 1882.
- . “Perceive.” In *A Concise Etymological Dictionary of the English Language*, 383. Oxford, U.K.: Clarendon Press, 1882.
- . “Philosophy.” In *A Concise Etymological Dictionary of the English Language*, 388. Oxford, U.K.: Clarendon Press, 1882.
- . “Practice.” In *A Concise Etymological Dictionary of the English Language*, 407. Oxford, U.K.: Clarendon Press, 1882.
- . “Pragmatic.” In *A Concise Etymological Dictionary of the English Language*, 407. Oxford, U.K.: Clarendon Press, 1882.
- . “Present.” In *A Concise Etymological Dictionary of the English Language*, 409. Oxford, U.K.: Clarendon Press, 1882.
- . “Proceed.” In *A Concise Etymological Dictionary of the English Language*, 412. Oxford, U.K.: Clarendon Press, 1882.
- . “Produce.” In *A Concise Etymological Dictionary of the English Language*, 413. Oxford, U.K.: Clarendon Press, 1882.
- . “Real.” In *A Concise Etymological Dictionary of the English Language*, 434. Oxford, U.K.: Clarendon Press, 1882.
- . “Regular.” In *A Concise Etymological Dictionary of the English Language*, 440. Oxford, U.K.: Clarendon Press, 1882.
- . “Right.” In *A Concise Etymological Dictionary of the English Language*, 450. Oxford, U.K.: Clarendon Press, 1882.
- . “Rule.” In *A Concise Etymological Dictionary of the English Language*, 457. Oxford, U.K.: Clarendon Press, 1882.
- . “Sacrifice.” In *A Concise Etymological Dictionary of the English Language*, 459. Oxford, U.K.: Clarendon Press, 1882.
- . “Science.” In *A Concise Etymological Dictionary of the English Language*, 468. Oxford, U.K.: Clarendon Press, 1882.
- . “Sympathy.” In *A Concise Etymological Dictionary of the English Language*, 537. Oxford, U.K.: Clarendon Press, 1882.
- . “Wise.” In *A Concise Etymological Dictionary of the English Language*, 612. Oxford, U.K.: Clarendon Press, 1882.
- Slater, William J. “Επί.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Εὐδαιμονία.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Εὐδαίμων.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Καρδία.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Κῆνέω.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Μετά.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Νοέω.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Νόος.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Οδός.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Οἶδα.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Πάσχω.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Πεῖρα.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Πρᾶξις.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- . “Συῖν.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.

- . “Φαίνω.” In *Lexicon to Pindar*. Berlin: De Gruyter, 1969.
- Slobodkin, L. B., F. E. Smith, and N. G. Hairston. “Regulation in Terrestrial Ecosystems, and the Implied Balance of Nature.” *The American Naturalist* 101, no. 918 (1967): 109–24.
- Smith, F. E. “Effects of Enrichment in Mathematical Models.” In *Eutrophication: Causes, Consequences, Correctives*, 631–45. Washington, D.C.: National Academy of Sciences, 1969.
- Smith, Frederick E. “Experimental Methods in Population Dynamics: A Critique.” *Ecology* 33, no. 4 (1952): 441–50. <https://doi.org/10.2307/1931519>.
- . “Quantitative Aspects of Population Growth.” In *Dynamics of Growth Processes*, edited by Edgar J. Boell, 277–94. Princeton, NJ: Princeton University Press, 1954.
- . “Spatial Heterogeneity, Stability, and Diversity in Ecosystems.” In *Growth by Intussusception: Ecological Essays in Honor of G. Evelyn Hutchinson*, 44:309–35. Transactions. New Haven: Connecticut Academy of Arts and Sciences, 1972.
- Sosa, Ernest, and Michael Tooley, eds. *Causation*. New York: Oxford University Press, 1993.
- Spence, Mark David. *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks*. New York: Oxford University Press, 1999.
- Stachowicz, John J. “Mutualism, Facilitation, and the Structure of Ecological Communities.” *BioScience* 51, no. 3 (March 1, 2001): 235–46. [https://doi.org/10.1641/0006-3568\(2001\)051\[0235:MFATSO\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2001)051[0235:MFATSO]2.0.CO;2).
- Stanley-Jones, D., and K. Stanley-Jones. *The Kybernetics of Natural Systems: A Study in Patterns of Control*. New York: Pergamon Press, 1960.
- State of California Department of Fish and Game. “Natural Resources of the Eel River Delta.” Sacramento, October 1974.
- . “The Effects of Middle Fork Eel River Development on Wildlife Resources.” State of California Department of Fish and Game, December 1969.
- State of California Department of Water Resources. “Bulletin No. 3 - The California Water Plan.” State of California Department of Water Resources, May 1957.
- Stauffer, Robert C. “Haeckel, Darwin, and Ecology.” *The Quarterly Review of Biology* 32, no. 2 (June 1, 1957): 138–44. <https://doi.org/10.1086/401754>.
- Stevens, William K. “Theory on the Number of Links in Food Chain Is Upheld in River Test.” *New York Times*. December 11, 1990, National edition, sec. Section C.
- Stone, Edward C. “Redwood Ecology Project - Annual Report.” University of California, Berkeley: Wildland Research Center, University of California and Division of Beaches and Parks, California Department of Natural Resources, 1966.
- . “Redwood Ecology Project - Annual Report.” University of California, Berkeley: Wildland Research Center, University of California and Division of Beaches and Parks, California Department of Natural Resources, 1967.
- “Sūbiciō.” In *Oxford Latin Dictionary*, 1839–40. Oxford, U.K.: Oxford University Press, 1968.
- Tarski, Alfred. “The Semantic Conception of Truth: And the Foundations of Semantics.” *Philosophy and Phenomenological Research* 4, no. 3 (1944): 341–76. <https://doi.org/10.2307/2102968>.
- Taylor, Peter J. “Technocratic Optimism, H. T. Odum, and the Partial Transformation of Ecological Metaphor after World War II.” *Journal of the History of Biology* 21, no. 2 (1988): 213–44.

- Taylor, Peter J., and Ann S. Blum. "Ecosystem as Circuits: Diagrams and the Limits of Physical Analogies." *Biology and Philosophy* 6, no. 2 (April 1, 1991): 275–94. <https://doi.org/10.1007/BF02426841>.
- Taylor, Walter P. "What Is Ecology and What Good Is It?" *Ecology* 17, no. 3 (1936): 333–46. <https://doi.org/10.2307/1931838>.
- Teague, Sharon A., Allen W. Knight, and Bradley N. Teague. "Stream Microhabitat Selectivity, Resource Partitioning, and Niche Shifts in Grazing Caddisfly Larvae." *Hydrobiologia* 128, no. 1 (September 1, 1985): 3–12. <https://doi.org/10.1007/BF00008934>.
- Thayer, Joseph Henry. "Ἐπί." In *Greek-English Lexicon of the New Testament*, 231–36. New York: American Book Company, 1889.
- . "Ἐπίσταμαι." In *Greek-English Lexicon of the New Testament*, 243. New York: American Book Company, 1889.
- . "Ἐπιστήμων." In *Greek-English Lexicon of the New Testament*, 243. New York: American Book Company, 1889.
- . "Ἰστημί." In *Greek-English Lexicon of the New Testament*, 307–8. New York: American Book Company, 1889.
- . "Καρδιά." In *Greek-English Lexicon of the New Testament*, 325–26. New York: American Book Company, 1889.
- . "Πάθημα." In *Greek-English Lexicon of the New Testament*, 472. New York: American Book Company, 1889.
- . "Πάθος." In *Greek-English Lexicon of the New Testament*, 472. New York: American Book Company, 1889.
- . "Πάσχω." In *Greek-English Lexicon of the New Testament*, 494. New York: American Book Company, 1889.
- . "Ποιέω." In *Greek-English Lexicon of the New Testament*, 524–27. New York: American Book Company, 1889.
- . "Ποίημα." In *Greek-English Lexicon of the New Testament*, 527. New York: American Book Company, 1889.
- . "Ποίησις." In *Greek-English Lexicon of the New Testament*, 527. New York: American Book Company, 1889.
- . "Ποιητής." In *Greek-English Lexicon of the New Testament*, 527. New York: American Book Company, 1889.
- . "Πράξις -Εως." In *Greek-English Lexicon of the New Testament*, 534. New York: American Book Company, 1889.
- . "Πράσσω." In *Greek-English Lexicon of the New Testament*, 535. New York: American Book Company, 1889.
- . "Ἐπι-Πάσχω." In *Greek-English Lexicon of the New Testament*, 597. New York: American Book Company, 1889.
- . "Ἐπίστασις." In *Greek-English Lexicon of the New Testament*, 585–86. New York: American Book Company, 1889.
- . "Ἐπιπαθεύω." In *Greek-English Lexicon of the New Testament*, 596. New York: American Book Company, 1889.
- . "Ἐπιπαθής, -Ες." In *Greek-English Lexicon of the New Testament*, 596. New York: American Book Company, 1889.
- . "Ἐπιπρόνημα, -Τος, Τό." In *Greek-English Lexicon of the New Testament*, 658. New York: American Book Company, 1889.

- . “Φρήν.” In *Greek-English Lexicon of the New Testament*, 658. New York: American Book Company, 1889.
- . “Φρωέω.” In *Greek-English Lexicon of the New Testament*, 658. New York: American Book Company, 1889.
- The British Academy. “Causa.” In *Dictionary of Medieval Latin from British Sources*, edited by R. E. Latham, Fascicule II: C:304. London: Oxford University Press, 1981.
- . “Causare, ~ari.” In *Dictionary of Medieval Latin from British Sources*, edited by R. E. Latham, Fascicule II: C:305. London: Oxford University Press, 1981.
- . “Cudere.” In *Dictionary of Medieval Latin from British Sources*, edited by R. E. Latham, Fascicule II: C:528. London: Oxford University Press, 1981.
- . “Efficientia.” In *Dictionary of Medieval Latin from British Sources*, edited by R. E. Latham and D. R. Howlett, Fascicule III: D-E:751. London: Oxford University Press, 1986.
- . “Efficiere.” In *Dictionary of Medieval Latin from British Sources*, edited by R. E. Latham and D. R. Howlett, Fascicule III: D-E:751. London: Oxford University Press, 1986.
- . “Ex.” In *Dictionary of Medieval Latin from British Sources*, edited by R. E. Latham and D. R. Howlett, Fascicule III: D-E:821–22. London: Oxford University Press, 1986.
- . “Facere, Fieri.” In *Dictionary of Medieval Latin from British Sources*, edited by D. R. Howlett, Fascicule IV: F-G-H:886–90. London: Oxford University Press, 1989.
- The British Academy, and D. R. Howlett. “1. Realis.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “1. Res.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Identificare.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Judex.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Judicare.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Legalis.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Passio.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Passivus.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Pati.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Patientia.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Planare.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Plere.” Brepolis Publishers. *Dictionary of Medieval Latin from British Sources*, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.

- . “Ponere.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Producere.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Rectus.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Regere.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Regula.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- The British Academy, D. R. Howlett, and J. Blundell. “Motio.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Movere.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- The British Academy, and R. E. Latham. “Belliger.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Ciēre, Ciēre.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Compassio.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Complēre.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Componere.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Compositio.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Cor.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Creare.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- The British Academy, R. E. Latham, and D. R. Howlett. “2. Dicere.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Ducere.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- . “Explanare.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- The British Academy, R. E., and R. E. Latham. “Afficere.” Brepolis Publishers. Dictionary of Medieval Latin from British Sources, 2015. <http://clt.brepolis.net.libproxy.berkeley.edu/dmlbs/pages/QuickSearch.aspx>.
- The Eel River: Friend and Foe*. Film: 16mm, 1969. https://archive.org/details/carcht_000043.
- The National Academy of Sciences. *Teaching about Evolution and the Nature of Science*. Washington, D.C.: The National Academy Press, 1998.

- The National Academy of Sciences Institute of Medicine. *Science, Evolution, and Creationism*. Washington, D.C.: The National Academy Press, 2008.
- The Nature Conservancy. “Who We Are - Our History.” The Nature Conservancy, 2019. <https://www.nature.org/en-us/about-us/who-we-are/our-history/>.
- The Times-Standard. “Benbow Dam Removal Completed.” *The Times Standard*. December 24, 2017. <https://www.times-standard.com/2017/12/24/benbow-dam-removal-completed/>.
- Thienemann, A.F. “Der Nahrungskreislauf Im Wasser.” *Verhandlungen Der Deutschen Zoologischen Gesellschaft* 31 (1926): 29–79.
- Tjossem, Sara. “Victor Shelford.” In *Oxford Bibliographies*. Ecology. Oxford University Press, March 31, 2016. <http://www.oxfordbibliographies.com/view/document/obo-9780199830060/obo-9780199830060-0145.xml?rskey=wGkw4P&result=163>.
- Travis, Mark L. “Flow River Flow: The Eel River and Its Environs.” Senior thesis, University of California, Berkeley, 1985.
- Trush, William J. “The Influence of Channel Morphology and Hydrology on Spawning Populations of Steelhead Trout in South Fork Eel River Tributaries.” Doctoral dissertation, University of California, Berkeley, 1992.
- Tryon, Edward P. “Is the Universe a Vacuum Fluctuation?” *Nature* 246, no. 5433 (December 1973): 396–97. <https://doi.org/10.1038/246396a0>.
- Tuozzo, Thomas M. “Aristotle and the Discovery of Efficient Causation.” In *Efficient Causation: A History*, edited by Tad M. Schmaltz, 23–47. Oxford Philosophical Concepts. New York: Oxford University Press, 2014.
- Ulanowicz, Robert E. “Information Theory in Ecology.” *Computers & Chemistry* 25, no. 4 (July 1, 2001): 393–99. [https://doi.org/10.1016/S0097-8485\(01\)00073-0](https://doi.org/10.1016/S0097-8485(01)00073-0).
- Ulanowicz, Robert E. “Life after Newton: An Ecological Metaphysic.” *Biosystems* 50, no. 2 (May 1, 1999): 127–42. [https://doi.org/10.1016/S0303-2647\(98\)00097-5](https://doi.org/10.1016/S0303-2647(98)00097-5).
- Ulanowicz, Robert E. “The Central Role of Information Theory in Ecology.” In *Towards an Information Theory of Complex Networks: Statistical Methods and Applications*, edited by Matthias Dehmer, Frank Emmert-Streib, and Alexander Mehler, 153–67. Boston: Birkhäuser Boston, 2011. https://doi.org/10.1007/978-0-8176-4904-3_7.
- . “The Organic in Ecology.” *Ludus Vitalis* 9, no. 15 (2001): 183–204.
- United States Army Corps of Engineers, San Francisco District. “Eel River Basin Resource Analysis.” San Francisco: United States Army Corps of Engineers, August 1980.
- United States Army Corps of Engineers, United States Bureau of Reclamation, Soil Conservation Service of the United States Department of Agriculture, and State of California Department of Water Resources. “Joint U.S.-California Water Development Planning. California State-Federal Interagency Group.” September 1966.
- United States Bureau of Reclamation. “About the Central Valley Project.” Mid-Pacific Region: Welcom to the Bureau of Reclamation’s Mid-Pacific Region, April 18, 2017. <https://www.usbr.gov/mp/cvp/about-cvp.html>.
- . “Eel River Division - Ultimate Phase - North Coast Project, California.” Sacramento, 1972 1974.
- . “English Ridge Unit - Eel River Division - North Coast Project - California: Feasibility Report.” Sacramento: United States Bureau of Reclamation, March 1972.
- . “The Bureau of Reclamation: A Very Brief History.” Reclamation: Managing Water in the West. Reclamation History., August 15, 2018. <https://www.usbr.gov/history/borhist.html>.

- . “Welcome to the Projects and Facilities Database. Reclamation’s Portal for Information on Dams, Powerplants and Projects.” Reclamation: Managing Water in the West. Projects and Facilities., April 25, 2017. <https://www.usbr.gov/projects/>.
- United States Bureau of Sport Fisheries and Wildlife. “North Coast Project - Eel River Division - English Ridge Unit - California: Report of the Bureau of Sport Fisheries and Wildlife.” Portland, Oregon: Bureau of Sport Fisheries and Wildlife, January 1972.
- United States Congress. National Environmental Policy Act of 1969, Pub. L. No. 91–190, 83 Stat. 852 (1970). <https://www.govinfo.gov/app/details/STATUTE-83/STATUTE-83-Pg852/summary>.
- United States Department of the Interior, Bureau of Reclamation. “United Western Investigation Interim Report on Reconnaissance - California Section.” Salt Lake City, Utah, 1951.
- United States Department of the Interior, Pacific Southwest Field Committee. “Natural Resources of Northwestern California: Preliminary Report,” 1956.
- United States Fish and Wildlife Service, United States Forest Service, United States Bureau of Land Management, and United States National Park Service. “Eel River, California.” National Wild and Scenic Rivers System. Accessed January 16, 2019. <https://www.rivers.gov/rivers/eel.php>.
- Urry, Lisa A., Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, and Rebecca B. Orr. *Campbell Biology*. 12th ed. Hoboken, N.J.: Pearson Education, Inc., 2021.
- U.S. Army. Corps of Engineers. “Eel River, Calif. Letter from the Secretary of War, Transmitting... a Letter from the Chief of Engineers, United States Army, Dated August 17, 1933, Submitting a Report, Together with Accompanying Papers and Illustrations, Containing a General Plan for the Improvement... January 3, 1934.,” no. Serial Set Vol. No. 9833, Session Vol. No.29. 73rd Congress, 2nd Session. H.Doc. 194 (January 3, 1934). https://docs.newsbank.com/openurl?ctx_ver=z39.88-2004&rft_id=info:sid/iw.newsbank.com:SERIAL&rft_val_format=info:ofi/fmt:kev:mtx:ctx&rft_dat=11E3F3A70B2587E8&svc_dat=Digital:ssetdoc&req_dat=0D0CB57AB53DF815.
- U.S. Army Corps of Engineers, San Francisco District. “Eel River Basin California: Interim Report on Water Resources Development for Middle Fork Eel River.” San Francisco: United States Army Corps of Engineers, April 1968.
- U.S. Fish and Wildlife Service. “Eel River, California.” National Wild and Scenic Rivers System, n.d. <https://www.rivers.gov/rivers/eel.php>.
- Vaan, Michiel de. “Capiō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 89–90. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Iaciō, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 292–93. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Ob.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 421. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.
- . “Per.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 459–60. Leiden Indo-European Etymological Dictionary Series 7. Leiden, The Netherlands: Brill, 2008.

- . “Sisto, -Ere.” In *Etymological Dictionary of Latin and the Other Italic Languages*, 7:567. Leiden Indo-European Etymological Dictionary Series. Leiden, The Netherlands: Brill, 2008.
- Vaughn, Melville M. “A California Principality: Humboldt and Its Redwoods.” *The Overland Monthly* Second Series. 28, no. 165 (September 1896): 328–68.
- Volpi, Franco. “In Whose Name?: Heidegger and ‘Practical Philosophy.’” *European Journal of Political Theory* 6, no. 1 (January 1, 2007): 31–51. <https://doi.org/10.1177/1474885107070828>.
- Volterra, Vito. “Fluctuations in the Abundance of a Species Considered Mathematically.” *Nature* 118, no. 2972 (October 1, 1926): 558–60. <https://doi.org/10.1038/118558a0>.
- . “Variations and Fluctuations of the Number of Individuals in Animal Species Living Together.” *ICES Journal of Marine Science* 3, no. 1 (April 1, 1928): 3–51. <https://doi.org/10.1093/icesjms/3.1.3>.
- Walker, Jeremy, and Melinda Cooper. “Genealogies of Resilience: From Systems Ecology to the Political Economy of Crisis Adaptation.” *Security Dialogue* 42, no. 2 (2011): 143–60. <https://doi.org/10.1177/0967010611399616>.
- Wallace, David. *The Emergent Multiverse: Quantum Theory According to the Everett Interpretation*. New York: Oxford University Press, 2012.
- . “Worlds in the Everett Interpretation.” *Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics* 33, no. 4 (December 1, 2002): 637–61. [https://doi.org/10.1016/S1355-2198\(02\)00032-1](https://doi.org/10.1016/S1355-2198(02)00032-1).
- Weiss, Robert. *Learning from Strangers: The Art and Method of Qualitative Interview Studies*. New York: The Free Press, 1994.
- West, Paige, James Igoe, and Dan Brockington. “Parks and Peoples: The Social Impact of Protected Areas.” *Annual Review of Anthropology* 35 (2006): 251–77.
- Westfall, Richard S. *The Construction of Modern Science: Mechanisms and Mechanics*. New York: John Wiley & Sons, Inc., 1971.
- Westphal, Tobias, Hans Hepach, Jeremias Pfaff, and Markus Aspelmeyer. “Measurement of Gravitational Coupling between Millimetre-Sized Masses.” *Nature* 591, no. 7849 (March 2021): 225–28. <https://doi.org/10.1038/s41586-021-03250-7>.
- Wheeler, John Archibald. *A Journey into Gravity and Spacetime*. New York: Scientific American Library, 1990.
- Wheeler, John Archibald, and Kenneth Ford. *Geons, Black Holes, and Quantum Foam: A Life in Physics*. New York: W. W. Norton and Company, 1998.
- Wheeler, William Morton. “The Ant-Colony as an Organism.” *Journal of Morphology* 22, no. 2 (1911): 307–25. <https://doi.org/10.1002/jmor.1050220206>.
- White, S.L. “The First Ten Years.” The Ecological Society of America’s History and Records, August 3, 2013. <https://esa.org/history/the-first-ten-years/>.
- Whitney, Elspeth. *Paradise Restored: The Mechanical Arts from Antiquity through the Thirteenth Century*. Vol. 80. Transactions of the American Philosophical Society. Philadelphia: The American Philosophical Society, 1990.
- Wiener, Norbert. *Cybernetics: Or Control and Communication in the Animal and the Machine*. 2nd ed. Cambridge, MA: The MIT Press, 1961.
- Wilczek, Frank. *Fundamentals: Ten Keys to Reality*. Ebook. New York: Penguin Press, 2021.
- . *The Lightness of Being: Mass, Ether, and the Unification of Forces*. New York: Basic Books, 2008.

- Wilson, Edward O. *The Meaning of Human Existence*. New York: Liveright Publishing Company, 2014.
- Wilson, Edward O., and G. Evelyn Hutchinson. "Robert Helmer MacArthur, 1930-1972." *Biographical Memoirs of the National Academy of Sciences*, 1989, 318–27.
- Wilson, Richard A. "Citizens Environmental Advisory Committee - Sacramento, California - To: Robert J. Pafford, Jr., Regional Director, United States Department of the Interior, Bureau of Reclamation - Subject: Comments on the Eel River Ultimate Phase, Eel River Division, North Coast Project, California, Status Report, June 1972," August 10, 1972. Appended in United States Bureau of Reclamation, December 1972, "Concluding Report: North Coast Project, Eel River Division, Ultimate Phase." University of California, Berkeley Library TD224.C2 E35 1974 NRLF.
- Wittgenstein, Ludwig. *Philosophical Investigations*. Translated by G. E. M. Anscombe. 3rd ed. New York: MacMillan Publishing Co., Inc., 1958.
- Wolda, Henk. "The Equilibrium Concept and Density Dependence Tests What Does It All Mean?" *Oecologia* 81, no. 3 (November 1, 1989): 430–32. <https://doi.org/10.1007/BF00377095>.
- Wolters, Gereon. "Mach and Einstein, or, Clearing Troubled Waters in the History of Science." In *Einstein and the Changing Worldviews of Physics*, edited by Christoph Lehner, Jürgen Renn, and Matthias Schemmel, 39–57. New York: Springer Science+Business Media, 2012.
- Wootton, J. Timothy. "The Nature and Consequences of Indirect Effects in Ecological Communities." *Annual Review of Ecology and Systematics* 25, no. 1 (November 1, 1994): 443–66. <https://doi.org/10.1146/annurev.es.25.110194.002303>.
- Wootton, J. Timothy, and Mark Emmerson. "Measurement of Interaction Strength in Nature." *Annual Review of Ecology, Evolution, and Systematics* 36 (2005): 419–44.
- Wootton, J. Timothy, Michael S. Parker, and Mary E. Power. "Effects of Disturbance on River Food Webs." *Science* 273, no. 5281 (1996): 1558–61.
- Worster, Donald. *Nature's Economy: A History of Ecological Ideas*. New York: Cambridge University Press, 1994.
- . "The Ecology of Order and Chaos." *Environmental History Review* 14, no. 1/2 (1990): 1–18. <https://doi.org/10.2307/3984623>.
- Wrathall, Mark A. Letter to Robert Parks. "Follow up to Our December/January Emails," May 19, 2022. <https://mail.google.com/mail/u/0/#search/mark.wrathall%40philosophy.ox.ac.uk/QgrcJHrhxnRXXMKVbXjsJjRTFJLKxHdrcPRV>.
- . "Heidegger on Human Understanding." In *The Cambridge Companion to Heidegger's Being and Time*, edited by Mark A. Wrathall, 177–200. New York: Cambridge University Press, 2013.
- . "Introduction: Background Practices and Understandings of Being." In *Background Practices: Essays on the Understanding of Being*, edited by Mark A. Wrathall, 1–15. Oxford, U.K.: Oxford University Press, 2017.
- . "Introduction: Hubert Dreyfus and the Phenomenology of Human Intelligence." In *Skillful Coping: Essays on the Phenomenology of Everyday Perception and Action*, edited by Mark A. Wrathall, 1–22. Oxford, U.K.: Oxford University Press, 2014.
- Wu, Jianguo, and Ori L. Loucks. "From Balance of Nature to Hierarchical Patch Dynamics: A Paradigm Shift in Ecology." *The Quarterly Review of Biology* 70, no. 4 (1995): 439–66.

- Yu, Haocun, L. McCuller, M. Tse, N. Kijbunchoo, L. Barsotti, and N. Mavalvala. “Quantum Correlations between Light and the Kilogram-Mass Mirrors of LIGO.” *Nature* 583, no. 7814 (July 2020): 43–47. <https://doi.org/10.1038/s41586-020-2420-8>.
- Zélé, Flore, Sara Magalhães, Sonia Kéfi, and Alison B. Duncan. “Ecology and Evolution of Facilitation among Symbionts.” *Nature Communications* 9, no. 1 (November 19, 2018): 1–12. <https://doi.org/10.1038/s41467-018-06779-w>.