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Why cognitive linguistics requires embodied realism

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In our book *Metaphors We Live By* (1980), we presented evidence that taking the existence of conceptual metaphor seriously would require a massive rethinking of many foundational assumptions in the Western philosophical tradition concerning meaning, conceptualization, reason, knowledge, truth, and language. In the twenty years between that book and *Philosophy in the Flesh* (1999), a mushrooming body of additional empirical evidence from linguistics, psychology, cognitive neuroscience, and anthropology became available, which not only reinforced our original claims about the pervasive, constitutive nature of conceptual metaphor, but also revealed implications for traditional philosophy that were even more devastating than we at first imagined.

What we saw, especially in light of sweeping, rapid developments in cognitive neuroscience, was that meaning is grounded in our sensorimotor experience and that this embodied meaning was extended, via imaginative mechanisms such as conceptual metaphor, metonymy, radial categories, and various forms of conceptual blending, to shape abstract conceptualization and reasoning. What the empirical evidence suggests to us is that an embodied account of syntax, semantics, pragmatics, and value is absolutely necessary for an adequate understanding of human cognition and language. You cannot simply peel off a theory of conceptual metaphor from its grounding in embodied meaning and thought. You cannot give an adequate account of conceptual metaphor and other imaginative structures of understanding without recognizing some form of embodied realism.

The reasons are discussed at length in *Philosophy in the Flesh* (1999: chapters 3, 4, and appendix). As Grady (1997) and Johnson (1997) have (jointly) observed, there is a system of hundreds of primary conceptual metaphors that we all learn by the age of four or earlier on the basis of “conflations” in our experience—cases where source and target domains are coactive in our experience. For example, verticality and quantity are coactive whenever we pour juice into a glass or pile up objects.

This is the experiential grounding for MORE IS UP. As Grady and Johnson show, the hundreds of primary conceptual metaphors arise automatically and unconsciously just through our everyday functioning in the world. Such coactivation results in neural connections (“Neurons that fire together wire together!”) via recruitment learning (Narayanan 1997).

However, Rakova denies the very existence of conceptual metaphor of the sort that we and others in our discipline have been providing evidence for over the past twenty years. The argument she gives is a philosophical, not an empirical one. She asserts that

the main point I want to make here is that *the idea of the metaphoric structuring of concepts is only tenable if an extreme empiricism of Lakoff and Johnson’s kind is accepted*. However, it is doubtful that any version of extreme empiricism can ever turn out to be true. (p. 218)

In other words, she has first mistakenly identified embodied realism as a form of “extreme empiricism”. Then she has incorrectly assumed that conceptual metaphor theory could only be a form of “extreme empiricism”. Finally, she assumes that if she can debunk “extreme empiricism”, then she has refuted the theory of conceptual metaphor. It’s a three-step argument in which all the steps are false.

Now, the question of the necessity and cognitive reality of embodied realism is an *empirical* issue, not a matter of armchair speculation but rather a question of what view of human cognition is supported by the evidence and is necessary to explain human meaning and all forms of symbolic expression. Over the past twenty years, in a series of books and articles, we have tried to present the available kinds of evidence for the embodiment of thought. While we obviously cannot survey the relevant evidence here, we hope to indicate what that evidence looks like, how it requires an embodied realism, and why it is impossible to separate a cognitively adequate theory of conceptual metaphor from embodied realism.

At the outset, it is helpful to explain why we believe that our views have been subject to so much serious misinterpretation of the sort we find throughout Rakova’s critique. One of the most robust and far-reaching findings of cognitive linguistics is the phenomenon of framing (Fillmore 1975, 1982) and correlative notions of idealized cognitive models (Lakoff 1987). How a person frames a particular situation will determine what they experience as relevant phenomena, what they count as data, what inferences they make about the situation, and how they conceptualize it. The frames and idealized cognitive models that underlie traditional views of generative linguistics and traditional philosophical views of meaning, thought, and understanding are the very views that are called radically into

question by the evidence for conceptual metaphors and other related cognitive structures. The idea that our abstract concepts get significant parts of their ontologies and inference patterns via multiple, often inconsistent metaphors is fundamentally incompatible with all literalist theories of meaning, all objectivist theories of language, and classical correspondence theories of truth. Once you are compelled by the empirical evidence to abandon literalism and objectivism, the whole house of cards falls. Anglo-American analytic philosophy becomes untenable, as do other traditional approaches to philosophy. You cannot hold onto traditional conceptions of meaning, thought, and language. You need to explain where meaning comes from in creatures like us who have no modules of the sort required by generative syntax or by language-of-thought paradigms. (See Lakoff and Johnson 1999: chapter 20; Edelman 1994: appendix). You need to explain how creatures with our peculiar neural and physiological makeup can experience meaning, can conceptualize, and can reason abstractly. And, in such an account, the body is implicated every step of the way. We believe that Rakova's misrepresentations of our view of embodied realism, and, indeed, of our account of conceptual metaphor and other imaginative structures, are the result of the philosophical frames she brings to the study of language, apparently from Anglo-American philosophy.

Let us illustrate this directly by addressing the first major criticism she levels against embodied realism, which she mistakenly equates with what she calls "extreme empiricism" (p. 237). We do not, and never have, espoused any form of empiricism at all, extreme or otherwise. Classical empiricism is a philosophical position, which claims that we are born with a *tabula rasa*—a blank slate: no knowledge is innate, and all knowledge (including all knowledge of concepts and reasoning) is acquired via the senses. Empiricism is opposed to rationalism, which argues that all human reason (and hence, human conceptual structure) is innate. If you accept this empiricist–rationalist dichotomy, here's what follows: if you believe that any concepts or any forms of human reason can be learned, you must be an empiricist, and if you believe that basic forms of abstract reason are the result of a learning process, then you must be what Rakova calls an "extreme empiricist".

Modern neuroscience has thrown out the innate–learned, nature–nurture, and rationalist–empiricist dichotomies. There is no way to sort out exactly what is "inborn" from what is learned. The recent revelation that babies learn part of their mothers' intonational system in the womb brings into question the innate–learned dichotomy: it's learned, but you are born with it. The dichotomy is also challenged by the discovery that our visual systems are tuned in the womb via neural patterns activated

across the retina. Neural “learning” is taking place, with input from the perceptual organs, but with no perception of anything external—and well before birth.

We have pointed out since *Metaphors We Live By* that the empirical findings we were reporting on do not fit either rationalism or empiricism, and we proposed a third alternative that did not require the dichotomy. We called it *experientialism* and later described it in *Philosophy in the Flesh* as an *embodied realism*. We pointed out there that the evidence favored the existence of *both* built-in and learned cognitive mechanisms. The built-in ones include, from Regier’s work (1996), topographic maps of the visual field, center-surround receptive fields, orientation-sensitive cell assemblies, filling-in neural architectures within topographic maps, and others as well. From Narayanan’s work (1997), there are controller X-schemas, used both in complex motor-control and perception, as well as in abstract aspectual reasoning (that is, reasoning about the structure of events).

Rakova incorrectly attributes to us the claim that image schemas are entirely learned from experience. We follow Regier (1996) in accepting the foregoing apparently inborn aspects of image schemas. We also agree with Regier’s neural version of Talmy’s (1985) theory that complex image schemas are learned and that they are composites of universal, and possibly innate, primitives. Here, as always, we reject the rationalist–empiricist dichotomy in favor of the evidence indicating a third alternative that allows both inborn *and* learned aspects of our conceptual systems, as well as many that cannot clearly be called either inborn or learned.

We have so consistently argued this position in virtually all of our books over two decades that it is hard to imagine how Rakova could have interpreted us as “extreme empiricists”. We have given extensive evidence for the experientialist view that experience is the result of embodied sensorimotor and cognitive structures that generate meaning in and through our ongoing interactions with our changing environments. Experience is always an *interactive* process, involving neural and physiological constraints from the organism as well as characteristic affordances from the environment and other people for creatures with our types of bodies and brains. This idea of embodied organism–environment interaction is a theme that we have repeated so many times in our writings that it is surprising to find it denied or ignored in Rakova’s account. Meaning comes, not just from “internal” structures of the organism (the “subject”), nor solely from “external” inputs (the “objects”), but rather from recurring patterns of engagement between organism and environment. This led us, as early as *Metaphors We Live By*, to speak of “interactional properties” (Lakoff and Johnson 1980: 119–125, 177).

The framework which Rakova seems to presuppose (though she never names it) leads her to espouse a radically different conception of image schemas from the one we have consistently argued for over the past fifteen years. She approvingly cites Pinker's idea that a schema's originating connections to sensorimotor activities could be severed, so that the embodiment of the schema would be "bleached out" (p. 217). Our view, in sharp contrast, has always been that image schemas are meaningful, and can play the role in abstract cognition that they do, precisely because of their ongoing connection to sensorimotor experience. On Regier's (1996) account, image schemas are computed (at least in part) by structures in the visual system (topographic maps, orientation-sensitive cell assemblies, and so on). Since image schemas are computed via structures *in* the sensorimotor system, they cannot be "severed" and still do the same computational work. They certainly take input from parts of the brain in imagination (as in mental imagery experiments) and in dreams, but their essential function—fitting what we see, imagine, and dream about in our visual system to our language—cannot be done without those computations in the sensorimotor system. Recall that visual imagination and dreaming make use of the visual cortex used in seeing. There is no severing, separation from, or bleaching out of the bodily dimensions of meaning. Mind is embodied, meaning is embodied, and thought is embodied in this most profound sense. This is the substance of an *embodied* realism.

Embodied realism, as we understand it, is the view that the locus of experience, meaning, and thought is the ongoing series of embodied organism–environment interactions that constitute our understanding of the world. According to such a view, there is no ultimate separation of mind and body, and we are always "in touch" with our world through our embodied acts and experiences. As we said in *Philosophy in the Flesh*,

[a]t the heart of embodied realism is our physical engagement with an environment in an ongoing series of interactions. There is a level of physical interaction in the world at which we have evolved to function very successfully, and an important part of our conceptual system is attuned to such functioning. (Lakoff and Johnson 1999: 90)

Embodied realism is not a philosophical doctrine tacked onto our theory of conceptual metaphor. It is the best account of the grounding of meaning that makes sense of the broadest range of converging empirical evidence that is available from the cognitive sciences.

It is therefore disconcerting to see Rakova claim that "experientialism is a theory of representation" (p. 219). As we said in *Philosophy in the Flesh*, the only workable theory of representations is one in which

a representation is a flexible pattern of organism–environment interactions, and *not* some inner mental entity that somehow gets hooked up with parts of the external world by a strange relation called “reference”. We reject such classical notions of representation, along with the views of meaning and reference that are built on them. *Representation* is a term that we try carefully to avoid, since it calls up an idealized cognitive model of mind with disembodied internal idea-objects that can somehow correspond to states of affairs in the external world. According to our experientialist view, neither image schemas nor any other aspect of conceptual structure are “representations” in this sense. An image schema is a neural structure residing in the sensorimotor system that allows us to make sense of what we experience.

It should also be clear from this account of embodied realism that our view in no way rests on what Rakova calls an “agentive perception” (p. 221) of an image schema. Saying that infants begin to learn about the meaning of balance, containment, forces, and paths from their burgeoning experience *does not entail* either that we learn these things consciously or that we must in all cases initiate actions in order to acquire and extend these schemas, even though action is very important to perception generally.

Rakova’s rejection of embodied realism appears to result from her failure to consider the full range of converging empirical evidence that is available on this issue. She accuses us of employing “artificial” neural models as “the only kind of evidence they use, and is not supported by data from realistic brain studies” (p. 223). Interestingly, Rohrer (2001) has presented evidence from ongoing fMRI and ERP experiments at UCSD (done jointly with M. Sereno and M. Kutas) indicating that the part of the motor cortex connected to the hands is active not just in hand experience, but also in literal sentences about the hands—and in metaphorical sentences that use hands as a source domain! This is exactly the kind of “realistic brain study” Rakova is asking for—and the results so far support an embodied theory of meaning.

Interestingly, she makes no reference of her own to any relevant brain studies. We, and many other metaphor researchers, have spent over two decades laying out at least nine types of empirical evidence for a view of embodied meaning, as is discussed at length in *Philosophy in the Flesh*. This evidence includes polysemy generalizations, inference generalizations, extensions to novel metaphor, spontaneous gesture studies, historical semantic change studies, psychological experiments, sign language analyses, and discourse analyses. Some of this evidence argues for the central role of imaginative structures like conceptual metaphor, but it also includes evidence for body-based meaning. Some of this evidence comes from linguistics, some from literary studies, some

from experimental psychology, some from developmental psychology, and some from natural language processing. None of this empirical research is discussed or even mentioned by Rakova. There is no serious discussion of the mountains of evidence—especially that coming from experimental psychology. There is no discussion of Gibbs' (1994) survey book, and none of such dramatic recent experiments by Boroditsky and her co-workers (2000) indicating that the analysis of time metaphors that we gave in *Metaphors We Live By* and *Philosophy in the Flesh* is essentially correct.

Rakova's other major criticism of embodied realism is that it leads to an internal contradiction in our theory between claims that sound reductionist (and foundationalist) and those that sound radically relativist. The view which we believe we have consistently presented over the years, and which is most carefully elaborated in *Philosophy in the Flesh*, is that, although aspects of our shared embodiment coupled with the commonalities of our shared environments will give rise to shared image schemas and many shared conceptual metaphors, there is room within these general constraints for extensive cultural variation in the ways the meaning it extended and elaborated. For example, it is hard to imagine any creature with a body similar to ours, located within a gravitational field like the one we inhabit, that would not have some form of verticality schema, some form of balance schema, and some shared schemas of forceful interaction. However, there is great variability in the ways a notion of vertical orientation can be interpreted and the valuation that can be placed upon it. In our various books and articles we have cited cross-linguistic evidence of this variability in conceptual systems, *even though those systems make use of what appear to be universal image schemas and conceptual metaphors*.

Rakova claims that "relativism in the strong sense of the word means that cultural presuppositions can bear on biologically fixed parameters to a qualitatively significant extent" (p. 228). Without a serious discussion of what counts as "biologically fixed parameters" and "a qualitatively significant extent," we cannot make sense of what she means. "Relativism" has many senses, and our response to most of them are given in great detail in Lakoff's *Women, Fire, and Dangerous Things* (1987: chapter 18). The way that "relativism in the strong sense of the word" is usually taken involves two claims:

- (1) There are no conceptual universals.
- (2) There are many concepts that differ considerably across languages and that have changed over time.

We disagree strongly with (1), citing universal embodied concepts such as primitive image schemas, the aspectual motor control schemas of

Narayanan (1997), the primary metaphors of Grady (1997), as well as the more traditional work on central color concepts (Lakoff 1987). That takes us out of the strong relativist camp—indeed, we constantly encounter attacks on our work by relativists who take us as rationalists for these empirically based positions. On the other hand, we agree with (2)—for “many” concepts, but by no means all, or even nearly all. Rationalists take us to be relativists for adopting this empirically based position. In truth, we are neither classic relativists nor classic anti-relativists. We just go where the empirical evidence leads us—away from both classical positions!

We hold a third position—embodied realism—because the empirical evidence seems to require it: there is extensive cross-cultural variation in conceptual systems that has been studied in detail, but there are also a great many conceptual universals. It is simply false that such semantic variation is incompatible with our claims about shared, body-based structures of meaning. English, Chinese, and Mixtec all use body-part concepts, both to understand spatial relations and as a basis for metaphorical structuring of abstract concepts. They use body-part concepts because of the crucial role of sensorimotor structures in our very ability to experience meaning. These preconceptual dimensions of meaning are shared by creatures with bodies similar to ours, who inhabit and interact with similarly structured environments. But the fact that every human creature will have preconceptual experiences of bodily balance and of forces is perfectly compatible with the fact that these image-schematic structures can be elaborated conceptually in a wide variety of ways. For example, both English and Chinese have lexical items for the mouth, lips, and tongue, and they both have metaphors based on those bodily structures. However, Chinese has a far more detailed and extensively developed system of metaphors using mouth, lips, and tongue than English does. English and Mixtec have body-part terms that are the basis for metaphorical structurings of abstract concepts, but, as Brugman (1985) showed, Mixtec has some elaborately detailed concepts (and corresponding lexical items) for body-part relations that are used in spatial relations concepts that do not exist in English.

Such cross-linguistic and cross-cultural variation doesn't make *primitive* image schemas any less universal, or any less body-based. Indeed, it is the fact of shared bodily structures that even makes it possible for us to understand different cultures, their conceptual systems, and their symbolic expressions. An adequate theory needs to explain just as much semantic universality and just as much cultural variation as one finds in the symbolic expressions of different cultures. So, when Rakova complains that “instead of resolving the reductionism–relativism puzzle, Lakoff and Johnson (1999) make it look even more problematic” (p. 230), we respond

that what she takes to be “the reductionism–relativism puzzle” is a phantasm of her philosophical preconceptions. The facts are more complex than her a priori philosophical assumptions allow for. Issues about what is universal and what is culturally variable *are complex*—more complex than can be accounted for with the simple-minded dichotomy. There can be no substitute for specific analyses and explanations for each language and conceptual system one encounters. Questions about universal versus culturally variable aspects of syntax and semantics are questions for empirical study that cannot be answered generically by grand claims and overly simple dichotomies. Consequently, contrary to what Rakova claims, there is no fundamental contradiction in our theory between our claims about preconceptual, body-based meaning and image schemas, on the one hand, and conceptual variation, on the other.

In general, what Rakova cannot abide in our theory is the embodiment of meaning. Thus, when she next proceeds to criticize our theory of the way abstract ideas are conceptualized via metaphors grounded in bodily experience, she denies the necessity of bodily grounding. Rakova appears to prefer some form of either an abstractionist or homonymy position, according to which there is no source-to-target directionality to metaphorical understanding of spatial terms. For example, she claims that “there is nothing in cases like *leave out*, *pick out*, *take out*, etc., themselves to show their physical origin” (p. 232). Of course, there is nothing in the expressions themselves that shows their physical origins! That is why we have claimed in everything we have written on metaphor for the past twenty years that the metaphors are *conceptual*, not *linguistic*. One can only see that the spatial senses of the term are the basis for their metaphorical extensions by examining the particular conceptual mapping that defines the metaphor. Only then does it become clear how the nine types of evidence presented in the literature so far show that we are conceptualizing and reasoning about abstract concepts on the basis of embodied meaning from the spatial and corporeal source domains. Again, this is a question of marshalling converging empirical evidence from multiple sources and then using the conceptual mapping as the generalization that explains the phenomena and evidence. In chapter 18 of *Metaphors We Live By* we gave a detailed critique of the abstractionist and homonymy accounts of polysemous terms. In *Women, Fire, and Dangerous Things* (1987), *The Body in the Mind* (1987), and *Philosophy in the Flesh* (1999), we attempted to set out the types of evidence for the embodied conception of conceptual metaphor that we believe best explains the evidence about language, conceptualization, and reasoning. Our experientialist alternative is one according to which we first acquire the bodily and spatial understanding of concepts and later understand their

metaphorical extensions in abstract concepts. Christopher Johnson's (1997) research on primary metaphor acquisition provides developmental evidence for how this works, together with Grady's theory of primary metaphor (1997) and Narayanan's neural theory of metaphor (1997).

Incidentally, Rakova presents an "argument" that she claims contradicts Johnson's research. The argument is based on an empirical claim, namely, that Finnish does not have any version at all of the KNOWING IS SEEING metaphor, which is a subcase of the THINKING IS PERCEIVING metaphor, in the MIND-AS-BODY system. Here is the mapping as it occurs in *Philosophy in the Flesh*.

(3) The THINKING IS PERCEIVING submapping of the MIND AS BODY metaphor:

- THE MIND IS A BODY
- THINKING IS PERCEIVING
- IDEAS ARE THINGS PERCEIVED
- KNOWING IS SEEING
- COMMUNICATING IS SHOWING
- ATTEMPTING TO GAIN KNOWLEDGE IS SEARCHING
- BECOMING AWARE IS NOTICING
- AN AID TO KNOWING IS A LIGHT SOURCE
- BEING ABLE TO KNOW IS BEING ABLE TO SEE
- BEING IGNORANT IS BEING UNABLE TO SEE
- IMPEDIMENTS TO KNOWLEDGE ARE IMPEDIMENTS TO VISION
- DECEPTION IS PURPOSEFULLY IMPEDING VISION
- KNOWING FROM A "PERSPECTIVE" IS SEEING FROM A POINT OF VIEW
- EXPLAINING IN DETAIL IS DRAWING A PICTURE
- DIRECTING ATTENTION IS POINTING
- PAYING ATTENTION IS LOOKING AT
- BEING RECEPTIVE IS HEARING
- TAKING SERIOUSLY IS LISTENING
- SENSING IS SMELLING
- EMOTIONAL REACTION IS FEELING
- PERSONAL PREFERENCE IS TASTE

This is an extraordinarily common metaphor in English, as well as languages throughout the world. Not every language will have instances of every submapping, but the general form is so commonplace that it is rarely even noticed. Here are some English examples.

When one says "I *see* what you're saying", he or she is expressing successful communication. A *cover-up* is an attempt to *hide* something, to keep people from knowing about it. To deceive someone is to *pull the wool over their eyes*, *put up a smokescreen*, or *cloud the issue*. *Clear* writing is writing

that allows the reader to know what is being communicated; *unclear* or *murky* writing makes it harder for the reader to know what is being said.

An attempt to gain knowledge of something is conceptualized as *looking* or *searching* for it, and gaining knowledge is conceptualized as *discovering* or *finding*. Someone who is ignorant is *in the dark*, while someone who is incapable of knowing is *blind*. To enable people to know something is to *shed light* on the matter. Something that enables you to know something is *enlightening*, it is something *that enables you to see*. New facts that have *come to light* are facts that have become known (to those who are looking).

When we speak of someone who *has blinders on*, who can only *see what's in front of his nose*, we mean someone whose focus of attention narrows the range of what he can think about and makes it impossible for him to see certain things. When we speak of *pointing something out* so that you can *see* it, we mean we are directing your attention to something so that you can have knowledge of it. If someone says to you “Do I have to *draw you a picture?*”, they are asking if they have to explain something in detail. If I understand, then I “get the picture”.

The notion of a perspective, angle, viewpoint, or standpoint derives from this metaphor. When you are looking at a scene, you have to be looking at it from some location. From a given location, you can only see certain things. If you are far away, small details may be invisible. Some things may be hidden from your view. The implication is that you can know a scene better by taking many viewpoints. Metaphorically, someone who has only one perspective on the world may be ignorant of things that are hidden from that perspective. Closeness matters as well. To know something, you need to be close enough to see the details, but not so close that you can't make out the overall shape of things. You don't want to be someone who *can't see the forest for the trees*.

To claim that Finnish has NO KNOWING IS SEEING metaphor is to claim that Finnish has nothing at all like the English equivalents of *any* of the foregoing expressions in italics—neither exact equivalents nor peculiarly Finnish versions of the general mapping. The claim is false, as an internet inquiry soon established. Antti Mattila sent along his dissertation title as an example: “Seeing things in a new light: Reframing in therapeutic conversation”. Iina Hellsten, a researcher at the University of Amsterdam, adds a few more examples:

- | | | |
|--------|---------------------------|--------------------------------|
| (4) a. | <i>Peitellä asioita</i> | ‘cover up things’ |
| b. | <i>Valaista asiaa</i> | ‘shed light on the matter’ |
| c. | <i>Osoittaa jotain</i> | ‘point something out’ |
| d. | <i>Nähdä metsä puilta</i> | ‘see the forest for the trees’ |
| e. | <i>Näkökulma</i> | ‘point of view’ |

In addition, Hellsten observes, Finnish has several very conventionalized phrases based on the KNOWING IS SEEING metaphor that are commonly used in spoken language. Where English speakers would say *you know*, Finnish speakers say *nääs* or *näätsä* depending on the dialect they are using. Both are based on *Näetkö sinä?* ‘Do you see?’

Hellsten goes on to point out a surface syntactic restriction: the Finnish verb corresponding to English *see*, though used metaphorically to mean ‘know’, has a lexical restriction against taking complement *wh*-clauses. Thus, there is no Finnish equivalent of English *I see what you mean*. This lexical constraint on syntax is, of course, irrelevant to the question of the presence of the general form of KNOWING IS SEEING in Finnish, which as we have just seen, does occur, contrary to Rakova’s claim.

Rakova appears to adopt an abstractionist view when she claims that “it is a more economical and evolutionarily advanced state if in–out orientation has a higher generality, if there is no need for every new born to acquire the connection between the physical and the non-physical, and if ontogenesis does not have to repeat phylogenesis” (p. 233). Our reply to the claim about evolution and economy is that, on the contrary, it is precisely the fact that human infants learn the meaning of things first through their bodily interactions, which they can then extend in abstract ways, that makes the experientialist view evolutionarily economical, insofar as sensorimotor structures can provide the basis for abstract reason. Moreover, our view is more compatible with facts about the evolutionary development of the human brain and the ways in which cortical areas responsible for “higher” cognitive operations have re-entrant connections to “lower” sensorimotor areas (Edelmann 1992; Damasio 1994). In other words, the brain is constructed so that earlier evolutionary developments are made use of by later evolutionary forms of life. The brain adds structure, making use of earlier structure.

Rakova’s abstractionism shows up, as one would expect, in her view of logical relations which she thinks cannot be grounded in sensorimotor experience. As she says, “logic as a constraint on knowledge ... can only be the essence of the image schemas themselves, not an ad hoc hypothesis derived from them” (p. 235). Her view is that “there are no inferences ... made about the physical” (p. 235), so there can be no logic of the physical source domain to structure some abstract conceptual domain.

She is right that we are claiming just the opposite; namely, that the corporeal or spatial logic, arising from bodily experience, is exactly what provides the basis for the logic of abstract thought. This is, of course, an explanatory hypothesis to be pursued by detailed analyses of the metaphorical basis of various kinds of abstract reasoning. Two major studies have been done. Narayanan (1997) shows, via the construction

of explicit computational neural models, that the same neural circuitry capable of motor control is also capable of abstract inferences. For a short review, see the discussion in *Philosophy in the Flesh*, chapter 3 and appendix.

The second thorough treatment of this to date is Lakoff and Núñez, *Where Mathematics Comes From* (2000), which examines the metaphorical foundations of set theory, logic, and other forms of higher mathematics. Again, this is not a matter for armchair theorizing, but rather a matter requiring detailed analysis and explanation of the conceptual foundations of various types of abstract thought and inferences.

Rakova's critique ends with serious misrepresentation of our view of science. In a nutshell, she denies the constitutive role of conceptual metaphor in scientific theory, claiming that such a view would allow no way of identifying misleading or erroneous scientific reasoning. While Rakova's denial of the critical role of metaphor in science is completely consistent with her denial of the constitutive character of conceptual metaphor in human thought generally, it is at odds with a growing number of studies showing how metaphors have guided scientific research, not just as imaginative aids, but as constitutive of the key concepts. From the early work of Max Black (1962) and Mary Hesse (1966) up to the present proliferation of recent studies (e.g., Nersessian (1987); Varela et al. (1991); Fernandez-Duque and Johnson 1999), there has been an ever-expanding body of research on the metaphorical foundations of various sciences. However, none of these studies of the constitutive role of metaphor in science in any way entails that metaphors cannot sometimes be misleading. Whether metaphors are more or less apt, more or less fruitful, will depend on a host of considerations, such as explanatory fecundity, experimental adaptability, entailments for observable phenomena, and evidential support. Rakova's claim that "it is hard to see how scientific realism can be compatible with the profoundly metaphoric nature of concepts restricted to body-derived meaningful structures" (p. 237) is simply an expression of the challenge we tried to take up in chapters 6, 7, and 8 of *Philosophy in the Flesh*. Our answer, as one might expect, is *embodied realism*:

What fills out embodied realism, permitting us to move far beyond mere observation and manipulation, are several crucial findings about our embodied concepts and imaginative capacities. The first important finding is that there are perceptual and motor "inferences" and that there is a neurally instantiated logic of perception and motor movements. The second crucial finding is the existence of conceptual metaphor, which allows us to conceptualize one domain of experience in terms of another, preserving in the target domain the inferential structure of the source domain. Mathematics allows us to model metaphorical theories and to calculate precisely inferences about literal basic-level categories. Such inferences

can then be projected onto scientific subject matters to give explanatory accounts for existing data and to make predictions. What permits this is that metaphoric theories can have literal, basic-level entailments. (1999: 91)

So, while the metaphors can play a constituting role in defining the central concepts of a theory and the forms of reasoning appropriate to that theory, inapt metaphors can be at odds with empirical evidence and basic-level observations. There is thus no fundamental incompatibility between embodied scientific realism and the fact that some metaphoric models in science are better or worse than others.

When we first received Rakova's paper to comment on, we were hoping that it would provide some substantive critiques, or some new data, to get us thinking beyond what the existing literature provides. Unfortunately, there is nothing substantive in Rakova's paper that we could find. It is simply a collection of misreadings with no serious discussion of evidence and no engagement at all with our actual positions on the issues. The question however arises as to why someone so obviously accomplished—a graduate of the University of Edinburgh and a faculty member in St. Petersburg—would write such a long paper based wholly on misreadings. The misreadings arise from her very accomplishments. Because she has successfully mastered and incorporated the Western philosophical tradition and made it part of her mode of thought, she naturally and systematically misreads our work—and will similarly misread a large body of the research in cognitive linguistics.

She is seeing our work through idealized cognitive models of the mind and language—including metaphors—derived from traditional forms of philosophy of the sort we discussed in *Philosophy in the Flesh*. In her essay we can spot a great deal of Anglo-American analytic philosophy (of the sort taught at Edinburgh where she was a student) as well as some flashes of Plato, Aristotle, Descartes, and Kant. Among the traditional philosophical positions she seems to be taking for granted are

- the dichotomy of rationalism versus empiricism;
- the dichotomy of relativism versus reductionism;
- the correspondence theory of truth;
- the objectivist view of reality;
- the literalist theory of meaning;
- the view of reason as transcendent;
- the representational theory of mind;
- the view of concepts as conscious;
- the view of metaphor as linguistic (not conceptual);
- the view of concepts as disembodied;
- the independence of philosophy from empirical science.

These traditional philosophical views are presupposed in her argumentation throughout her paper. But these very views, as we discussed at length in *Women, Fire, and Dangerous Things* and *Philosophy in the Flesh* are contradicted by the empirical evidence surveyed in those works. One of our chief motives for writing *Philosophy in the Flesh* was to point this out. But Rakova nowhere discusses this central point of our book—our analysis of the metaphorical foundations of Western philosophy, especially Anglo-American analytic philosophy (see chapters 12 and 21).

Rakova's philosophical assumptions are so implicit in the fabric of her argument that many readers may well fail to see just where the assumptions are. Here are a couple of examples:

- (5) "It is hard to see how the ideas of negation or noncontradiction could have developed from experience if they are the concepts that operate here—to know that one has traversed a boundary between two areas presupposes that one already knows that one is no longer in the first area" (p. 235).

We were talking about cases, say, where an infant experiences crawling into a box or being put into a crib, and we were describing the stage in early childhood when children systematically explore containers around them, and in the process learn—unconsciously and automatically—the experiential logic of containment.

Rakova's implicit argument is that "knowing that one is no longer in the first area" presupposes logical negation, as in the word *no* in *no longer*. But her argument portrays this "knowledge" from the perspective of a conscious adult imposing a formal logical analysis on the experience of an infant, not from the perspective of the infant herself. The infant, crawling around, can be using a neurally embodied container schema (see Regier 1996), which imposes an unconscious, implicit, neurally embodied "logic" of containers—without any prior conscious logical concept of negation.

Rakova's argument assumes transcendent reason with an a priori logical structure of the kind used in formal logic: the concept of negation, like other logical concepts, is transcendent and hence, always present, structuring knowledge. Moreover, she assumes that such knowledge must be conscious knowledge.

The account of embodied experience leading to embodied concepts is a direct challenge to the transcendent disembodied view of logic that she is assuming. Our job, as cognitive scientists, is to explain how the conceptual structures discovered in cognitive semantics (like the container schema) could arise for all human beings. Assuming an a priori transcendent logic doesn't help.

Here is another case:

- (6) “Similarly Lakoff (1993) insists that metaphors are not propositional, and metaphoric mappings are not propositions either, but ‘ontological correspondences’ (p. 207; however this cannot be squared with the view that metaphors can be misleading – see previous section)” (p. 236).

In context, Lakoff was speaking of conceptual ontology—the conceptual entities in conceptual systems—not entities in the world. Our claim was that conceptual metaphors map a source domain ontology with its inferences onto a target domain ontology—often creating new conceptual entities and forms of reason in the process. For example, infinity as an entity, as Lakoff and Núñez (2000: chapter 8) demonstrate, is created via the basic metaphor of INFINITY. Infinity is a conceptual entity, not an external object in the world, and it is absolutely required in virtually all modern mathematics.

But in traditional philosophy, the only real “ontology” consists of mind-independent real objects in the world. If you mistakenly think we are talking about this “ontology”, then our claims indeed become senseless: how could a metaphor create a physical entity in the world? And if you accept the ridiculous idea that it could, then a metaphor could not be false or misleading, since the entities it creates are always really there. This is Rakova’s argument, and she follows it out to its “logical” conclusion that we must be contradicting ourselves when we claim both that metaphors are “ontological correspondences” and can nonetheless be misleading.

Once again we have an example of how traditional philosophical assumptions—in this case about metaphysics—make it impossible to give any accurate and intelligible reading of our claims, since our empirical research is calling those very assumptions into question.

A full and careful response to everything in Rakova’s paper would require detailed analysis of this sort, revealing her underlying assumptions and pointing out how they necessarily lead to systematic misreadings of our work. It would obviously take far too many pages to give such a thorough response to Rakova’s paper, and there is no point in doing so, beyond the attempt we have made here to characterize the source of her misreadings. *Philosophy in the Flesh* is our most recent extended attempt to analyze philosophical assumptions like these and to assess them in the light of relevant evidence from the cognitive sciences.

Rakova’s paper is testimony to the correctness of our central claim in *Philosophy in the Flesh* that there is a profound incompatibility between the results of the empirical study of the embodied mind, metaphorical thought, and other aspects of cognitive semantics on the one hand, and

traditional philosophy on the other. If, like Rakova, you read the work of our discipline through philosophical lenses that build in the above biases, then our work will look contradictory—because it will in fact contradict the implicit assumptions you are using in your arguments.

If Rakova's claims are based on philosophical assumptions of the sort listed, then it should come as no surprise that she ignores the evidence that fills the pages of our discipline to overflowing. From her perspective, her philosophical assumptions take precedence over all empirical evidence. They are taken as true a priori, and never argued for on an empirical basis. One critical moral to be learned from this is that cognitive linguistics must be grounded in empirical studies of mind, thought, and language. It cannot provide an adequate theory of these important matters merely on the basis of a priori philosophical assumptions about the mind. There can be considerable debate about how to interpret empirical studies, but the debates must cite converging evidence, not armchair philosophical assumptions.

Another important lesson to be learned from Rakova's paper is that we must always look very carefully at the assumptions and argument forms built into traditional philosophy, cognitive science, and linguistics. Cognitive scientists in general and cognitive linguists in particular need to recognize where philosophical assumptions are at odds with empirical research—sentence by sentence, paragraph by paragraph by paragraph—partly to avoid them and partly to *enjoy* them, because the philosophical assumptions, in themselves, provide such a wonderful form of evidence for cognitive linguistics.

A final important lesson to be learned is that such philosophical assumptions are not just made by other people. Such assumptions have been built into our philosophical, scientific, and linguistic educations. Becoming a cognitive linguist requires recognizing such philosophical artifacts in oneself and it requires a willingness and ability to subject them to empirical scrutiny.

Many cognitive linguists would prefer to ignore philosophical issues and just get on with their work. But you cannot ignore them. They will keep popping up in paper after paper, like Rakova's, as well as in one's own thought processes. One of the reasons we wrote *Philosophy in the Flesh* is to give cognitive linguists a tool for mastering such issues. Lakoff and Núñez had a similar motivation for writing *Where Mathematics Comes From*. The view that mathematics is objective and just part of the furniture of the universe is the ultimate imposition of a false philosophy—one that has stood in the way of doing linguistics and cognitive science. One of the wonderful things about cognitive linguistics is that it allows you to see traditional philosophy and mathematics as they are: two more products

of our system of conceptual metaphors. It is an important mode of intellectual liberation.

Another wonderful thing about cognitive linguistics is that it leads to an empirically responsible philosophy—embodied realism. It is a philosophical perspective that addresses legitimate philosophical concerns about the nature of truth, meaning, understanding, mind, concepts, reason, causation, events, time, and even morality. It is not something “added” to cognitive linguistics. It arises from the most fundamental of its empirical results.

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