

# Inequalities Within-Polities and in Interpolity Relations Since the Paleolithic Age

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Wooden war club,  
Marquesas Islands,  
Polynesia, pre-1890.  
Grainger Collection.

This essay examines and develops a set of hypotheses about the changing timing and nature of within-polity and between-polity (interpolity) inequalities in sociocultural evolution since the Paleolithic Age and develops a two-level causal model of the cycles of rise and fall and the long-term upward trends of hierarchies during the expansion and evolution of human interaction networks (world-systems).

What happened regarding hierarchies and inequalities over the course of human sociocultural evolution<sup>1</sup> since the Paleolithic Era? Small-scale polities<sup>2</sup> were relatively egalitarian both internally

<sup>1</sup> Use of the word “evolution” still requires explanation. We mean long-term patterned change in social structures and institutions, especially the development of complex divisions of labor and hierarchy. We do not mean biological evolution, which is a very different topic, and neither do we mean “progress.” Sociocultural complexity and hierarchy can be studied empirically regardless of whether they are either progress or regress. Most historians and some sociologists (e.g. Mann 2016) reject the idea that human polities have evolved (but see Morris, 2013).

<sup>2</sup> We use the term “polity” to generally denote a spatially bounded autonomous realm of sovereign authority such as a band, tribe, chiefdom, state, or empire. We use this term instead of “societies” because autonomous realms of authority are usually easier to bound spatially than are societies, as persuasively argued by Charles Tilly (1984) and Michael Mann (1986). Tilly (1984) pointed out that societies (defined as communities that share a common language and culture) are messy entities when we consider interaction networks.

and regarding their interpolity relations. Within-polity inequalities were mainly based on age and skill and, though interpolity relations<sup>3</sup> were contentious, there was little in the way of stable interpolity hierarchy in which some polities exploited and/or dominated other polities. What happened as polities got larger and more complex is that socially structured inequalities emerged within polities and more stable and institutionalized inequalities emerged in interpolity relations -- what world-systems scholars call core/periphery hierarchies. Within-polity hierarchies developed first but were soon followed by the emergence of between-polity hierarchies based on unequal exchange, tribute payments and conquest.

### **Core/Periphery Relations: C/P Differentiation and C/P Hierarchy**

The observation that core/periphery hierarchies emerged and evolved along with the processes of expansion and waves of the rise and fall of powerful core polities shines new light on historical and comparative studies of the rise of paramount chiefdoms, states, and empires and on the sequence of hegemonic rise and fall in the modern world-system.

Chase-Dunn and Hall (1996) made several changes in the conceptual tools that had emerged from the studies of the modern system. To use archaeological evidence, which is necessary for studying preliterate systems, they introduced a distinction between core/periphery differentiation (CPD) and core/periphery hierarchy (CPH). CPD means that polities with different degrees of population density (population per land area) are systemically interacting with one another. CPH means that some polities are exploiting and/or dominating other polities. World-systems are systemically interacting networks of polities and settlements.<sup>4</sup> The extent to which interpolity exploitation/domination was occurring needs to be examined, not assumed.<sup>5</sup>

Core, periphery and semiperiphery are relational concepts that depend for their meanings on the nature of interpolity relations. What semiperipherality is depends on the larger context in which it occurs, the nature of the polities that are interacting with one another and the nature of their interactions. The nature and structure of core/periphery relations evolved as new kinds of institutions were invented and diffused. But the most general definition of the semiperiphery is: "an intermediate location in an interpolity core/periphery structure." This general definition is useful because it allows us to see similarities across very different kinds of systems. Interpolity domination and exploitation are important because they strengthen the selection pressures that operate within sets of cooperating, competing and conflicting polities. To survive and be successful a polity must be able to withstand the efforts of other polities to exploit or conquer it. This selection pressure explains much about why advantageous innovations in technology, hierarchy and complexity spread from polity to polity in systemic networks.

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<sup>3</sup> Interpolity systems are the same as what international relations Political Scientists call international systems except that use of the term polity includes all the kinds of polities mentioned in Footnote 2 above.

<sup>4</sup> The term "settlement" includes camps, hamlets, villages, towns, and cities. Settlements are spatially bounded for comparative purposes as the contiguous built-up area.

<sup>5</sup> Our studies of marcher polities and research on Central Asian steppe nomadic confederations suggest that a clarification of the definitions of CPD and CPH is needed. There have been instances in which non-core polities (Hsiung-Nu, Mongols) have successfully extracted tribute from more population-dense polities (China). These steppe nomad confederacies repeatedly emerged in Central Asia (Barfield 1989, 2023). So, which was the core, and which was the non-core? In addition to population density, it is important to consider the quantities and relative magnitudes of social surpluses that are generated and accumulated in a system. The amounts of surplus extracted by Central Asian steppe nomads from China were not a large proportion of the total surplus produced and accumulated in the East Asian world-system. So, China was still the core even when it was paying tribute to steppe nomads.

## Qualitative Changes in the Logics of Accumulation

Chase-Dunn and Hall produced a dynamic model that was intended to represent continuities that have existed across small, medium, and large world-systems, but they also used a typology of qualitative changes in the logics of accumulation that have occurred as systems got larger and more complex. The typology of systemic logics they adapt was inspired by Marxist anthropology, especially that of Eric Wolf (1997). Wolf contended that small-scale societies were integrated by consensual moral orders composed mainly of kin-based obligations that were the main regulators of the mobilization of social labor. Coercion and non-kin exchange existed but were not predominant regulators. With the rise of states and empires specialized institutions were invented that allowed ruling classes to utilize coercion to extract resources and labor power that were less dependent on kinship relations. Kinship regulation was confined within households, and normative regulation using kin-like symbolism continued to be an important source of legitimation for hierarchies. The key forms of institutionalized coercion were tithing, taxation, military conscription and specialized bodies of armed men under the control of kings. These were the predominant structures that reproduced accumulation and they also facilitated accumulation based on tribute-taking from conquest.

The term we use for these institutions is the **tributary modes of accumulation** based on institutionalized coercion. Important innovations of what Michael Mann (1986) called “technologies of power” allowed conquest empires to get very large and to extract labor power and other valuables from distant sources. New transportation and communications technologies also made possible the emergence of larger trade networks and of city-states that specialized in profit-making based on commodity exchange and production. The trading city-states invented and diffused transportation, communications and accounting technologies and expanded and intensified large market networks. The Bronze and Iron Age capitalist city-states {Dilmun, Assur (the Old Assyrian city-state), the Phoenician cities (Byblos, Sidon, Tyre)} were in the semiperipheral interstices of world-systems still dominated by tributary empires. But larger maritime empires (e.g. Athenian, Carthaginian) eventually emerged that employed combinations of tributary and trading strategies that had been developed by the older capitalist city-states (Barfield 2023).

After the fall of the Western Roman Empire and the recovery of long-distance trade that was set back by the rise of the Islamic Empires, a set of competing capitalist city-states emerged in Europe followed by the advent of capitalist nation-states that formed the first world-system in which capitalist profit-making became the predominant logic of accumulation.

## The Evolution of Within and Between Polity Inequalities and Hierarchy

This essay seeks to accurately describe how within- and between-polity inequalities emerged and to formulate causal explanations of the relations between these two aspects of social structure. Another notable evolutionary aspect of hierarchies is that both within-polity and between-polity inequalities rose and fell in the middle-run while they both increased in the long-run. The long-term upward trend contains rises and falls with occasional upsweeps that account for the secular upward trend. These rise and fall cycles with occasional upsweeps are important for describing and explaining the causal relations connecting within and between inequalities.

What we call “rise and fall” corresponds to changes in the centralization of political/military power in a set of polities (Wilkinson 1994; Turner and Roberts 2023). We note that all world-systems<sup>6</sup> in which there are hierarchical polities experience a cycle in which relatively larger polities grow in power and size and then decline. This applies to interchiefdom systems as well as interstate systems, to systems composed of empires, and to the modern rise and fall of hegemonic core

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<sup>6</sup> The comparative world-systems theoretical research program defines world-systems as systemic interaction networks. Methods for spatially and temporally bounding these systems are examined in Chase-Dunn and Inoue (2024).

powers (e.g. Britain and the United States). Very egalitarian and small-scale systems such as the sedentary foragers of Northern California (Chase-Dunn and Mann 1998) did not display this kind of cycle, however.

Are the underlying mechanisms that generated these sequences similar in different kinds of systems? What are the temporal and causal relations among the different kinds of cycles? What is the relationship between the rise and fall of large polities and changes in the degree of inequality within polities, and are these relationships similar across different kinds of world-systems?

It is likely to be the case that some of the cyclical processes have different characteristics and different causes in distinct types of world-systems. The rise and fall of chiefdoms is analytically similar to the rise and fall of empires and the rise and fall of hegemonic core powers. All these are related to the stability of institutions for extracting resources from distant regions. But there are other important differences in addition to the obvious differences of scale. David G. Anderson's (1994) study of the rise and fall of Mississippian chiefdoms in the Savannah River valley provides an excellent and comprehensive review of the anthropological and sociological literature about what Anderson calls "cycling," the processes by which a chiefly polity extended control over adjacent chiefdoms and erected a two-tiered hierarchy of administration over the tops of local communities. At a later point these regionally-centralized chiefly polities disintegrated back toward a system of smaller and less hierarchical polities.

Chiefs relied more completely on hierarchical kinship relations, control of ritual hierarchies, and control of prestige goods imports than do the rulers of true states. These chiefly techniques of power were all highly dependent on normative integration and ideological consensus. States developed specialized organizations for extracting resources that chiefdoms lacked -- standing armies and bureaucracies. And states and empires in the tributary world-systems were more dependent on the projection of armed force over great distances than modern hegemonic core states have been. The development of commodity production and mechanisms of financial control, as well as further development of bureaucratic techniques of power, have allowed modern hegemons to extract resources from far-away places with much less overhead cost.

The development of techniques of power have made core/periphery relations ever more important in competition among core powers and have altered the way in which the rise-and-fall process works in other respects. One big difference between the rise and fall of empires and the rise and fall of modern hegemons is in the degree of centralization achieved within the core. Tributary systems alternate back and forth between a structure of multiple and competing core states on the one hand and core-wide (or nearly core-wide) empires on the other. The modern interstate system experiences the rise and fall of hegemons, but these never take over the other core states to form a core-wide empire. This is the case because modern hegemons are pursuing a capitalist, rather than a tributary form of accumulation.

## Single and Bilevel Models of The Rise and Fall of Hierarchies and Inequality Overshoots

Social scientists who comparatively study the emergence of inequalities in human societies have developed different functional theories of stratification. The famous theory of sociologists Kingsley Davis and Wilbert Moore (Davis and Moore 1945) contended that inequalities incentivize competition for wealth and power to select competent individuals to fill important leadership roles.<sup>7</sup> Other social scientists have formulated what are known as conflict theories in which elites and ruling

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<sup>7</sup> Economist Joseph Schumpeter had a similar idea in his theory of the role of capitalist entrepreneurs in technological change (Schumpeter 1939)

classes supported ideologies, technologies and institutions that protected their power, fortunes, and privileges (e.g. Lenski 1966). Another functional theory was implicit in some versions of structural-functional theories and was made explicit in the work of anthropologist Elman Service (1971, 1975). Service argued that hierarchies in chiefdoms and states emerged to integrate and regulate emergent complexity as polities got larger. Increasing differentiation generated centrifugal forces that required the emergence of hierarchy to resolve conflicts and to solve other problems that emerged with complexity and size. This macro theory of stratification implies that each level of complexity requires an adequate degree of hierarchy. This idea is usually applied to single polities, but it also has implications for interpolity systemic networks (world-systems) that get larger and more complex.

This macro functional theory of stratification explains rise but not fall. Rise and fall can be explained by combining the functional explanation with a version of conflict theory – the idea that inequalities are challenged by those at the bottom of a stratification hierarchy and defended by those at the top. What happened repeatedly, both within polities and in interpolity systems, is what we can call “hierarchy overshoot.” Inequalities emerged to integrated increasingly complex social structures but the expansion of elites and the growth of states, empires, and hegemon all eventually ran up against limits on the ability of systems to generate enough social surplus to sustain the costs of population growth and over-sized hierarchies. The number of chiefs, aristocrats, elites, and ruling classes grew too large, and inequality increased beyond what was functional for a given level of complexity. This caused the collapse of governance structures and increased conflict within and between polities. The within-polity process has been theorized by the Goldstone (1991)/Turchin-Nefadov (2009) structural demographic secular cycle model. The interpolity aspect of rise and fall was first theorized by Ibn-Khaldun’s (2015 [1337]) theory of nomad/sedentary interactions (see below). Overshoot is also part of the reason that social movements demanding greater equality keep reemerging throughout human history. But hierarchies continue to reemerge after collapses because of the functional needs of complex polities for regulation. And political institutions emerge that involve less violence and that allow some popular say over the processes of regime change have emerged. Despite continuing chaos and injustices, this could be considered both political evolution and, dare we say, progress.

The functionalist theory of modern international hierarchy has been most clearly formulated in the “long cycle” theoretical research program developed by George Modelski and William R. Thompson (Modelski 1987,1990, Modelski, and Thompson 1996; see also Inoue and Chase-Dunn (2019). This theory proposes that world orders need “system leaders” but that leadership exhibits a rise and fall pattern. The balance between coercion and consent gets repeatedly wrecked by imperial overreach when the system leader (the term that Modelski and Thompson use for what world-system scholars call the hegemon) tries to continue to extend and maintain its centrality after its rewards to the rest of the system have declined. Declining returns from expansion cause the system leader to overplay its-preponderant military superiority (Kennedy 1980; Modelski 2005). Imperial overreach is the interpolity form of overshoot.

Combining within-polity and interpolity processes of inequality overshoot into a bilevel model that theorizes the links between them may be able produce an explanation of the patterns of rise and fall that happened within all hierarchical polities and in all hierarchical world-systems including the modern one. But it may be necessary to develop different models that account for the qualitative changes that occurred in logics of modes of accumulation and in core/periphery relations. Turchin and Nefedov (2009) tested their secular cycle formulation on several agrarian empires, confirming the principle that cycles of population growth and elite overproduction lead to sociopolitical instability and regime collapses within states (see below). And Peter Turchin (2017) has extended the theory and operationalized the model to explain cycles of political instability in the United States since 1790.

## Types of Within- and Between- Inequalities in World-Systems

Table 1 is a list of within and between inequality configurations that shows how these changed as polities and interpolity systems became larger and more complex. Note that the fifth column regarding synchrony/asynchrony/ counter-synchrony contains many question marks, as does the Type 7 row, which has not happened yet.

<b>Types</b>	<b>Largest Polity size/system size ( Small, Medium, Large</b>	<b>Modes of Accumulation</b>	<b>Within Ineq/ Between Inequality</b>	<b>Within/ Between: A-synchrony/ Synchrony/ Counter-synchrony</b>	<b>More within- in core inequality or more within non-core inequality</b>	<b>Global Governance *</b>
<b>Type1</b>	Sm/Sm Bands and Tribelets	Kin-based	Little /Little	No rise and fall of within-polity hierarchy/ No hierarchy rise and fall	No core	Interpolity rivalry, but little hierarchy
<b>Type2</b>	Bigger/ Bigger Chiefdoms	Kin-based	Some/ Some	Non-synch	More inequality within core polities	Raiding, Some Tribute
<b>Type3</b>	Medium/ Medium Bronze Age Early States and Early Empires	Tributary	More/ More	More synch?	More inequality within core polities	Conquest/ Tribute, trade. Early non-core trading city states
<b>Type4</b>	Large/ Large Iron Age Classical Empires	Tributary	Even More/ Even More	More synch?	More inequality within core polities	Interempire, more trade
<b>Type5</b>	The “Modern Europe-Centered System: Large/ Large Modern Hegemons and Colonial Empires	Capitalist	Relatively Less/ More	Synchrony during early industrialization Both went up.	Less inequality within core polities	Hegemony in the Core; Colonial Empires

<b>Type6</b>	Medium/ Global Neocolonial North/South Inequalities	Capitalist	Less and then More/ More and then Less	Synch?	Less inequality within core polities	Post-colonial U.S. hegemony
<b>Type7</b>	Global	?	?/?	Synch?	More in non-core	Global State

**Table 1: Seven Within/Between Inequality Types in World-Systems**

Note: \*Forms of global governance:

Interpolity rivalry and alliances, line wars and raiding

Paramount chiefdoms: intermarriage, trade, raiding and tribute-taking

Early state formation: trade, inter city-state systems, writing, manufacturing, unequal exchange, incursions by nomadic peoples, wall-building

Early empire-formation: marcher states, conquest empires and tribute-taking,

Classical empires: Endogenous and Shadow Empire systems, commodified and state-controlled trade, capitalist city-states, maritime empires, conquest, provincial governors,

Colonial empires; modern capitalist hegemons, Westphalian balance of power in the core; colonial governors, interpolity and commodified trade, stock markets, state banks, chartered companies, global hierarchical division of labor based on unequal exchange

Post-colonial global international system, U.S. hegemony without formal colonial empires, supranational organizations, large transnational corporations, neocolonial economic relations with Global South (foreign investment, debt, resource extraction)

Global Federated Republic or a Global Police State

### Type1: Bands and Tribelets: Small Polities in Small Interpolity systems:

In small world-systems the kin-based mode of accumulation was predominant, so regulation and the social division of labor primarily relied upon normative and ontological consensus about identities and obligations among kin folks and settlements. Examples are all those world -systems in which systemically interacting polities consisted of one or a few settlements, and this includes both Paleolithic nomadic hunter-gatherers (camps) and some of the Mesolithic sedentary foragers (winter villages). An example of the latter is indigenous Northern California before its incorporation into the modern system (Chase-Dunn and Mann 1998).<sup>8</sup> World-systems were spatially small because communications and transportation technologies did not allow systemic effects to travel very far. Archaeologists who study interaction networks use the concept of fall-off to estimate how far something that happens in one place has consequences across space<sup>9</sup>

All the polities had the same low degree of within polity inequalities and there was very little stable between-polity hierarchy. Polities and settlements were about the same size, and all had

<sup>8</sup> An overview of stateless world-systems, including the rise of systems that contain chiefdoms is provided in Chase-Dunn and Lerro 2017: Chapters 6 and 7 and in an auxiliary chapter of this book entitled “Indigenous North American World-Systems Before the Rise of Chiefs” available at [http://s3-euw1-ap-pe-ws4-cws-documents.ri-prod.s3.amazonaws.com/9781612053288/9781612053288\\_online.pdf](http://s3-euw1-ap-pe-ws4-cws-documents.ri-prod.s3.amazonaws.com/9781612053288/9781612053288_online.pdf) . The Data Appendix for this book is at <https://irows.ucr.edu/cd/appendices/socchange/socchangeapp.htm>

<sup>9</sup> Colin Renfrew (1975) explained how **down-the-line trade** in which adjacent societies pass goods to one another and goods travel for long distances in the absence of long-distance traders was important in small-scale world-systems. He also clearly explained the nature of fall-off, in which the consequences of actions decline with distance, as an important characteristic for understanding the spatial limits of systemness (Renfrew 1977).



inequality based only on age and skills. The division of labor was relatively simple. There were no classes. What little differences in population density there were between polities (core-periphery differentiation) did not involve the denser ones exploiting and/or dominating the less dense ones even though they had military superiority based on the demographic differences. Within-polity equalities were reproduced by institutions that prevented the emergence of inequalities such as burying or destroying valuables rather than handing them down to children (Flannery and Marcus 2012). There was warfare among polities but little socially structured hierarchy between polities. The division of labor was mainly based on gender and age. The polities were nomadic bands or local tribelets. There was no hierarchy-cycling within polities or in interpolity systems. Archaeological evidence reveals trade pulsations (the expansion and contraction of exchange networks) and geographical reorientations of these networks were occurring.<sup>10</sup>

### Type2: Chiefdoms: Larger and more Hierarchical Polities and Core/Periphery Hierarchies

Intermarriage between groups within polities and across polity boundaries is an important form of interaction in all world-systems. But in some systems the patterns of intergroup intermarriage are a key feature of systems of alliances among polities that structure both trade and conflict. This is especially true of systems in which the mode of accumulation is predominantly kin-based because mechanisms of order based on states and markets do not exist (Collins 1992). Patterns of intermarriage both integrate, and are fundamental to, interregional hierarchy-formation in some systems. Friedman and Rowlands's (1978) theory of kin-based core formation in tribes and chiefdoms focuses on changes in the politics of kinship and gender relations that allow a core group to gain advantages over other regions. In more egalitarian regional systems, a balance of alliances takes a form in which marriages across polity boundaries are reciprocated such that an approximately equal number of men from each group marry women from the other groups (see also Leach 2021). Marriage reciprocity is symmetric. As tribes develop into chiefdoms there emerges a "wife-giving" strategy in which senior lineages marry their daughters to junior lineages in exchange for transfers of wealth known as "bride-price." In even more hierarchical systems -- conical complex chiefdoms and early states -- there was a shift toward "wife-taking" on the part of the core lineages. This is a situation in which sacred chiefs in the dominant group marry more women from the dominated group than *vice versa*. This results in the emergence of chiefly classes within core polities and the rise of hierarchical kinship relations both within and between polities.

Conical clans and ranked lineages were still based mainly on normative consensus about kinship and claims to seniority based on closeness to ancestors, but this was hard to maintain because the stresses of within-polity and between-polity competition and conflict were exacerbated by inequality and the costs associated with hierarchy. Chiefs tried to keep disputes under control by mobilizing projects that symbolized their authority and that increased available resources (irrigation systems, fishponds, etc.) and they also engaged in conquest of other peoples to expand access to resources. But these efforts did not prevent the emergence of a cycle of rise and fall of paramount chiefdoms as mentioned in the discussion of David G. Anderson's (1994) work above. The rise and fall of chiefdoms was similar in many respects to the rise and fall of states and empires theorized in

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<sup>10</sup> These pulsations can be seen in the archaeological evidence as having operated in the small world-system of Northern California. Chase-Dunn and Mann (1996:36, 140-141) discussed pulsating trade networks and described archaeological evidence for the rise and fall of interpolity exchange networks based on different kinds of shell beads that emerged to link the small-scale polities of Northern California with peoples in the Great Basin (Nevada) and with Central California. The first wave that linked the coast of Northern California with the Great Basin emerged from about 2000 BCE to 200 BCE, then contracted from 200 BCE to 700 CE, and then expanded again from 700 CE to 1500 CE. Beginning in the 16<sup>th</sup> century CE there was another expansion within what became California based on a different kind of shell (clam disk beads), that linked Northern California with bead producers near Clear Lake in Central California<sup>10</sup>



the structural demographic secular cycles model devised by Jack Goldstone (1991) and by Peter Turchin and Sergei Nefadov (2009) (see below). The limitations that kinship norms placed on the ability of chiefs to obtain autonomous access to resources constrained the size and longevity of both within-polity and between-polity hierarchies in world-systems in which chiefdoms were the largest and most complex polities.

The beginnings of core/periphery hierarchies were mainly based on both intermarriage and on raiding and unequal exchange. These systems saw the emergence of proto-money, although that may have already emerged in Type 1 systems (Chase-Dunn *et al* 2013) and the shell-bead money mentioned in Footnote 10 above. The core polities were larger, more hierarchical and had demographic power over smaller non-core polities. Trade networks sometimes involved the purchase of slaves (Chase-Dunn and Grell-Brisk 2017). Some of the polities were larger than others and the institutions of within-polity hierarchy often diffused from where they had emerged first to adjacent polities because of their need to protect their territories from the larger and more hierarchical polities. All single polities began undergoing within-polity rise and fall but these cycles were probably not yet synchronized or counter-cyclical across polities.

This original rise of within-polity and between-polity inequalities was driven by both the desires of some individuals and groups to have power and influence over others but also by the need for coordination within polities the functional needs of interpolity systems that were becoming more complex (Service 1975). Religious specialists (shamans) had already existed in small systems, but their services in providing legitimation for authorities grew along with their numbers and powers in complex chiefdoms. The manufacture of both symbolic objects and tools went from being something every boy or girl should know how to do to becoming the province of craft specialists supported by the sacred chiefs. Paramount chiefdoms also began the practice of extracting tribute from less powerful polities (see Rountree 1993). Unequal exchange of surplus products became possible because of the power differences between polities.

Some world-systems got stuck in what has been called the “nasty bottom” of the iteration model (see Figure 5 below) in which geographical and technological constraints stood in the way of escaping the demographic regulator formed by population growth and conflict. Conquest by either a core chiefdom or a semiperipheral marcher chiefdom could lead to the formation of a larger and more hierarchical polity that would regulate system-wide conflict and access to resources. But this was made very difficult by geography in some regions like the Marquesas Islands in which steep mountains and rugged coastlines made island-wide conquest impossible, and so a cycle of population growth and warfare persisted before the Europeans arrived to impose island-wide and interisland regulation (Kirch 1991; Apkarian *et al* 2009).

Faced with rising population pressure and no means of leaving the home territory, people more often killed each other and engaged in more infanticide to regulate population growth. People from different polities also were more likely to encounter one another during hunting/procurement activities and were more likely to fight over scarce resources. In short, there was increased danger from resource shortages, and increased pressure to migrate out, which had become difficult or impossible. Inter- and intra-polity conflict became more intense as these pressures became greater. Conflicts reduced population pressure by killing off users of scarce resources. The human “nasty bottom” is analogous to what happens when flour beetles are placed in a jar. When the beetles’ food supply of flour is reduced, they eat each other. When more flour is put in, they cease cannibalism and have more little beetles. Over time there is oscillation around an equilibrium ratio between the number of beetles and the food supply ( See Figure 5 below).

### Type 3: Early State Formation and Early Empires: Tributary Mode Becomes Predominant

Early states emerged in systems in which there were already chiefdoms. This happened independently in Mesopotamia, Egypt, the Indus River valley, the Yellow River valley, the Andes and in Mesoamerica. This, and the independent emergence of sedentism, horticulture, and chiefdoms in several world regions that were only lightly interacting with one another, is evidence that sociocultural evolution has an internal logic that plays out somewhat similarly in different places and times (Adams 1966).

Within-polity inequality began to separate from kinship in the early states with the emergence of specialized governance institutions (standing army, cross-lineage religions (city-gods), official standardized measurement systems, regulation of markets, written legal codes, ethnic and class differences based on property and wealth, commodified debt.). The earliest cities<sup>11</sup> and states emerged in Mesopotamia on the flood plane formed by the Tigris and Euphrates rivers

Early Mesopotamian city states formed peer polity networks as adjacent locations in similar biomes adopted the institutional inventions of the first cities. Most early states were theocracies ruled by priests, but these added battle kings when states began to war with one another over territory and control of trade routes (see Chase-Dunn and Lerro 2016: Chapter 8). A system of allying and contending city-states lasted for nearly a millennium before the emergence of the world's first conquest empire, the Akkadian. Sargon of Akkad was a cup-bearer to the Sumerian King of Kish He led a rebellion of Semitic-speaking servants that formed a new regime and then went on to conquer most of the states of Mesopotamia and a large territory beyond. In Egypt empire formation occurred shortly after the rise of states when the South conquered the north. The story was somewhat different in each of the regions where states and empires independently emerged. In others. In others this autochthonous process was interrupted by incorporation into an expanding formerly exogenous system (Wilkinson 1986).

Both state and empire formation involved changes in within – and between-polity inequalities. Individual polities experienced the rise and fall of dynasties and the interpolity systems experienced the rise of and fall of hegemon or conquest empires. Connections between within- and between- inequalities in early states have already been mentioned. The adoption by the theocratic Sumerian city-states of the institution of the battle king was an adaptation to increasing competition and conflict in the Mesopotamian interstate system. Class and ethnic tensions between a Sumerian ruling class and immigrant Semitic servants from peripheral regions led to the rise of the Akkadian Empire.

The core polities became internally more stratified than the peripheral polities with whom they were trading and from who they were importing workers. This propelled both internal rebellions and the rise of non-core marcher states in which the warriors identified more closely with their leaders than did the soldiers of the older core states, who were asked to fight to protect crusty elites with whom they had little in common. This dynamic was theorized by Ibn Khaldun based on his studies of rise and fall in North African Islamic states (see below), but it applies as well to the rise and fall processes that occurred earlier and in distant regions. The secular cycle model mentioned above was inspired by Khaldun's *Muqaddimah* (see below). Non-core marcher state conquests occurred when an older core power was having inequality overshoot and a nearby non-core power developed a military advantage.

#### **Type 4: Iron Age Classical Tributary Empires, Endogenous and Shadow Empire-state systems, Non-core Marcher States, Non-core Capitalist City-states,**

Conquest tributary empires got larger while continuing to rise and fall. This occurred in West Asia/North Africa, the Andes, Mesoamerica, and East Asia. Tom Barfield's (2023) distinction

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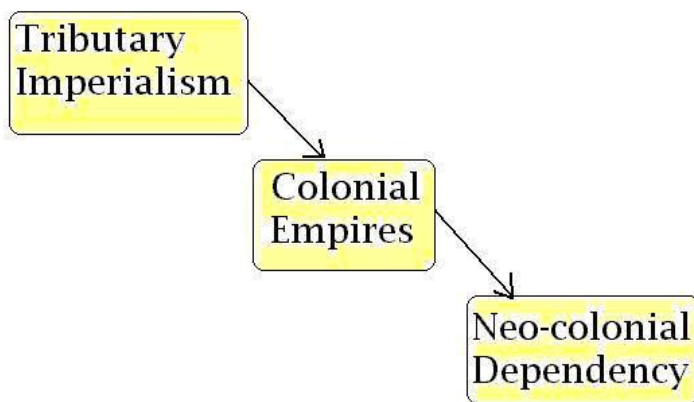
<sup>11</sup> The first human settlement to attain a residential population of 40,000 was Uruk on the Euphrates in 3100 BCE.

between Endogenous and Exogenous (Shadow) Empires turns on the sources of surplus product. Endogenous Empires primarily rely on surplus accumulated from internal agriculture and urban manufacturing. Exogenous (Shadow) empires primarily relied on their ability to extract surplus from Endogenous Empires.

Andre Gunder Frank and Barry Gills (1994) mistakenly claimed that AfroEurasia was a single world system already in the Bronze age, but they added helpfully to the analysis of systemic connectedness by developing the concept of “interpenetrating accumulation” (IPA) in which important flows of surplus (surplus product and surplus value) circulated in multiplicity networks. This idea was taken up and further developed by archaeologists studying Mesoamerica, especially Smith and Berdan (2003), Kepecs 2011; and Jimenez 2020). Susan Kepecs says that interpenetrating accumulation (IPA) is:

...the notion of single division of labor shared across political boundaries, ... IPA is the process through which elites in one zone capture part of the surplus captured by their counterparts in another. IPA engages people from multiple social strata, creating a complex political economy that shifts some labor (formerly invested in domestic production) to surplus production for exchange. As more workers are tied up in production for long-distance trade, more surplus in essential domestic goods is needed to meet local and regional demands (Kepecs 2011:96).

Barfield did not cite the Frank and Gills IPA concept, but his distinction between Endogenous and Shadow empires shines light on the same issue of the origins and destinations of surplus product and adds greatly to our comprehension of world-systems in which tributary empires were systemically interacting with one another and with smaller states and confederations of chiefdoms. Barfield’s review of the rise of thirty empires also tells many stories about non-core marcher states that conquered classical (endogenous) empires. And Barfield also summarizes the rise and fall of maritime empires, though his focus on the Iron Age occludes the emergence of Bronze Age semiperipheral capitalist-city state precursors of the Athenian and Carthaginian maritime empires. This was important because the rise of city-states and maritime empires in which profits were becoming more important than tribute was an important part of the path to the eventual rise of capitalism as predominant logic of accumulation.



The classical empires innovated technologies of power that allowed conquest polities to move beyond raiding for booty to the more long-lasting extraction of surplus from distant locations. They established colonial governors and tax farming and other extensions of institutionalized coercion and engaged in the movement of populations to new regions to be able to gather resources. But the costs of military campaigns and the abilities of imperial

**Figure 1: The Evolution of Types of Imperialism**

governance ran into limits as the distance from the empire’s capital and the frontier increased. Once the maximum size had been reached the flow of new surplus labor and goods decreased causing the need for social changes within the empire. This was part of the rise and fall process in which population pressure, the expansion of elites, decadence of leadership and competition and conflict

eventually led to a “time of troubles” in which dynasties collapsed or were conquered by invading polities. Classical endogenous empires did not just rely on coercion and conquest. Like later hegemonies they could lower the costs of domination by adopting universalistic ideologies that reduced the resistance of populations from whom they were accumulating resources. World religions that emerged from the non-core were adopted by the empires so that both the emperor and his subjects were conceived to be part of the same moral order. Again, we see connections between within-polity and between-polity inequalities. But did changes in the magnitudes of these occur synchronously, asynchronously or counter-synchronously?

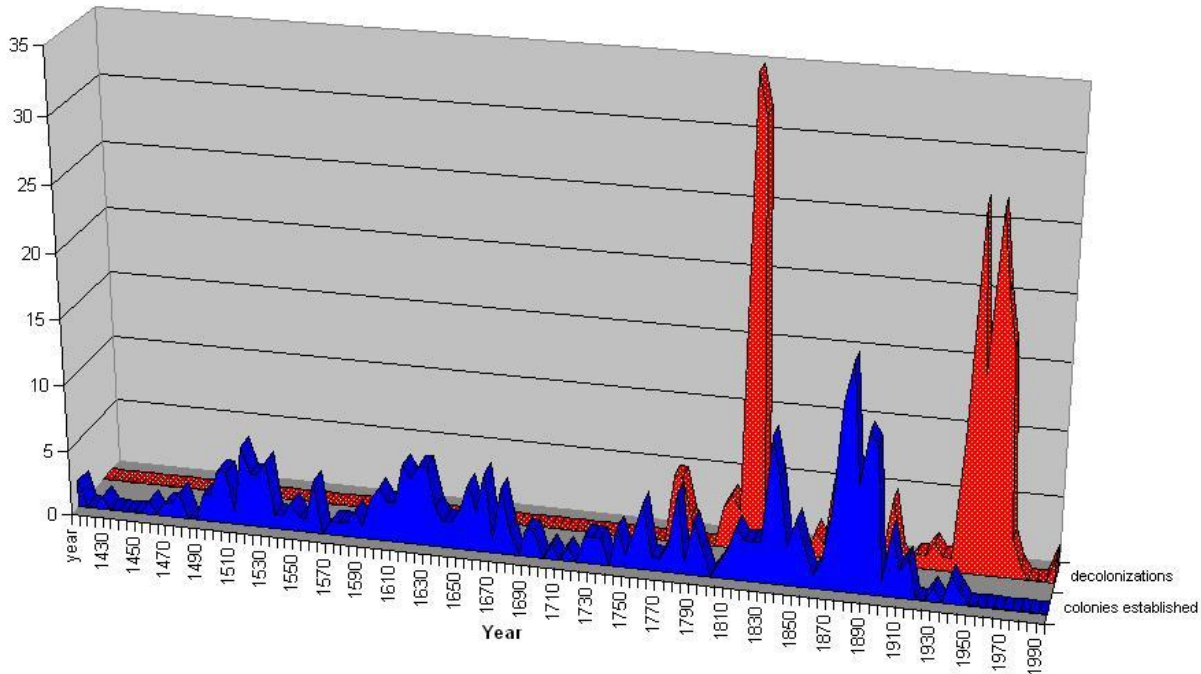
### Type 5: Modern Capitalist Hegemons and Colonial Empires

The modern Europe-centered world-system emerged as a recovery from the collapse of the Western Roman Empire after a rather long period in which states contracted into manors and the tributary mode of production survived as feudalism –warlords and their serfs producing mostly for subsistence (P. Anderson 2013a). Cities contracted and both local and long-distance trade came to a trickle. The Christian religion continued to spread, concentrated in monasteries. Contradictions within this politically decentralized system of manorial micropolities (Wallerstein 2011a), the rise of feeble entities like the Carolingian “Nostalgia Empire” (Barfield 2023) and the eventual return of trade connections with Afroeurasia after the crusades cracked the blockade posed by the Islamic empires, enabled the rise of a set of competing capitalist city-states on the Baltic and the Mediterranean Seas.

Genoa sought to break the Venetian monopoly over the Eastern trade by making an alliance with Portugal’s King Henry the Navigator and funding the establishment of trade colonies in Eastern and Western Africa to service an alternate route to India and beyond. While the crusades were the first wave of European colonial expansion, the Portuguese colonies began a second wave with the conquest of Ceuta (a former Carthaginian entrepot across the strait of Gibraltar) in 1415 CE. This wave of colonial conquest which established entrepots that would service trade was quite different from the imperialism of the classical empires, who conquered adjacent lands to extract surplus using coercion rather than commerce. Coercion was still involved, as it still is in the world of capitalist states, but it was supplemented by commodity trade and commodity production.

The fall of the Western Roman Empire and the coming of European feudalism produced a reorganization of within- and between-polity inequalities in which within-polity inequality evolved from latifundia slavery to minifundia manorial serfdom and between-polity hierarchy decreased from empire to minipolities. The interpolity recovery from the fall of Rome was weak for centuries and the endogenous empires that eventually emerged in Europe were poor imitations of Rome despite nostalgically claiming its name (Barfield 2023). Instead, there was an emergence of absolutist monarchies (P. Anderson 2013b) and a cluster of capitalist city-states that morphed into a system of nation-states in which accumulation became reorganized around capitalist profit-taking in a series of waves. The concentration of commercial city-states pushed the larger states into using naval power for what Frederic Lane called “protection rent” -- the extra profits to be had by commodity producers and merchants who were provided protection at cost (Lane 1979:12-13). Classical endogenous imperialism was eclipsed by nation-states with colonial maritime empires. The cycle of empire rise and fall was replaced by a process of the rise and fall of hegemonies that did not conquer other core powers but rather employed coercion and consent to reproduce a politically multicentric core. The waves of centralization and decentralization continued but in the form of the rise and fall of modern hegemonies. This was somewhat less disruptive of the world economy than the rise and fall of endogenous empires had been, constituting an instance of evolution in the institutions of global governance. The Westphalian agreement that states would protect one another’s sovereignty against rogue attacks and that equality among states was, at least in principle, possible was part of

this evolution. And the European state system spread to the colonies in a series of waves of decolonization, eventually producing the global system of today in which the United Nations recognizes 200 sovereignties.



**Figure 2: Waves of European colonization (blue) and decolonization (red) since 1405 CE to 1990 CE** Source: Henige (1970); updated to 1990.

The first modern capitalist city/nation-state was the United Provinces of the Netherlands, an intermediate form between a city-state and a nation-state that was a forerunner in the development of new economic institutions in the 17<sup>th</sup> century CE. By defeating the Spanish Empire’s campaign to reconquer Antwerp the Dutch rebels propelled the process of replacing endogenous empires with core nation-states with colonial empires. In Amsterdam they invented the stock exchange and the Dutch East India Company (a proto transnational corporation) for exploiting their colonies. And their contentious alliance, and then enmity, with Britain helped to shape the eventual rise of British hegemony after a long 18<sup>th</sup> century contest with France.

The coming of predominant capitalism also produced a rearrangement of the location of lesser and greater within-polity inequalities. For the first time core powers came to have less within-polity inequality than non-core polities, which produced a degree of class harmony within core that reinforced state legitimacy and provided greater internal solidarity for mobilizing both economic and military power. (see Table 1 above). The contentious rise and fall of dynasties was replaced in those polities, mostly in the core, by a more regulated and less violent process of regime change in the form of elections.

Industrialization of the core in the nineteenth and early twentieth centuries increased economic inequalities within core states with the rise of the capitalist bourgeoisie and its robber barons and greatly increased between-polity inequalities because average productivity and GNP per



capita increased in the industrializing core and not in the non-core. This was an instance of within- and between- synchrony.

## Type 6: U.S. Hegemony without formal colonial empires, Neocolonial North/South Inequalities

Until its incorporation into the Europe-centered system that part of North America that became the United States was the home of several regional world-systems that included very small systems of Type 1 and regions in which chiefdoms and early states (Types 2 and 3) had been emerging (Chase-Dunn and Hall 1998c).

As when Europeans began to colonize this region it became peripheral to the French, British, Dutch and Spanish core states, and in the late eighteenth century a decolonization movement succeeded in establishing formal hegemony in what Seymour Martin Lipset (1973) called “the first new nation.” This was the beginning of what has been called the World Revolution of 1789 that saw the rise of popular sovereignty and republicanism in France a great wave of decolonization in Latin America that included a successful slave revolt that led to an independent Haiti.

The Napoleonic Wars were a close-run struggle between France and Britain for global hegemony. The victory of Britain produced the global nineteenth century in which the Westphalian state system within the core was maintained and the system of core countries with colonial empires was sustained despite the huge wave of decolonizations that began in 1776. The failure of Britain to take back her rebellious thirteen North American colonies in 1812 allowed the eventual emergence of a continent-wide independent United States based on a new form of imperialism -- settler colonialism and the incorporation of territories into the governance structure as equal “states” (provinces) in a federal polity (Go 2011).

The U.S. moved economically into the core in the 1880s after a violent civil war over slavery and between different kinds of capitalists. In the U.S North were manufacturers and free workers who supported the policies of Alexander Hamilton and Henry Clay – challenging the core status of Britain by linking agriculture with domestic industry in the cities, and using tariff protections to protect infant industries. The South was led by agrarian plantation owners who wanted to remain exporters of raw materials to the manufacturing industries that had emerged in the European core states. They wanted free international trade and the extension of slavery to the West. (Chase-Dunn 1980).<sup>12</sup>

Colonial exploitation using coercion moved in the direction of more neo-colonial extraction based on foreign investment, loans and interest payments, and comprador elites who facilitated core exploitation of the non-core in a context in which formally decolonized non-core states have the trappings of independent sovereignty. International organizations emerged ostensibly to help keep the peace and to provide fairness in international relations, but they also facilitated the power of core states and the abilities of core corporations to accumulate profits from the non-core and to continue the operations of economic and ecological unequal exchange.

Transnational corporations grew to become ever more important players in the world economy and global value chains in which parts from many different countries were assembled to produce final products expanded. The world-system became ever more economically globalized in waves of growing connectedness by international trade and investment that were interspersed by periods in which connectedness decreased but then recovered its upward trend. There were also waves of democracy in which autocratic states adopted the institutions of electoral democracy, but

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<sup>12</sup> Interestingly nearly all the newly decolonized Latin American countries had similar civil wars except that in every case it was the internal “South”: that won.

these too were interspersed by periods of backsliding in the 20<sup>th</sup> and 21<sup>st</sup> centuries (Markoff 2016; V-Dem Report 2024).

The sequence of capitalist hegemonies evolved in Giovanni Arrighi's (2010) portrayal of a series of systemic cycles of capitalist accumulation that began with the alliance of Genoa and Portugal in the fifteenth century, followed by the Dutch, the British and the United States. The hegemonies got larger and reorganized the world economy and global governance as they rose. Perry Anderson (2017:109) described Giovanni Arrighi's (1994) notion of modern hegemony as:

Internationally, the condition of hegemony was a superior model of organization, production and consumption, inducing not only compliance with the ideals and values of the hegemon, but generalized imitation of it as a model among other states.

In turn, such hegemony yielded benefits for the ruling groups of all states, by setting predictable rules for the international system and policing common threats to it.

Some of the benefits of this kind of hegemony were extended to the non-core with the demise of the colonial empires. And the demographic revolution (decreasing death rates followed by decreased birth rates) reduced the force of human population pressure and promises to eventuate in a stable global population at some point in the 21<sup>st</sup> century. This will not eliminate population pressure as an evolutionary force, but it changes and reduces its effects. It also produces new problems by altering the population structure to include a larger proportion of old people.

Regarding within- and between-inequality, within- inequality decreased as the World Revolution of 1917 brought communism to some non-core states and social democratic welfare states in many core states. The socialists and communists threatened the private property of the capitalists and so the rough edges were taken off in the New Deal programs and income inequalities decreased. These changes were reversed in the 1970s and 1980s when neoliberalism replaced global Keynesianism as the predominant policy model in most core states and at the International Monetary Fund. This allowed attacks on labor unions, the privatization and deregulation of many publicly-controlled organizations and sectors and the rise of global financial capitalism. It also promoted the relocation of capitalist production to low-wage countries which decimated many regions within the core and moved many workers who had had relatively high wage jobs to low-wage jobs but raised incomes in the countries to which capital flowed. Within- inequality increased in many countries to unprecedented levels as the rich got a lot richer and the middle classes contracted. But the relocation of capital to non-core countries, especially China and India, produced a more equal distribution of between-polity income (Lakner and Milanovic 2016 This was an instance of counter-synchrony – within- going up and the between “Elephant Curve”- going down.<sup>13</sup>

### Type 7: A Federal Global State with Nation-States as Subunits

The modern world-system's evolution of global governance has been mainly driven by the rise and fall of hegemonic core powers since the fifteenth century, but after the Napoleonic Wars the slow rise of supranational governance began. The Concert of Europe was organized by Britain and the Austro-Hungarian Empire to prevent future Napoleonic-type episodes, but the two main players fell out over what to do about growing Italian nationalism and the Concert fell silent. The League of Nations was created after World War I to prevent future world wars, but the United States never joined. Nevertheless, the League organized early versions of standardized accounting and record-keeping that were useful inventions when, after World War II the United Nations was

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<sup>13</sup> In 2014 David Harvey wrote: There has been a double movement over the last forty years: on the one hand a general trend towards a levelling up in per capita wealth and incomes across states (apart from those, like Greece, hit hard by the recent crisis) and on the other dramatic increases in income and wealth disparities among individual and social groups in almost every country of the world ( Harvey 2014:171).



born. The U.N. was created to be a club of nations that was intended to provide global security (peace) by facilitating communications, cooperation and resolving conflicts peaceably. It's Charter warrants a General Assembly in which each member (sovereign states) has one vote. Security actions are the jurisdiction of the Security Council whose permanent members each have a veto power over proposed actions and declarations. The permanent members are those countries that won World War II. (The United States, France, Britain, Russia and China).

The U.N. is not a state because it does not have a monopoly of legitimate violence, and it lacks an enforceable structure for obtaining resources. The U.N. Peacekeeping forces lack serious military capability and are legally constrained from engaging in battle. There are serious military alliances such as the North Atlantic Treaty Organization, but it is not under the control of the U.N. The U.N is mostly a debating society that tries to address problems by diplomacy and consensus-building. The European Union is another important supranational organization because it demonstrates that a degree of international sovereignty can be constituted without resort to military conquest.

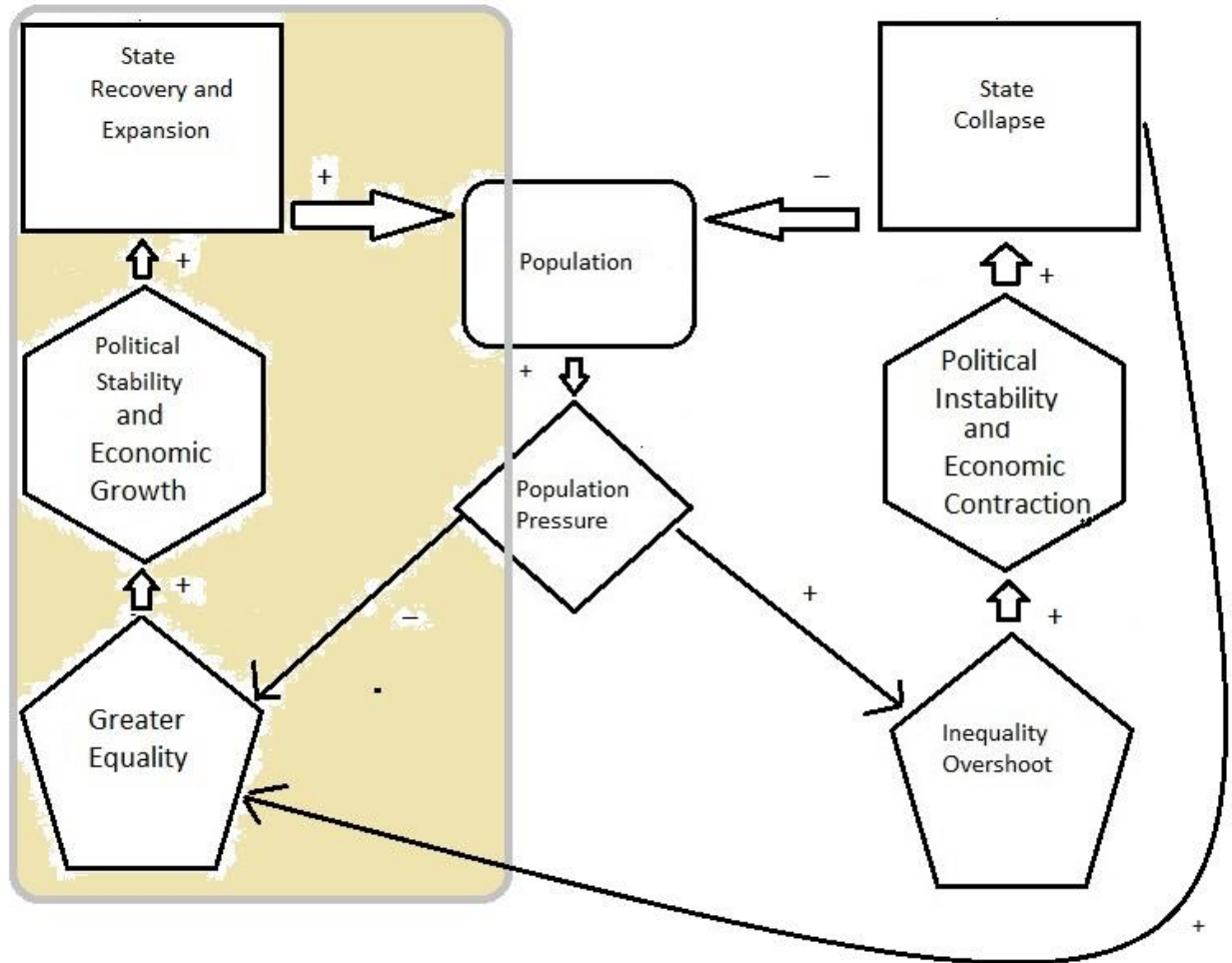
The waves of global governance evolution have, as with the rise and fall of empires, been mainly the outcome of wars. This is a primitive leadership selection mechanism but humans have already invented less violent substitutes for within-polity succession. The human species, if it survives the coming time of troubles during the period of U.S. hegemonic decline, will probably get around to building a real global state. But as with many aspects of sociocultural evolution, two steps forward are often followed by one step back. Brexit and the apparent popularity of “America-firstism” (both within the U.S. and in many places that have been pushed around by U.S. hegemony) show that a global federated democratic state (or alternatively a global police state) may be yet a long way off. There is a lot of uncertainty about how the within- and between- inequalities will evolve in Type 7 (as indicated in Table 1) because this Type has not yet come to be and there are several possible global structural futures during and after the current time of troubles.

### **Models and Levels of Analysis: Why A Bilevel Model?**

World-systems are nested networks in which wheels within wheels within wheels interact with one another. The current global system is composed of all the human individuals on Earth as well as those (few) who are orbiting it. And individuals live in households that are located in rural areas or in neighborhoods that are within settlements (hamlets, villages, towns, exurbs, suburbs, cities, and urban agglomerations). Individuals also usually participate in civil society organizations (firms, clubs and associations, religious organizations, educational institutions, local, national and transnational social movement organizations) and these interact with one another and with government authorities organized in municipalities, counties, provinces, nation-states and international governmental organizations. And all these are nested within local, within-polity regional, national, transnational, world regional and global economic, political, kin-based, and communications networks. The global reality is a very complex nested network. And earlier middle-sized and large regional world-systems were similarly complex nested networks of systemic interactions.

But grand complexity is the enemy of computational simulation modeling. Modelers are forced to assume a degree of simplicity because a model that looks like a bowl of spaghetti does not have identifiable outcomes and is not testable. This recognition is not a license to do just anything that is beautiful or convenient because the purpose is to get at the essential deep structure of a process (or set of processes) and to replicate abstractly those main features that operate in the reality. So we will reduce the complex reality of a multilevel set of nested networks to just two levels – the level of single polities and the level of whole systemic interaction networks (world-systems). Many of those scholars who are also trying to explain sociocultural evolution with computational models focus on only one level of analysis – the polity. We contend that enough value will be added

by including the larger level of interpolity systems to make the additional complexity worth the cost. But the proof will be in the pudding.



**Figure 3: Causal form of the structural-demographic model of the within-polity secular cycle**

Figure 3 is a revised diagram of the single-level structural demographic model presented by Peter Turchin (<http://peterturchin.com/structural-demographic-theory/>) as the main logical components of the structural-demographic theory.<sup>14</sup> The right side is the main focus of the secular cycle model of state collapse. “Inequality overshoot” includes increasing overall inequality (landless peasants, wage stagnation, unemployment) and the expansion of the size of the elite. Political instability and economic contraction include elite competition and conflict, mass rebellions and social movements from below, banditry, peasant revolts, civil wars, coups and revolutions. State collapse involves the decline in state legitimacy, fiscal crises, failure of military power and the failure of state-managed welfare institutions. The negative effect of state collapse on population size was due to famines, civil wars, emigration, economic disruptions, and failures of infrastructure. The positive effect of polity collapse on within-polity equality was due to the losses of elite powers and wealth and expanded opportunities of subaltern peoples no longer under the control of states or empires.

<sup>14</sup> The structural demographic theory explicitly treats processes involving interactions that are external to individual states as exogenous, but an article by Turchin, Gavrilets and Goldstone (2017) proposed the development of a bilevel model that would include interpolity variables such as warfare and economic globalization as well as processes operating at the level of individual decision-making.

The left side of Figure 3 depicts polity recovery and expansion. This is the part that is needed for explaining both the upswings and the upsweeps that our research has found (Inoue et al 2012; 2015) Population pressures caused both polity collapses and recoveries. But it was under conditions of polity collapse that population pressure supported polity recovery or expansion.

Population pressures cause state collapse and relaxing of population pressures enables state recovery. People got tired of conflict and killing, and eventually a new elite coalition emerged that reorganized the state and the economy.

## Ibn Khaldun Cycles

The structural demographic cycle of political instability has been theorized to occur entirely within polities (states), but this kind of model recalls Ibn Khaldun's (1958) interpolity model of both state formation and state breakdown – dynastic cycles. Ibn Khaldun was a Tunisian Arab from an Andalusian family. In the 14<sup>th</sup> century CE<sup>15</sup> he argued that dynasties typically lasted three or four generations. A dynasty would get old and corrupt, and “barbarians” (what we call non-core marcher states) would take over. The non-core marcher polities that Khaldun knew about were nomadic pastoralists whose polities had less within- inequality than did the urban polities that they conquered. The leader of a “barbarian” marcher polity had to be generous, charismatic, and a sophisticated war leader as well as a good manager to inspire his warriors and to get their strong support. His followers thus developed *'asabiyah*, basically loyalty, but more than loyalty -- an obligation formed by the leader's generosity (they owed him for feasting, presents, etc.) and by respect for his abilities and successes.

With strong leadership and *'asabiyah*, a marcher polity could take over an older core state and found a new dynasty. The first generation went well. The leader was the charismatic founder. There was lots of land and loot, to say nothing of women and slaves, captured from the former dynasty. The warriors were duly rewarded for their *'asabiyah*. They settled down, but they were still warlike enough to hold the state against all comers.

The second generation was often a Golden Age, with the dynasty ruling over a realm of peace and prosperity. Wealth derived from using the land and other resources, producing taxes which were used to support brilliant culture, science, and literature. The empire often expanded at the expense of its neighbors and the population grew.

The third generation was a time of decline. The land filled up with people. Production declined because of environmental degradation and taxes also declined. The rulers had to raise taxes and tributes to keep going. Military expansion hit limits. –The costs of war now exceeded the returns. The ratio of war expenses to captured loot declined because the low hanging fruit had already been picked and remaining targets were further away, requiring greater expenditures for conquests. Meanwhile the court was now far from its charismatic founder. The royal family had expanded, and there were large numbers of supernumerary princes running around desperate for wealth. The bureaucracy had expanded to try to control the mess. Princes and bureaucrats fell prey to corruption. How else could they keep up their lifestyle? This meant still more taxes on a population that had expanded while the land based had ceased to grow.

The fourth generation saw overpopulation, corruption, decadence and a broken system. The population became disloyal, and rebellions broke out. The stage was now set for another non-core marcher state to take-over. The whole cycle took about 100 years (generations are typically 25 years).

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<sup>15</sup> We use the convention developed by world historians to designate calendar years CE= “common era” (since the birth of Christ) and BCE “before common era” This conveniently corresponds with the more usual BC/AD convention and was intended to be somewhat less Eurocentric. Archaeologists use B.P. (Before present) in which present means 1945 when the detonation of atomic explosions altered the background radiation levels used to calibrate radio-carbon dating.

This cycle played out with incredible faithfulness throughout Near and Middle Eastern history. Turchin and Nefedov (2009) argued that in areas that were less exposed to pastoralist nomadic marchers, the cycle usually took more generations, typically 200 to 300 years. And the dynastic changes were more often due to internal coups, rather than non-core conquests. China tended to alternate between periods of disunion ruled by small dynasties that lasted about 75 years and periods of union under dynasties that ruled from 200 to 400 years, but which followed the dynamics of Ibn Khaldun's cycles (charismatic leader, golden age, overpopulation, corruption, collapse) to the letter except that some of the new dynasties were founded by Chinese generals who co-opted popular revolutions, not by marcher lords (see also Lattimore 1940).

## The Revised Whole System Iteration Model

The bilevel spiral model includes processes that operate within polities and those that operate in the whole system of interacting polities. The main empirical variables we are trying to explain are proxies for sociocultural complexity and hierarchy and these can be operationalized both within polities and in whole interpolity systems.

We have added several important variables to the whole system level model that were not included in the original iteration model proposed by Chase-Dunn and Hall (1997: Chapter 6). Recall that the variables in this model are attributes of the whole world-system under study. For example, total population is the number of humans who are residents of the whole system and the other variables are also attributes of the whole system.

The whole-system variables are:

1. Total Population of the whole system
2. Resource availability (food, energy, size of the economy, etc.)
3. Population Pressure (relationship between population size and available resources)
4. Epidemic Diseases
5. Non-anthropogenic Climate Worsening
6. Environmental Degradation (includes anthropogenic climate worsening)
7. Emigration
8. Circumscription<sup>16</sup>
9. Warfare (level of interpolity conflict)
10. World Revolutions (periods in which local rebellions and unrest cluster in time)
11. Technological Development (includes production, distribution (transportation) and organizational techniques)
12. Interpolity trade
13. Non-Core Development (includes non-core marcher and specialized trading polities)
14. Interpolity Hierarchy (degree of power configuration<sup>17</sup> in the interpolity system)
15. Interpolity Complexity (interpolity division of labor and specialization)

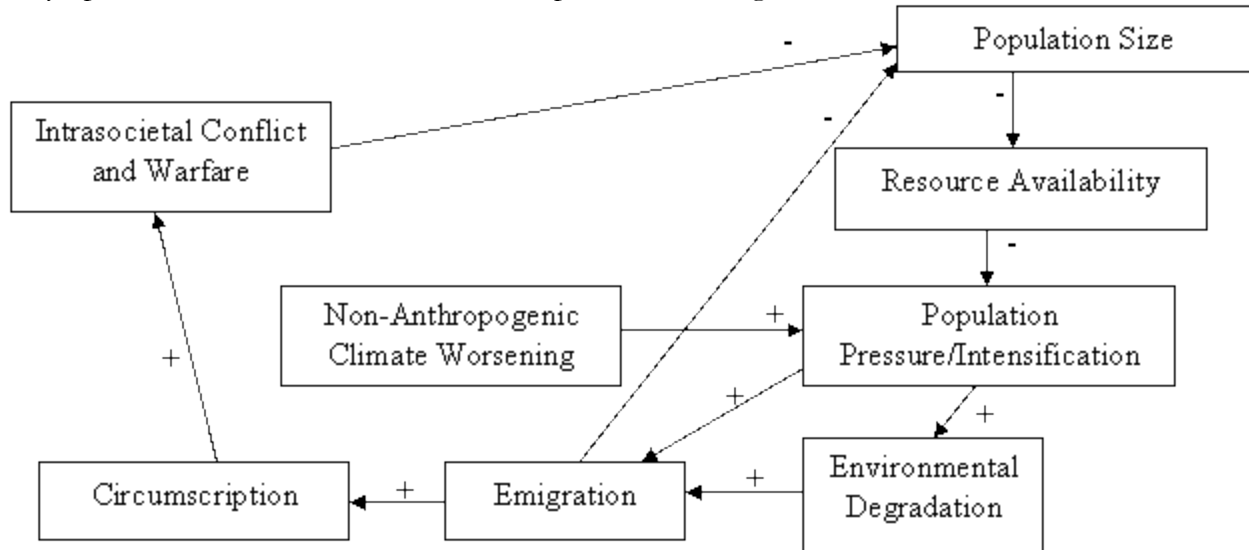
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<sup>16</sup> Circumscription means that opportunities for migration to new home places are restricted by either geographic or social factors. Once all the resource-rich regions have been occupied only resource-poor areas are left and the current residents of the resource-rich areas may not want migrants and may have the capabilities to repel immigration. Robert Carneiro (1970) saw circumscription as an important causal component in the rise of early states.

<sup>17</sup> David Wilkinson's power configuration variable codes the distribution of relative military power among the states in an interpolity system (see Wilkinson 2004.)



demographic regulator that humans share with many other species. The full model in Figure 4 above explains how human interpolity networks expanded and became more complex. The nasty bottom module shows the pressures and processes that kept humans (and continues to keep many other species) stuck in bounded, relatively small world-systems that were not evolving. The nasty cycle only operates after a condition of circumscription has emerged.



**Figure 5: The Nasty Bottom Demographic Regulator (Source Apkarian *et al* 2009)**

The nasty bottom submodule has no technological or organizational changes. It was those systems that managed to escape the nasty bottom that led the slow and then faster and faster expansions of size, complexity and hierarchy.

## The Revised Secular Cycle Model:

The revised secular cycle model includes some variables that impinge upon a polity from interaction with people outside of that polity. We added trade, warfare, climate change, and epidemics that are suggested by the hub theory, panarchy, Diamond, Lieberman, Khaldun and Wilkinson.

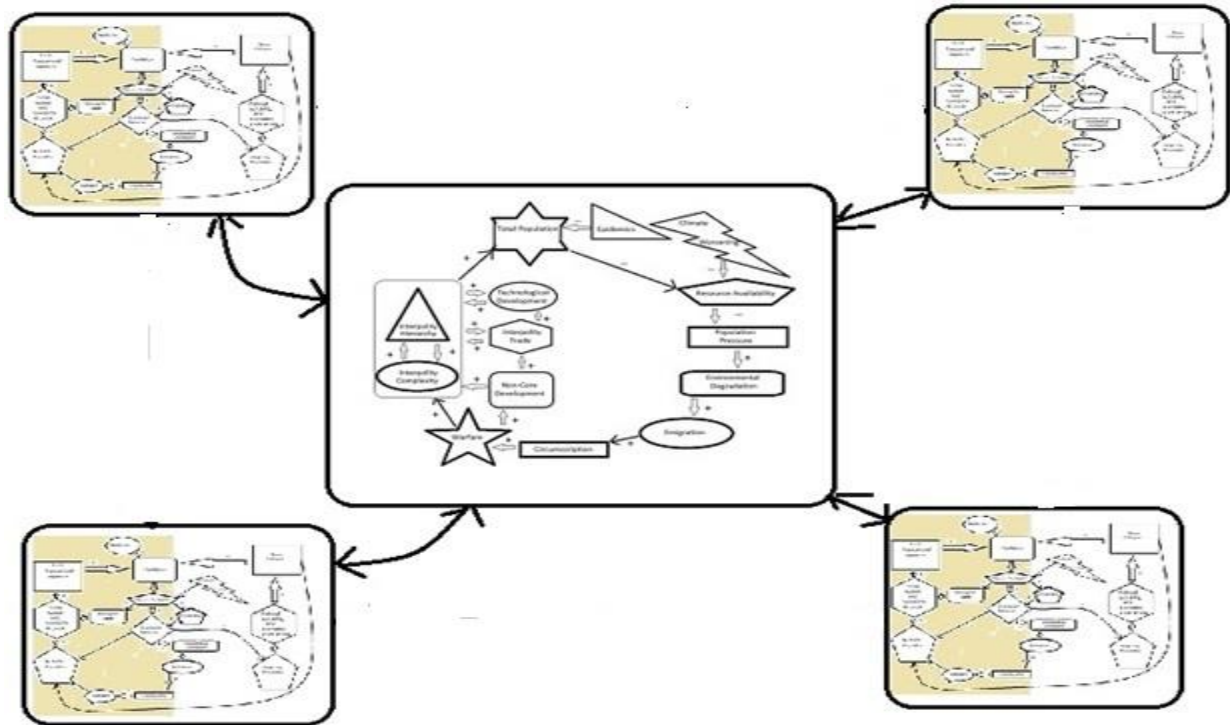
The within-polity independent variables are:

1. Total population of the polity
2. Resource availability (arable land, size of the economy, etc.)
3. Population pressure within the polity
4. Epidemics
5. Interpolity exports and imports
6. Non-anthropogenic climate worsening
7. Environmental degradation (including anthropogenic climate worsening)
8. Emigration
9. Immigration
10. Circumscription
11. Warfare
12. Technological Development
13. Inequality overshoot (greater overall inequalities of income and wealth and size of elite)
14. Political instability, social movements, intralite conflict and economic contraction
15. Political stability, economic growth and ethno-nation-building
16. State collapse
17. State recovery and expansion





that does not have identification problems due to reciprocal causality among variables. Our studies so far show that we have at most about six or seven whole world-systems for purposes of comparison. But the construction of a bilevel model can help to clarify the results we are able to obtain comparing the systems that we have. And we hope to be able to use a combination of agent-based modeling with our polity models as interacting agents inside our system-level model for purposes of simulation.



**Figure 7: The Bilevel Model With One Whole System and Four Single Polities**

Figure 8 depicts a simplified version of the bilevel model with the whole system model in the middle and four polity models around the edges. For purposes of simplicity, we do not allow the polities to have direct causal relations with one another that do not go through the system model. The system model contains both whole system contextual variables and interpolity relations.

Within-Polity Variables	Whole System Variables
Total population of the polity	Total Population of the whole system
Resource availability (arable land, size of the economy, etc.)	Resource availability (food, energy, size of the economy, etc.)
Population pressure within the polity	Population Pressure (relationship between population size and available resources)
Epidemics	Epidemic Diseases
Non-anthropogenic climate worsening	Non-anthropogenic Climate Worsening
Environmental degradation (including anthropogenic climate worsening)	Environmental Degradation (includes anthropogenic climate worsening)
Emigration	Migration
Immigration	Circumcession
Circumcession	Warfare (level of interpolity conflict)
Warfare	Interpolity trade
Interpolity exports and imports	Technological Development
Technological Development	
Inequality overshoot (greater overall inequalities of income and wealth and size of elite)	Non-Core Development (includes non-core markets and specialized trading policies)
Political instability, social movements, intralite conflict and economic contraction	World Revolutions
Political stability, economic growth and ethno-nation-building	Interpolity Hierarchy (degree of power concentration in the interpolity system)
State collapse	Interpolity Complexity (interpolity division of labor and specialization)
State recovery and expansion	
	Interpolity Overshoot

**Table 2: Variables in the Bilevel Polity and Whole System Model**

The variables in the two models are related to one another in two different ways. Looking at Table 2, the variables within the box include all those for which the value of the polity variable is an additive component of the corresponding system-level variable at the level of measurement. These variables may also have causal effects on one another that are somewhat different from their compositional aspects. The remaining variables (those not inside the box) are not compositionally related. They are characteristics of polities or of the whole system, that may be related causally but not compositionally.

### Tentative Conclusions and Next Steps

The connections between within-polity and between-polity inequality evolve over time as world-systems get more complex and more hierarchical. While the two types of inequality both emerge and expand since the Stone Age, the ways in which they interacted changed as human polities evolved as can be seen from Table 1 and the discussions of world-system Types 1-7 above. Our guesses regarding synchrony/asynchrony/counter-synchrony certainly need closer studies of changes in quantitative proxies over time. But estimates of settlement population sizes and the territorial sizes of polities are becoming more available. And so are David Wilkinson's coding of changes in the distributions of military power among interacting states, so testing our hypotheses will become increasingly possible.

Regarding our construction of causal models, we need to go through the pairs of variables and discuss the existence of causal relations among each of the variables in the polity and whole system models and the directions of causal relations between the pairs, especially equality overshoot and collapse. And we need to examine exogenous variables and add them to the models. Diffusion, long-distance incursions, non-anthropogenic climate change and natural disasters all impacted endogenous processes of the emergence and increase of size, complexity and hierarchy.

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