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Information Networks in Premodern Hierarchical World-Systems

A Thesis submitted in partial satisfaction
of the requirements for the degree of

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in

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by

Teresa Neal

March 2019

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ABSTRACT OF THE THESIS

Information Networks in Premodern Hierarchical World-Systems

by

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Master of Arts, Graduate Program in Sociology
University of California, Riverside, March 2019
Dr. Christopher Chase-Dunn, Chairperson

This paper is a historical sociological exploration into the viability of using world-systems theory to examine premodern societies. Looking at world-system theory from the anthropological aspect of interactive networks, I argue that the most important and controversial network is the information network, although political/economic methods of studying world-systems persist among researchers of world-systems. The model for the premodern world-system is different enough from the modern model that the question arises if world-systems is even a viable framework for studying the premodern period. The main contribution I make in this paper is the discussion of four "facts" ala Durkheim's "social facts" that when considered, inform us of the effectiveness of information flows throughout premodern world-systems, absent of modern speed of transportation and communications transmissions. Information flowed effectively through premodern world-systems via the steady and constant ability of people to navigate these systems by traditions of human resiliency and social cooperation that we still see in indigenous populations today. The human element in the study of world-systems is the

key to understanding premodern world-systems. A failed information network meant failed systemness, but it did not necessarily mean the failure of social organization. That continued through traditions of human resiliency. Putting the human face on the world-system may be the way to save this theory as a viable tool for the study of society.

INTRODUCTION

World-systems analysis provides a theoretical basis for the study of large units of analysis in world history and social evolution. World-systems analysis is a method by which societies may be analyzed as historically systemic “engines” of production, accumulation, and power. World-systems have been studied as hierarchical and non-hierarchical constructs.¹ The theoretical analysis of hierarchical world-systems is a study of systemically ordered socio-economic units of analysis varying in size and purpose, e.g., from multi-cultural and multi-national economic complexes to homophilic kin-groups. This paper will discuss premodern hierarchical world-systems. A hierarchical world-system is made up of a dominant core exerting influence and hegemonic power over peripheral and semi-peripheral entities as they engage in unequal balances of power between and among the power core and its near and distal tributaries (Wallerstein 1974, 2000, 2004). Key networks of intersocietal activity within hierarchical world-systems, i.e., networks of trade, warfare, governance, and communications, regularize and systematize a hierarchical world-system, thus perpetuating its activities and reinforcing the domination of the core over the entire system (Chase-Dunn and Hall 1991, 1997; Hall

¹ Christopher Chase-Dunn and Kelly M. Mann argue in *The Wintu & Their Neighbors: A Very Small World-System* (1998) that world-systems have existed among stateless societies and can be non-hierarchical. However, Kent Flannery and Joyce Marcus point out in *The Creation of Inequality: How Our Prehistoric Ancestors Set the Stage for Monarchy, Slavery, and Empire* (2012) that even among egalitarian hunter-gatherers, gender inequality often existed where women were not trusted members of the group (2012:558). Social inequality in any form implies a hierarchical structure. Flannery and Marcus also state that, although hunter-gatherers usually tried to maintain social equality, by 2500 B.C.E, every form of social inequality to ever emerge had done so in central locations - less so in remote communities (2012:x). Since this paper talks about intersocietal networks known as information networks that operate optimally in central locations, i.e., populated areas and improve performance when in contact with nodes of informed people, the premodern world-systems which these networks systematize are characterized as engaging in unequal, hierarchical social norms.

and Chase-Dunn 1993). A balance of political and economic power carried out through the intersocietal networks is thought to sustain premodern hierarchical world-systems (Chase-Dunn and Hall 1997). The most important of the intersocietal networks for sustaining the systemness of a premodern world-system and defining its boundaries is the Information Network (IN). In this paper, I discuss the importance of formal and informal information content transmitted along information networks, and how premodern information networks maintain the viability of a world-system by maintaining the regulation of its intersocietal networks. The main contribution I hope to make in this paper is the discussion of four specific and ever-present factors (I call them "facts" in deference to Durkheim's "social facts") that when considered, inform us of the flow of information throughout premodern hierarchical world-systems, arriving at how fall-off of the information network bounds a world-system.

Premodern hierarchical world-systems operated somewhat differently than the modern world-system of today (1500 to the present). Premodern hierarchical world-systems tended to be "world-empires" according to Wallerstein (1974) rather than "world-economies," primarily because empires (which declined and eventually ceased in all but name only in the modern era) were self-sustaining under the autocratic structure of a single ruling power. Wallerstein felt less inclined to accept the existence of "world-economies" in the premodern era because world-economies are self-sustaining systems of social organization and power without being governed by a single ruling entity or single state (1974). Wallerstein admitted to there being world-economies before 1500, but that they were either subsumed into empires or failed (Wallerstein 1974, Frank and Gills

1993). An important aspect of the modern world-system as compared to the premodern world-system is thought to be more effective transactionality through advanced transportation technologies and speed-of-light communications. This allows for rapid execution of the imperatives of the core entity resulting in global coercive social ordering, effective deployment of military power, instantaneous communications between the core and its semi-peripheral buffer zones, and nearly unlimited extraction of resources far away from the shorelines of core entities, often deep within the continental interiors of underdeveloped peripheries. An assumption of inferiority of premodern systemic structures based on ranking higher technologies above lower technologies is an error of modern scholarship (Adas 1989) that this paper attempts to address.

The premodern era (before c. 1500) is too vast to be dealt with in this work comprehensively. However, there are factors and processes common to the long period before the modern era that can be used to teach us about premodern world-systems, especially concerning dealing with the way human societies created knowledge and transmitted what they knew as it pertained to living within a hierarchical world-system. Information networks in premodern hierarchical world-systems acted as conduits of formal and informal communications in service to the dominant world-system core. These communications convey messages of socio-economic obligation, most importantly, risks and rewards that go along with life in a hierarchical world-system. For this reason, I will not discuss here the simple communications of calls and signs (although sign language will appear later) or premodern line-of-sight techniques such as flags, signal fires, reflective beams of light, etc. For the more complex communications needed to

manage life in a world-system, premodern societies utilized complex oral traditions and eventually, in part, written scripts and documentation, beginning with petroglyphs, inscribed tablets, and stelae like those which posted the Law of Hammurabi. Writing was a relatively "modern" invention that facilitated and reinforced the hegemonic aspirations of the core elite in the most permanent of ways possible - "in stone." However, it can also be argued that the remarkable effectiveness of oral transmission and other forms of non-written documentation throughout the systemic information networks before modern mass communications instruct us regarding the reach of premodern world-systems through the information networks, in spite of the technological differences between the modern and premodern eras.

The premodern world-system existed in the three forms conceived of by Wallerstein, i.e., world-empires, world-economies, and mini-systems, but they tended to be world-empires, of which we are familiar - Rome, Persia, Egypt, Byzantium, the Aztec, etc. Hierarchy of the core, semi-periphery, and periphery of a world-empire is inextricably linked to, in fact constructed from, the social and political stratification of the imperial state. World-economies in premodern history existed, but were not held together by a single division of labor, something that is integral to Wallerstein's arguments for the more stable modern world-system. It could be argued that the Indian Ocean maritime polities coupled with the Central Asian Silk Roads territories of approximately the eighth- through twelfth centuries could be considered a world-economy (Beaujard 2005; Palat 2015; Abu-Lughod 1989; Chaudhuri 1985), however, further research needs to be done to explain this historical system in the framework of

world-systems theory. Although "mini-systems" were thought by Wallerstein to be too small to be true world-systems, Chase-Dunn has studied them as viable world-systems (Chase-Dunn and Hall 1974; Chase-Dunn and Mann 1998). For this paper, I accept all three types of world-systems as systemically sustained models of social organization, and focus on the relationship between the hierarchical iterations of such and their impact on ordinary people. Abu-Lughod pictured the premodern world well when she described it as "...an archipelago of 'world cities' elevated above a sea of relatively isolated rural areas and open stretches..." (1989:353). In every part of this spotty mix of sporadic development and intransigent traditional life, people lived in a variety of social orders, some of which were hierarchical hegemonies we can study as world-systems.

In what way was the information network dominated by the structure and control of the premodern hierarchical world-system? Transmission of content vital to social order and systemic activity of premodern hierarchical world-systems depended on mobilizing people to do the will of the core elite. This was done formally through social institutions (economics, politics, religion, education, etc.) and informally through family and community ties emphasizing both collaborative bonding and stratification (Turner and Maryanski 2008). Ordinary human communications imparted paradigms of well-being which by way of long-standing traditions could provide skills to cope with the obligations and risks inherent in hierarchical hegemonies. Human resiliency skills sometimes perfectly matched the demands of a core entity, as well as offering challenges to it. Often, "well-being" became imperceptibly intermingled with the top-down messaging of the hierarchical world-system. Historically, frustrated human aspirations and oppressive

inequality could also lead to a steady decline of quality of life - eventuating in "social death" (Patterson 1982). Human resiliency and obedience to the demands of the core depended on the flow of useful and accurate information between the power mechanisms of the premodern hierarchical world-system and its inhabitants. The accuracy and effectiveness of premodern information networks did not depend on the same rubrics of speed and mass dissemination as our modern information network does. However, it was effective.

There are assumptions about world-systems theory as put forward by Immanuel Wallerstein (1974, 2000, 2004), that are challenged by several ideas embedded in the purpose of this paper. First, world-systems analysis originated from the study of the "long sixteenth century" to the present, and even into the future (Wallerstein, Lemert, Rojas 2013). The arguments as to whether this theory can inform us regarding premodern societies is a debate nearly as old as the theory itself. Jane Schneider accepted world-systems but saw the need to adjust its modern logics to fit the realities of premodern trade activities and social order, particularly with the trade in prestige goods by which strong network ties could be made, thus establishing and maintaining systems of power and trade (1977). Janet Abu-Lughod pulled the world-system into a premodern period (1250-1350 C.E.), demonstrating that world-systems analysis could be used to study systems occurring earlier than the sixteenth century (1989). She found that the successful productivity of a premodern world-system (a world-economy, in fact) that stretched from Europe to China was impossible "unless the methods of mobilizing labor and organizing the work process were quite advanced" (1989: 8). However, Wallerstein argued that

premodern world-systems were weakened by overextension of a single government over a vast geographical area or by the premodern technological challenges to transportation and communication (Wallerstein 1974:348-349; Frank and Gills 1993). He did not see lasting systemness in tributary modes of accumulation, multiple divisions of labor, or in the slow pace of communications or transportation in the premodern world.

Secondly, the modern world-system emphasizes global capitalism, a blanket of whole cloth covering us all in the modern era which was only barely pieced together from incomplete scraps in the premodern era of history. Capitalism distinguishes the modern world-system from all others that came before because it was, in Wallerstein's words, "aggressive, expansive and efficacious..." causing the dramatic "caesura" of what came before (Frank and Gills 1993:295). However, capitalism is also blamed for the extreme gap in wealth and opportunity worldwide and a historic exploitative relationship between the superpower core and the underdeveloped peripheries, what Andre Gunder Frank called the "development of underdevelopment" (Frank 1967). These extremes were mitigated in the premodern era by virtue of the limitations of technology, transportation and communications, and this presents us with new rubrics for examining premodern world-systems (Beaujard 2005). For this reason, we are also justified in examining the direct effect of human resiliency often exhibited in successful navigation of the premodern world-system by its peripheral actors. The challenge is to find, and even accept, *systemness* in the very limitations that Wallerstein argued weakened the viability of premodern world-systems.

Finally, Wallerstein did not conceive of "intersocietal networks" as argued by Chase-Dunn and Hall and did not endorse the parsing of "separate economic acts and phenomena from social ones or the latter, in turn, from political dimensions and realities" (Wallerstein, Lemert, Rojas 2013:xxxiii). However, Chase-Dunn and Hall identified four discrete intersocietal networks which function in all world-systems as interconnected operations of economic, socio-cultural, and political dimensions (1997). The four networks are called: (1) the prestige goods network (PGN) which trades in precious resources and the items made from them; (2) the bulk goods network (BGN) dealing with the economics of bulk commodities; (3) the political/military network (PMN) which oversees central governance and territorial expansion; and (4) the information network (IN) which transmits communication throughout a world-system. From the study of the information network alone, which reinforces and maintains "regularized" interactions of intersocietal networks (or *systemness*), we can see that its reach often indicates the boundaries and fall-off of a world-system.

Understanding and accepting the existence of intersocietal networks in world-systems allows us to examine world-systems from various disciplinary approaches without limiting this research to political economy alone. Research in intersocietal networking is rooted in interactional studies in anthropology whereby society is understood through "extraregional"² intersocietal interaction (Schortman and Urban

² This word can indicate a very large unit of analysis. The pursuit of a study of human groups that transcends nationalism or the use of political units of analysis has been the dedicated goal of many sociologists, anthropologists, and historians since the mid-20th century. Ref. Fernand Braudel, Arnold Toynbee, Marshall G.S. Hodgson, William H. McNeill, Phillip Curtin, Immanuel Wallerstein, and Eric Wolf.

1992; Kohl 1987). Immanuel Wallerstein's world-systems theory is a kind of interactional study whereby the model unit of analysis is the modern world-system: an extraregional, poly-cultural entity that is systemically drawn together by a single mode of production (capitalism) perpetuated by an unequal core/periphery power relationship which is buffered by an intermediary semi-periphery. Some archaeologists and anthropologists have been able to incorporate this unit of analysis into their existing concepts of interactional studies (Algaze 2005; Friedman and Friedman 2008). Others, according to Schortman and Urban, have rejected world-systems as a framework because of a perception of Wallerstein's narrow consideration of premodern world-systems (1992:18). As a unit of analysis for the study of what historians John R. and William H. McNeill called "the human web" (McNeill and McNeill 2003), sociologists, world historians, and anthropologists can use world-systems analysis to frame an understanding of premodern social phenomena with some adjustments to world-systems theory, in particular, greater acknowledgement of human agency, especially because world-systems theory is well-suited to dealing with large units of analysis. I propose the analysis of data and evidence borrowed from compatible disciplines that study the social evolution of people navigating the demands of hierarchical premodern world-systems in the transmission of information through systemic intersocietal information networks. This includes archaeological evidence of population migration and material distribution, anthropological analysis of human networks, sociocultural spreads and drifts, religious history and the historical record in general, numismatics, linguistics, art history, and the history of human resiliency through people's traditional work, play, and community-

building. If these types of evidence lead to a fuller understanding of premodern information networks as efficient tools for maintaining the systemness of hierarchical world-systems, then we should be able to utilize these types of data to study all aspects of premodern world-systems from the hunter-gatherer period to the eve of the modern age when the first Portuguese ship sailed into the Indian Ocean.

PEOPLE AND LIFEWAYS IN WORLD-SYSTEMS

Premodern hierarchical world-systems controlled many things in society: wealth distribution and trade, dissemination of information about how to comply with the world-system, and political and military activity, including dominance in domestic and foreign affairs. It is vital to explore the agency of people subject to the control of premodern hierarchical world-systems. The people within a world-system's bounds (core, semiperiphery, and periphery) reproduced the messages transmitted by the core, but they also communicated to each other age-old methods of resiliency. People then as now had the ability to come to terms with hierarchical world-systems by developing ways to accept or push back on its coercive nature. Scientists who study human resiliency today often refer to this capacity to survive and thrive as "relational well-being," characterized by "self-efficacy and self-confidence, internal locus of control, and good problem-solving ability" (McCubbin et al. 1999:5). The life of a resilient human produced a certain amount of self-determination that allowed a person to overcome the stresses of natural or human-made barriers or catastrophes. Meeting the challenges of predation, whether from the natural environment or from a hierarchical world-system, built traditions and social norms around resiliency, many of which still exist today among indigenous peoples (Hall

and Fenelon 2009). These methods include building consensus and collectivity, valuing reciprocity, and positively interacting with the earth (2009:21) I have interpreted this human resiliency as being derived from ancient strategies that became the stuff of peoples' communications through myths, songs, prayers, lullabies, lessons, cautionary tales, etc., all of which could become part of the information network. Often these strategies became formalized into religions and then were incorporated into the fabric of a formal world-system (for example, by becoming a state religion). Latent strategies for well-being, as well as their codified religious nostrums, became part of the world-system's information network. Conversely, a premodern hierarchical world-system could transmit messages from the hegemonic core on the information network that could become part of the traditions and norms of ordinary people. Politicians became gods; edicts became scriptures. Eventually, village elders, temple priests, and government officials could all transmit a common message of social order to ordinary people living within the bounds of a hierarchical world-system via the world-system's information network.

Premodern hierarchical world-systems sought to control social order, social resistance, and even resiliency and well-being in order to coerce people into compliance with their demands. Ideally, premodern communities produced a balance between social cooperation and social conflict and competition (Blute 2010; Turchin 2009). Premodern world-systems had the ability to enjoin society into complying with its aims without crushing the resiliency of the people. Otherwise, oppressiveness and lack of collaborative methods could cause the collapse or failure of human resiliency. Wholesale conquest,

rape, scorched earth policies, slavery, or genocide, could collapse the world-system itself. Recent studies in cooperation have modeled the costliness of force or punishment, concluding that force rarely reproduces normalized reciprocity typically found in small homophilic societies and cannot sustain "network or 'generalized' reciprocity [in large ones]" (Blute 2010:106-7). Therefore, the tradition of community-building and sharing hardships together was more likely the norm than constant competition and conflict if systemness through networking was to be sustained in the hierarchical world-system.

Premodern hierarchical world-systems tended to arise in the cities, the highly dense locations where strangers collected and interacted, whereas nonhierarchical world-systems often arose out of low-density kin-based collectivities. For long periods (eons) humans in non-hierarchical world-systems (e.g., mini-systems, kin groups, sodalities) maintained low birth counts and technological stasis rather than rapid innovation and unsustainable population growth (Christian 2004). Premodern hierarchical world-systems utilized the advantages of integrated pools of ideas arising from populations of strangers. They had the resources to demand or finesse cooperation out of a large, heterogenous population and obtained that cooperation by coercion at times, but often more successfully by taking advantage of people's own proclivity for reciprocity. This accounts for imperial policies such as conscription of labor for monumental construction projects as an obligation of citizenship (Egypt), paying slaves for labor (Persia), and allowing religious and political autonomy that did not threaten the core's power (Rome).

There is nothing conclusive about the frequency or result of cooperation versus use of force in larger populations (Blute 2010), but we should think of social conflict as

an aberration in premodern hierarchical world-systems simply on the basis of their longevity and achievements which stand out to this day as remarkable. We can look to pyramid construction around the world, which is a demonstration of an understanding of physics and its application to engineering. Also world-wide was astronomical knowledge leading to calendars and precise directional orientations of structures coinciding with solar events. We can find achievement and ingenuity in the historical and archaeological record that reveal exquisite arts and crafts, some of which are not reproducible today. Wide-spread phenomena such as Venus figurines found across Europe point to intercontinental transmission of an idea, a religion, and an art. Large non-native stones in stone circle formations speak to us of long projects of labor and skill. From this tip of the iceberg recounting premodern human achievement, we must consider that cooperation, collaboration, and communication are not the exception, but the norm, and that premodern human societies exhibited advanced, complexity and a logic that is often a mystery to us today. If we are to attempt to view their reality not through the filter of our own productivity, we must accept a level of collaboration not seen in the extreme competitive modern world-system which according to Wallerstein is systematized by capitalism, an inherently aggressive, egocentric division of labor.

INTERSOCIETAL NETWORKS

The three economic and political intersocietal networks (PGN, BGN, PMN) identified by Chase-Dunn and Hall needed communication mechanisms through the fourth network, the information network (IN) in order to function well. Systemically keeping trade and the economy active and productive while establishing power and

maintaining order required the population to be informed of their obligations to the world-system. For this reason, the information network (IN) in premodern hierarchical world-systems maintained the systemness of the other three networks. It is important to examine what that systemness looked like in relation to the information network. The following considers this, albeit not exhaustively.

Trade Exchanges - The Bulk Goods Network (BGN) and the Prestige Goods Network (PGN)

The two trade networks were a consistent connective tissue between the core, semiperiphery, and periphery. Goods and wealth traveled back and forth through the entire composition of the world-system from the core to the periphery and back again.³ In the semiperiphery, we may find a crossover of functions depending on whether the semiperiphery had been a former core on the way down or was an up and comer looking to significantly improve its economic and power potentials. Trade routes formed a map of information routes as well, since in premodern times information was conveyed physically, hand to hand or face to face. Information was a constant fellow traveler among merchants, mariners, pilgrims, and diplomats.

The nature of making a living in the premodern world depended to a large degree on ingrained self-reliance and social cooperation to do family and village farming, fishing, milling, and entrepreneurial business endeavors based on artisanal crafts,

³ An excellent annotated inventory of the great variety of raw material, bulk goods, and prestige goods, including animals, humans, exotic woods, biologicals, precious gems, and minerals in circulation throughout a premodern world-system is provided in the classic work of Edward H. Schafer, *The Golden Peaches of Samarkand: A Study of T'ang Exotics* (1963).

harvested surpluses, and trade in manufactured goods (jewelry, pottery, textiles, etc.). In effect, people had to be owners of myriad small businesses operated out of personal spaces like stalls, marketplaces, homes, workshops, watercraft, and caravans. The scales of mass production, although less voluminous and at a slower rate of production than modern models of production and distribution, were nevertheless robust. Activities of the BGN and PGN also had a great capacity for meeting human resiliency goals by allowing people to make a living and support their families, communities, and even their religions, as the Jain merchants did by building richly appointed temples and financing artists.

The BGN and PGN trade networks, since they are identified as part of a hierarchical world-system, carried out certain kinds of regulatory control over business practices and wealth accumulation. Hence, many of the early law codes, such as the Code of Hammurabi, communicated severe punishments for property crimes. Trade could also be strictly regulated, as it was for foreigners trying to do business in China. However, gatekeeping and over-regulation had to be balanced with a certain amount of freedom to thrive in commercial endeavors in order to maintain social cooperation. Trade networks helped people meet core demands (taxation, tithes, tribute, and other distributions of wealth) and support relational well-being by using the same distribution technologies and trade routes used in the pursuit of self-sufficiency such as roads and seaways, ancient tracks of peoples long forgotten, and marketing zones. For example, market day could be both a socio-economic imperative in the hierarchical world-system and a personal pleasure. Traditional festivals and feast days arose from going to market. Then as now, wealth accumulation also meant putting aside something for Caesar and something for

one's arbiter of well-being, in this life and the next. This is an ancient conflation of the demands of the core with cultural obligations to gods and ancestors.

Political and Military Power - The PMN

The PMN which facilitated political and military expansion and coerced social order was a network utilized almost exclusively by the core or by quasi-independent semiperipheral states with military capabilities. It was the political/military network that forced compliance with the core's demands and either risked social conflict or stepped in to control it. However, expansion projects through conquest and war reduced resources and killed or degraded populations. Part of the purpose of expansion was to gain territory (including its natural resources and human-made improvements such as canals and roads) as well as to gain people (for labor and revenues). State-mandated violence had to be weighed against possible systemic failure. Although the PMN could actually pose a long-term threat of world-system failure (a lesson learned by the over-expansion of the Roman Empire), there were short-term benefits of social control even if they were gained through brutality. Communicating the intentions of those in power was done in two ways: by doing political/military things (e.g., getting people's attention by marching into their city) and by transmitting political/military information through the information network.

Coins were used in the trade networks (PGN and BGN), but they were directly issued by the political/military network (PMN) as declarations of economic and political power made through the treasury of the core. Coins were stamped with portraits of the person in power and bore words and symbols that communicated dominance. Therefore, coins were informational as well as political and economic - in fact, part of the

information network. The coins of the late 1st-to early 2nd-century C.E. Kushan Empire in Central Asia combined symbols of political power with iconographies that were recognizable to multiple cultures in that part of the world including Romans, Greeks, Persians, Sogdians, Indians, Steppe nomads, and Chinese. The coins themselves were designed to convey a message to be understood by all (Bopearachchi 2015). The obverse side of the coins bore the image of the ruler of the Kushan Empire. The reverse side of the coins depicted Buddha, Apollo, Mithras, and other mythical and religious figures recognizable by multiple cultures along with religious symbols and Greek words, Greek-rooted languages being the *lingua franca* in that region at that time (Fig. 1). The issuers of these coins seem to have welcomed diversity and expected social cooperation between traders of different cultures who travelled through the Kushan Empire.

We can glean from these coins whether the Kushan Empire was a core or semiperipheral entity within the remnant Greco-Bactrian world-system of the late Hellenic period. Since the coins attempted to "speak" multiculturally to the people who would use them, it could well be argued that Kushana was a semiperipheral entity with a large sphere of influence that solicited for participants in its BGN and PGN rather than commanded them to obey a heavy handed core entity. These coins can be interpreted as enticements to trade, perhaps something like the financial incentives offered today to lure big corporations to towns eager to boost a sagging local economy. The information on the coins is not threatening but inviting. This message passed through the information network along the trade routes of the empire where the coins circulated.

Fig. 1 - Second-Century Kushan Empire Coin



The obverse of this coin shows Kanishka I, the figure of power in the PMN. The reverse combines the figure of Buddha with a Persian fire altar and the text, "Boddo" (Buddha) in Greek. Source:

<http://coinindia.com/galleries-kanishka.html>

Information content could change as easily as changing the image on a coin from Apollo to Buddha. However, the methods of transmitting information in the premodern world-system rarely changed well into the modern era; it remained hands-on and face to face for millennia. One major innovation in the political/military and information networks of the premodern period became the foundation for the future modern era (Weber 1958). Roughly between c. 200 B.C.E. and 500 C.E, bureaucracies appeared throughout the old world ecumene or the "Central System"⁴ first in the Qin and Han dynasties, then the Roman Empire, and later the Sasanian Persian Empire. I posit that bureaucracies mitigated the need for constant military demonstrations of power in favor of diplomatic and official governmental communications. The IN of the premodern

⁴ William H. McNeill in *The Rise of the West* (1963) referred to Europe, North Africa and Asia as the "ecumene" which developed during the Ancient, Classical, and Post-classical periods of history. David Wilkinson (1987, 1994) coined the term "Central System" to name the region of west Asia at the confluence of the great ancient Egyptian and Mesopotamian civilizations that eventually engulfed Europe and became the modern world-system of today. Both scholars were influenced by Arnold Toynbee's conception of the evolution of world civilizations.

world-system was needed to support the PMN and maintain effective and consistent control over people without inciting revolution or degrading the productive potential of the population. With the development of bureaucrats and government officials who could personally convey the demands of the core through face to face or hands-on transmission, an entirely new level of information carriers at the middle-management level was created. Bureaucrats were trusted and tested underlings, sometimes castrated or holding slave status, with the intended purpose that they served the core without posing any threat of overthrowing it. Their work was administrative and significantly communicative as they disseminated the will of the leadership throughout a given world-system. Eventually, the introduction of this new conduit in the information network did impact the core elite which could become dependent on information "experts" in the bureaucracy. In Sasanian Persian society a new middle class emerged, while in the Roman Empire new titles of officialdom replaced older forms of status left over from the days of the Republic. In China, the civil service became a means of upward mobility for ordinary people who could master the extensive educational regimen. The establishment and complete integration into society of this system of bureaucrats and their rising importance from this point on distinguished the later premodern and early modern world-systems of the Turkish and Mughal Empires (c. thirteenth to sixteenth centuries C.E.) from much earlier ancient absolute power systems like the early Assyrian Empire or the Shang Dynasty of the third and second millennia B.C.E. The rise of bureaucracy was the most significant innovation in the premodern information network until the invention and widespread use of the printing press centuries later. A study of the rise of bureaucracies, their spread and

interaction with each other, should be a significant clue to the location, extent, and fall-off of premodern hierarchical world-systems.

KNOWLEDGE PRODUCTION - FOUR "FACTS"

Now that we have explored functions of the premodern information network in hierarchical world-systems and the interaction between information networks and other world-system networks, there are four "facts" governing how the IN functioned in premodern world-systems for consideration in any study of the interactive networks of premodern world-systems.

1) *Information was physically conveyed throughout the geography of the premodern world-system.*

I have repeated this many times above, but it needs to be emphasized. As simple as this statement may seem, it is difficult for modern people to realize how basic was information transmission before electronic methods, starting with the telegraph in the 1850s. Up to that point, information was delivered throughout the world-systems by carriers who directly spoke their messages or directly or indirectly transmitted information to the recipient in the form of physical documents. Verbal communication began with the evolution of language. Human language was fine-tuned through the development of a concise toolkit of sounds, symbols, and gestures, shaping human oral skills and eventually becoming written language. In our various communities, we humans devised specific meanings out of these limited components that gave accuracy and finesse to our messages. These were in turn learned by others and passed on. But how did verbal and later written communication remain intact over long distances? Early in our

evolution, humans developed "collective learning" (Christian 2004). This meant that we gathered and passed on information that could be shared and retained by successive generations of the collective beyond the information giver's own lifetime. Collective learning was also tactile as well as vocal, carried out through physical touching, gesturing, handling, tasking, and play. This helped to develop language and reinforce agreed-upon meanings.

The physicality of information transmission through most of human history is important. William H. McNeill (1995) stated that we used synchronized physical movements such as village-wide dancing or marching together as soldiers during drill to create unity through "muscular bonding." Communities could be brought together by what he called a "kinesthetic undergirding" (1995:152). In early human societies, the link between information, communications, learning, and physical bonding explains the deeply rooted history of hands-on, face to face, often non-textual communications that existed before speed-of-light transmission technologies were invented in the modern age. Social bonding was a strategy for resiliency and well-being in the human web. Information transmission through premodern information networks depended on established habits of collective learning and bonding. High-stakes costs and rewards in hierarchical world-systems made this imperative.

Apprenticeship is one of the most pervasive forms of collective learning and information transmission around the world in any era. Evidence of apprenticeship indicates it existed in earliest Egyptian and Mesopotamian civilizations (Wendrich, 2013). Apprenticeship was characterized by personalized training through habitual steps

and activities: shadowing master workers, repeating learned skills, reciting rote rules, and following oral and written instructions. The information that the apprentice gained was conveyed through a close, personal, and familial relationship of communication. Mental, emotional, and muscle memory helped one to retain what was being taught. The knowledge gained through the apprenticeship system up to the master level was learned through multiple modes of learning on the basis of kinetic, auditory, visual, and textual input in different settings of indoor and outdoor space. This multi-modal, multi-spatial pedagogy was encouraged for classroom teaching even in the modern era (Gardner 1983). The more senses implemented in learning, the better the retention. Generations of apprentices retained knowledge of their craft, memorized procedures, and replicated their learning, passing their knowledge on to younger generations. They learned to keep instructions intact over distance and time.

It is important to acknowledge that Chase-Dunn and Hall questioned whether information could be transmitted unaltered down the line through a premodern information network, asserting that by comparison to "unaltered" exchange of physical objects in the PGN and BGN, information in the IN would become "garbled and lost" (1997:53). However, my first rule for understanding premodern information networks supports the idea that premodern peoples had the ability to replicate and transmit information effectively and had done so for generations. In fact, successful, so-called "unaltered" trading in a premodern world-system was only possible by an effective information network. This is not to say that information was always accurate, as we will see in the next rule. But people in the premodern era were actually in a good position to

retain large amounts of knowledge on many subjects. They had muscle as well as mental memory and took advantage of what we would today call "institutional memory" through communal knowledge preserved in family and village life. They moved information along to others by the slow technologies of the premodern era effectively after centuries of practice. Their survival in a hierarchical world-system depended on it.

2) Both truthful and non-truthful information was transmitted through the information network either deliberately or inadvertently.

Information transfer in an era when transmission was only as fast as walking, riding, or sailing had to overcome inertia and error. This was possible because of ancient routines of communal bonding and collective learning as described above. The effectiveness of premodern world-systems depended on the effectiveness of the information network and the extent to which the IN was collectively meaningful, i.e., accurate. However, we cannot assume that all the information on the IN was truthful, factual, or complete. Information could include deceit, gossip, and disinformation. It also certainly contained myths, exaggerations, and inaccuracies. But the question arises as to how important it was for the information on the IN to be correct, either upon entering the IN or during transmission. What was the impact if information was missing or deliberately misleading, corrupted, or even censored?

To be a trader and be misunderstood or receive poor information about travel, markets, or contacts could lead to personal failure in the trade networks. Failure of too

many individual traders could bring down a trade network and lead to world-systems failure. Multicultural traders, mariners, caravanners, and merchants needed to develop good methods of communication through blending diverse languages. The earliest way to blend languages was through sign languages, but with severe limitations of vocabulary (Arends et al 1995). Alternatively, premodern peoples could use a string of word stems from two or more languages (1995:29) to build vocabularies for simple common phrases like "how much?" One important way that people understood information was by creating pidgin languages. Pidgins are complex languages that have no native speakers (1995:3) but are used to communicate ideas across multilingual lines. To use a pidgin language did not require speakers to live in the same location and develop a language through the slow processes of language evolution. Speakers of pidgins possessed their own native languages, but could use the pidgins when they came together as strangers with a common purpose of trade. However, pidgins provided opportunities for strangers to be both understood and misunderstood and for errors to enter information networks, sometimes even deliberately.

At this point, we should consider the pace of communication, especially relative to the difference between diffusion of information and the transmission of information within a hierarchical world-system. The IN had to function differently from the long, unplanned processes of cultural diffusion or other long-term evolutionary processes of language development. Diffusion is informational "drift;" it is not systemic or necessarily coercive by nature but driven by chance and opportunity. William H. McNeill (1954, 1963) and Jared Diamond (1997) devoted much of their analysis of premodern history

(pre-1500 C.E.) to the phenomenon of diffusion and chance encounters. Knowledge gained by diffusion included innovation and new ideas, whereas knowledge gained through the information network could include actual inventions, perhaps with specific plans and instructions. Diffusion of ideologies and philosophies over long spans of time became, in a premodern hierarchical world-system, temple rituals, sacred books, creeds and laws. Diffuse information that drifted over long spans of time included farming methods, building techniques, art and iconographies (such as nature idioms), food cultures, forms of entertainment (games, songs, stories, and poetry) - the list is as voluminous as human history. In fact, diffusion is often tied to the drifting of the physical object itself without any explicit instructions. Wheat migrated from West Asia to East Asia, but its message was embedded in its 'objectness' - "plant me!" However, if at some point a message came to the people ordering them to plant wheat or to deliver so many bushels of wheat each year to the power elite, that message came across the information network, not by diffusion. Here, Fernand Braudel's conception of historical temporality elucidated in his book, *On History* (first published in French in 1969)⁵ best describes the

⁵ In Fernand Braudel's book *On History* (English trans. 1980), he described the three temporalities of the *longue durée*, *conjoncture* (or conjuncture), and *événementielle*. The latter of these three, the event, he condemns to the "time of the ...journalist" (1980:28). It explodes into our daily life and offers little to illuminate the longer view of history. The opposite of this is the *longue durée*, a dimension of periodicity that "borders on the motionless" (1980:33). This is sometimes described by others as "glacial," yet Braudel counted it in mere centuries. However, the most important thing about the *longue durée* is that it is a coherent story arc that begins and ends almost imperceptibly amidst seemingly other, more rapid cycles of events, but once the *longue durée* is over, the change wrought in that longer time span becomes clear. About *conjoncture*, Braudel had little to say, but it must fall between what he called the "distant past and the too-close present" (1980:37). So we could call *conjoncture* the near past and the far away present. He associated this time span with economists and sociologists who track the rise and fall of prices. The impression is that Braudel favored thinking historically in terms of the longest cycles, which is why he was a great influence on macrohistorians, macrosociologists, and environmental historians. He found the conjuncture cycles to be nearly on equal terms with the short cycles of daily events (1980:27). But world-systems analysis is well suited

processes of time on formal and informal communications. Information that was transmitted by diffusion traveled across continents slowly without imperatives or coercion, blown along over long cycles called the *longue durée*. Premodern world-systems operated in the more tempered progress of the *conjoncture* cycles of time.

The slow pace of diffusion during a cycle of the *longue durée*, sometimes thought of as moving so slowly that change is nearly imperceptible, is in direct contrast to the more imperative pace of life in a world-system. However, events that happened at the opposite end of Braudel's temporal spectrum in the fastest of Braudel's time cycles, the *événementielle*, are more common to the rapid news cycles of today. For premodern peoples in a hierarchical world-system, formal communications could not be transmitted long-distance with the speed of today's modern methods. All intersocietal activities within the unit of analysis of the premodern hierarchical world-system eventually took place at the moderate pace of the camel, the horse, the walking or running messenger, or the sail. Events that we would call "news" became enmeshed in the slow crawl of information gathering that became an evening's entertainment by a troubadour or a letter received after months in transit. Exceptional attempts by the power elite at more "real time" communication of events could be done through use of 'marathon' runners, signals, birds, etc., but this was a luxury for those who could afford such resources. For the most part and for most people in premodern times, the business of the hierarchical world-system was apace with the cycles of the *conjoncture* temporality. Everything came back

to be periodized within the frame of the *conjoncture*, i.e., cycles of human-wrought change, of rise and fall, and of collision and redirection made necessary by human will. There is nothing of nature, of geographical determinism, fate, or destiny in the *conjoncture*; only hubris and history.

to that. For example, to return to the problem of communicating with strangers, linguists now agree that pidgin languages can develop within one or two generations (Lefebvre 2002:248). Thus, this type of communication is squarely in the *conjoncture* temporality. In the time that a merchant could be active in trade and pass his or her business to an adult child, a complex language could be fashioned to facilitate that business. Intersocietal activities within premodern hierarchical world-systems occurred and changed at just the pace that prevented a world-system's networks from breaking down, at least for as long as possible.

The stakes were high in hierarchical world-systems to deploy armies, meet tax or tribute obligations as commanded, or to succeed in business and other vocations in service to the economic and political aims of the hierarchical world-system. I do not argue that humans never lied or tried to disrupt factual information. They did as modern people do today, every day, in every walk of life. Given the slower time cycles of the *conjoncture*, information could be mangled by the time it got down the line. However, rapid news cycles today often yield little to assure people of the accuracy and veracity of the modern world-system's messaging. Mistaken or deceptive information could enter into the communications of a premodern world-system or change in the process of long transmission times. I argue that pressure was always imposed upon people to meet the obligations of life in a premodern hierarchical world-system in spite of errors entering into the information network. The next two 'facts' address what people did with imperfect information flows.

3) *The information network could “self-correct” based on people's experience with the information and their incentives to avoid costs and receive rewards from the core.*

There was no greater probability of inaccuracy on the IN as there was of accuracy. We cannot assume that because these information networks were active before modern rapid transportation and mass communications that they were ineffective. This was in large part due to our human ability to correct information. All the interactive networks were interconnected and kept their systemness through the information network. I argue that human resiliency facilitated meeting the aims of the world-system in which people found themselves. Our capacity for "self-righting" (McCubbin et al. 1999) was based on strategies for relational well-being that were millennia old. This was applied to the information network by altering the content transmitted through it. In the premodern world-system, people used their skills, past learning, traditions, and instincts to correct errors, fill in gaps, and emend bad information. They could even improve upon what they received in order to avoid the costs of negative interaction with one or more of the other networks. They also wanted to benefit from the rewards of success, and this was only possible with good information. It harked back to their training as apprentices and the development of problem-solving at the master's (or father's or grandmother's) knee. They had the skills to successfully manage the world-system's information network because they were used to trouble-shooting their own resiliency daily.

As an example, a mariner with bad information about how to navigate across the Indian Ocean during monsoon season could use his knowledge of seafaring to correct faulty information. He had to if he was to succeed in business, and in the premodern

hierarchical world-system, this was practically mandated. He could use failure to teach him by trial and error or rely on past maritime experience to attempt the voyage, learning as he went. He could seek out the *Periplus Maris Erythraei* or make inquiries among other experienced mariners in order to change his original information content from inaccurate to accurate. As both Turchin and Blute pointed out, cooperation was as viable an option as competition in many cases. As this single mariner corrected misinformation, it would spread among other mariners, eventually finding its way through the informational conduits that transmitted information useful for complying with the demands of the hierarchical world-system. Again, if we accept an assumption that premodern world-systems balanced social cooperation and social conflict and competition in order to maintain order, then we can accept that there was intentional cooperation and sharing of corrected information when errors were found. This can account for why trade flourished for millennia in the premodern era in spite of slow transmission times and problems with accuracy of information.

Since information was conveyed physically, it most often travelled with the trade on the BGN or PGN, moving along down-the-line trade routes (Chase-Dunn and Hall 1997). However, the IN was not confined to the trade routes and was actually web-like instead of linear. Many intersectional nodes and interconnected lines, both laterally (locally) and down-the-line (regionally and extraregionally) criss-crossed premodern world-systems. According to historian, Valerie Hansen (2012), the Silk Road was never a road, even though the first map drawn by geographer Ferdinand von Richthofen in the 19th century illustrated it as a few major trunk lines, almost like a railway map of the

cross-continent routes he coined the Silk Road (Hansen 2012:7). In fact, Hansen describes the Silk Road as "a stretch of shifting unmarked paths...a patchwork of drifting trails and unmarked footpaths...[and] meandering trails that converged at oasis towns" (2012:5-8). Using trade routes from maps to provide an idea of the conduits of information on the IN could give the impression of singular lines of travel. However, overall, people traveled along adjacent or connecting lines that do not appear on maps. Information, while it did travel along major overland and maritime routes, was diverted down these minor roads and paths, up tributaries and along creeks. It floated on boats around small islands as well as across seas. It crossed deserts, but also found every wadi and oasis. Communication was not two-way and linear like our concept of a trade route, down the line and back again, but multi-directional. This could result in a networking type of transmission and communication which could be extensive even in a world where information was being physically carried and communicated from person to person.

Since information in the premodern world-system travelled through a web or network of lines of communication, the chances were high that it would pass through nodes with individual people or groups possessing a high level of comprehension of what was trying to be sent. Shipboard was such a node, as were urban centers, oases, depots, pilgrim destinations, guild halls, and marketplaces. Information on the IN was connected to the other intersocietal networks where the stakes were perceived to be high and the costs were perceived to be significant to the human actors. High stakes in terms of costs and rewards were directed (dictated, ordered, imposed) by the core and filtered down to everyday life through this fishnet of an IN, encouraging content to be emended and its

usefulness maximized. Premodern people who honed their skills in resiliency were already familiar with correcting information and being adaptive when necessary.

4) *When the information network no longer sustained self-correction and non-compliance bore no risks, fall-off occurred, thus bounding the network and often the world-system itself.*

I agree with Chase-Dunn and Hall (1997:53) that there are "multiple bounding criteria" for determining the extent of a world-system. Resource availability is a major factor. At the furthest extent of the exchange networks, lack of trade in manufactured goods or inability to extract raw materials indicated the point of fall-off of a premodern world-system. But this explains why the core would no longer want to expand past a certain point. What would, conversely, cause that "point" to no longer need or want to be part of the core? Although Chase-Dunn and Hall argued that bounding should be "group-centric" rather than "system-centric" (1997:53), one has to examine what makes groups at the edges of a world-system no longer compliant with systematization. One important reason is fall-off of the information network.

I posit that fall-off of the IN happened when the core's demands and instructions were no longer understood, enforced, or relevant. Information network fall-off also occurred when information relative to the world-system was not subject to self-correction. This could be because people no longer had some knowledge of the information and could not continue to emend or improve upon it. If the world-system still exercised power over any inhabitant who was not paying attention to the content on the IN, consequences could be severe. This is how we know that the boundary of a world-

system has *not* been reached. But somewhere near the end of the "world," the demands of the core became moot. Without any high-stakes repercussions of success or failure personally, politically, militarily, or commercially, there would be little motivation to maintain the integrity of information transmission on the IN. Lacking any serious outcomes for ignoring or simply being out of reach of the core, the information network would end. Thus, we can see that the limits of the world-system have been reached and fall-off has occurred by the limits of the its information network.

At the edges of a world-system, people could fall back on traditional normalizing behaviors, adopt nonhierarchical social organization, and abandon vestiges of "modernization" that were imposed upon them by a more urban and sophisticated world-system. This took place after the collapse of the Mycenaean civilization with the loss of the Minoan world-system during the Bronze Age and in Europe after the fall of the Western Roman Empire. In both cases, historians refer to the period that followed as a "dark age." In medieval Europe, people found refuge in the social cul-de-sacs of communal village life centered around feudal manors absent of centralized imperial governance. People in their own generation or only one or two generations removed from the Roman world-empire fell back to hunting and foraging as their ancient ancestors did; woods and pastures rather than urban centers (Rome at its zenith had a population of over one million people) became their new *old* normal. At the boundary of a world-system is an absolute periphery or no-man's-land absent of the influence of a world-system's core. Europeans lost knowledge of such hallmarks of systemic activity in the world-empire as complex social stratification and forms of government, learning and literacy in multiple

languages, the beauty of realistic art and sculpture, education in science and math, and monumental building and engineering skills. These myriad changes occurred because of the failure of world-systems messaging to travel through a collapsed information network at the Roman world-empire's boundary edge, or "Land's End."

The powerful imposition of the medieval Roman Catholic Church can be examined as a kind of replacement world-system. It certainly had a powerful network for transmitting information from the papal see through a hierarchical flow chart that went from the cardinals and bishops down to the lowliest parish priest and cloistered monk. However, the legitimacy of the messaging on its information network was constantly being challenged by rival medieval secular leadership, often without serious risks involved to ordinary people. It was rare for the pope to deploy armies to rebellious premodern lords who could mitigate the costs of their resistance through gifts to the Church. The core of the old Roman Empire had moved eastward to Turkey and based its vision for the future not on Europe but on Persia, the Middle East, India, and China. Not until the Crusades did Europe awaken as an adjunct to the semi-peripheral Byzantine Empire in what had come to be, during its long nap, a premodern world-economy centered not around the Mediterranean but the Indian Ocean and Central Asia as the conduits for systemic activity. And it was Crusades messaging by Pope Urban II on the information network that brought this European borderland back to life, further showing that a world-system must operate first on the basis of information through its information network before the PMN and other networks can fully function.

By the beginning of the long sixteenth century, a complete revival of robust and extensive bulk and prestige goods networks (BGN and PGN) out of Europe was underway which set in motion the rise of the modern world-system. However, a fully functioning secular hierarchical world-system emerged in Europe only when the information network conveyed convincingly powerful messages and instructions from emerging and increasingly more powerful European cores. It was the information network that completed the formalization of the modern world-system by conveying an entirely new way of perceiving intersocietal activity through capitalism, secular science, and state-sanctioned oppression, particularly racism (Adas 1989). As this information spread along the modern information network, the modern world-system established its new boundaries, becoming truly global by the 19th century when information transmission became global as well. This occurred in the 1850s with the invention of the telegraph, the first time in human history that information no longer needed to be carried physically from place to place and person to person. The millennia-old premodern information network with its manual transmission of information was finally replaced by modern technology.

CONCLUSION

Interactive networks of human activity engaged in governance, commercial exchange, material distribution, and communications. They kept the power dynamics alive and operational between and among a dominant core and two types of peripheral populations, i.e., the mid-zoned semiperiphery and the distal periphery. Chase-Dunn and Hall (1997) identified four discrete intersocietal networks present in all world-systems. I

argue that the most fluid and pervasive of these networks is the information network by which the core communicates its vision for social order and facilitates the systemness of the other networks.

In the modern world-system, systemness (the perpetuation of regulated order) is facilitated by modern technologies in production, transportation, and telecommunications which keep production going and help the core accumulate more and more wealth and power. However, we need to accept the limited yet brilliant abilities of premodern peoples to create systemic socio-economic phenomena in the age before modern technology. In premodern world-systems, systemness was achieved through incredible human effort and ingenuity. This is clearly evident in the historical record of human accomplishment. Though successful, the vulnerability of premodern technologies and mechanisms for creating and sustaining systemness in hierarchical premodern world-systems probably accounts for the variety of sizes, degrees of coerciveness, and the rise and demise of world-systems before 1500 C.E. The volatile history of premodern world-systems is how some historians of social evolution track what they see as the convergence of older and smaller premodern world-systems, eventually becoming the "Central System" (Wilkinson 1987, 2004; Chase-Dunn and Hall 1997; Frank and Gills 1993) and later merging into our single modern world-system of today. However, it should not diminish the *fact* of premodern world-systems and that we find them throughout human history from very small, stateless world-systems to extraregional world-economies with extensive intersocietal networks traversing continents.

Hand in hand with the rise and demise of premodern hierarchical world-systems is the steady and constant ability of humans to navigate these systems by traditions of resiliency and social cooperation. The strength of the premodern world-system depended on people's native abilities to keep the four intersocietal networks viable. Compliance with the demands of the core could become so tightly interwoven with traditional norms, cultures, and strategies for resilience that people might not see their lives as being coerced. This could account for why at the edges of a defunct world-system people would allow a new world-system to arise and the patterns of coercion and compliance would be repeated. The outcomes of systemic intersocietal activity could be oppressive or liberating as regards its impact on resiliency and well-being. A hierarchical world-system was demanding, intrusive, and often countermanding of traditional values and norms of behavior. On the other hand, one's development of knowledge, artistic expressiveness, wanderlust for trade, or aspiration for upward mobility in premodern times were, in many cases, achievable only within the social ordering and state-building of premodern hierarchical world-systems and the regular operations of intersocietal networks. Among these was the all-important information network. A robust information network was possible through the habits of communication that make us human. We can understand this to be especially specific to premodern hierarchical world-systems because formal and informal communications depended in large part on ancient habits of human resiliency and traditions of reciprocity and cooperation. Social cooperation explains the extent and influence of premodern hierarchical world-systems as well as their longevity and monumental accomplishments.

Traditional tribal or village values of community and cooperation which fostered human resiliency became tools for mastering collaboration with a powerful core entity while at the same time became a conduit for the core to dictate their demands to the people. The human element in the study of world-systems is therefore an important key to understanding why and how premodern hierarchical world-systems succeeded or failed. Processes of communication kept the world-system alive. At the boundaries of a premodern world-system, fall-off occurred because people no longer related to or sustained the information on the world-system's information network. Information networks failed because compliance or non-compliance no longer favored people with rewards or punished them with costs. Where there is no risk, there is no world-system. A failed information network meant failed systemness and signaled the boundary of a world-system, but it did not necessarily mean the failure of social organization. That continued in or out of the bounds of premodern hierarchical world-systems through the traditions of human resiliency.

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