The Complexity of Nomadic Empires

J. Daniel Rogers
Smithsonian Institution

ABSTRACT

The culture and organization of human societies encompasses differing levels of complexity. Generally, there are two types of complexity that are most recognizable: first, those represented by the social interactions and cultural practices of everyday life, periodic ceremonial practices as part of religion, and cultural traditions. A second type of complexity is recognizable through social institutions, especially control hierarchies, bureaucratic functions, and networks of interactions across social and political boundaries. Among the pastoralist/nomadic polities of Central and Inner Asia we know many aspects of complexity in general outline, but seldom in detail. Through the use of social theory, document analysis, ethnography, and archaeology new details and interpretations continue to emerge. Taken together, these new forms of information are beginning to allow the kinds of research I propose below.

The articles in this volume contribute numerous new details and ways of interpretation within the context of several different theories. In this article I will selectively highlight a few of these ideas by focusing on specific themes that I think will help place our collective work within a global context and in relation to emerging theories and methodologies. The themes I focus on include the concepts of complexity, theories that account for dynamic processes, forms of political power, and comparative analysis concerning how the pastoralist polities fit within general theories of culture change.

COMPLEXITY

Complexity, like many interpretive terms in the social and historical sciences, is typically used in a metaphorical sense, with definitions that vary from researcher to researcher. Across the sciences the term is used in other ways. Generally, in archaeology the term 'complexity' is used in high-level descriptive and comparative analysis of the components of a society. Usage is seldom based on a specific formal analysis of attributes that pro-

vide the rationale behind what is considered complex or not complex. In some cases, the term complexity is used to describe systems that are complicated, but do not necessarily have the attributes of complexity. While all human societies are complex, most researchers would agree that a hunter-gatherer band, such as the Yanomami in Brazil, is less complex than the Roman Empire, for example. That is, one society is judged to be more or less complex than another, based on relative scale, technology, specializations, status hierarchies, and control hierarchies. However, assessing complexity still depends on perspective and one's analytical goals. Declaring that one society is more or less complex than another is not a very useful conclusion by itself.

Understanding how complex systems actually function has emerged as one of the important trends in interdisciplinary research over the last two decades. Usually termed Complexity Theory, the group of concepts developed in this field has major implications for anthropology, whether in human biology, individual action, social institutions – at one end of the spectrum – to globalization and world systems at the other (Lewin 2001; Kohler 2012; Mitchell 2009). Turchin's (2003) work on historical dynamics offers useful parallels. In ecology the concepts of the Adaptive Cycle and Panarchy utilize Complexity Theory as a way to better understand the dynamics of change (Holling 1973; Garmestani, Allen, and Gunderson 2009; Gunderson and Holling 2002). Arguably, Complexity Theory has its origins in Chaos Theory and Catastrophe Theory, developed in an attempt to interpret periods of seemingly chaotic change (Hayles 1991; Thom 1983; Turner 1997). The attempts to understand complexity and seemingly chaotic change come from the centuries-old quest to discover whether every effect can be linked to a single cause or only to a group of potential causes (Oestreicher 2007).

The point of discussing some details about complexity here is to move towards a more complete way to analyze change or stasis in social systems. Several authors have described the primary concepts associated with Complexity Theory, including Holland (1998), Kay *et al.* (1999), Robinson (2009), and Rogers (2017). The key concepts are:

1. A *Hierarchy* of organized functions exists within the system. There are several different types of hierarchies (Ahl and Allen 1996; Lane 2006; Rio and Smedal 2009). In social research political hierarchies that control forms of power are of primary interest.

2. The *Emergence* of similar patterns occurs across demographic and social scales.

3. *Self-organization* occurs over time. A resilient system, for instance, is a characteristic of self-organization and includes functional redundancies, such as social systems with a high degree of heterarchy (Crumley 1987; see Kradin, this volume).

4. *Nonlinear* interactions on a small scale may have large results, sometimes with stability but no single equilibrium. The details that emerge from ethnographic, historical, and archaeological research make it possible to develop finer chronological scales and better interpretations of social interactions.

5. The system has *initial sensitivity*. Human societies are heavily affected by initial conditions and changes that take place over time. For instance, in the initial formation of a polity leadership, organization, geographical location, and other factors profoundly affect the trajectory of the social and political system over time. Essentially, this means that history never exactly repeats itself. It also means that traditions are important for predicting future changes.

6. *Openness* of the system means that boundaries are not easily defined and are therefore not crucial to explanation.

7. *Holism,* the components of a social system are greater than the sum of the parts.

Complexity science has shown that the development of complexity in human societies is not a linear process, nor can it be understood through only the lenses of demographic or environmental determinism (Cegielski and Rogers 2016; Feinman 2013; 1995: 274). There is also substantial evidence that the cycles often described in human history are better recognized as repeated decision making, shifts, turns, and realignments. However, some kinds of cycles do exist, but primarily as a repetition of events that may then have different outcomes. Canonical theory is a good example of a comprehensive approach to change based on iterative decision making processes (Cioffi-Revilla 2005; Rogers and Cioffi-Revilla 2009). Below, a theory of *dynamic trajectories* is described that accounts for some of the gaps noted in existing theories (Rogers 2017).

From the non-linearity of social change it follows that multiple factors play a role in high-level interpretation – no single cause is likely to be a sufficient explanation. Further, the non-linear processes of complexity development depend on non-equilibrium conditions. In turn, such conditions can be investigated through the study of dynamic processes. No matter the differing styles of our intellectual traditions we have the ability to study dynamics. To do so in a meaningful way requires sufficient detail. As an example, traditional cultural evolutionary theory, transitional approaches, and those that define increasing cultural complexity as 'progress' are essentially theories of predictable linear change, even when periods of 'stagnation' are recognized. Cultural evolution was initially formulated on the basis of scant detail. As our knowledge has improved, especially in chronology, system scales, and the diversity of cultural practices, simple linear reading of culture change no longer function. The development of trajectory or historical patterns over time, may instead be

viewed as the consequences of self-organization in complex systems along with a wide variety of human decision making – some logical and some not.

One measure of the complexity of interactions between social systems and the environments they inhabit is the abundance itself of explanations offered to describe and account for complexity in a particular system. These explanations derive from numerous fields of study and offer a wealth of ideas. Among these different approaches there are various levels of attention applied to how local dynamics are related to global change, although many approaches do not recognize the often-observed disjuncture between the scale of a change and its consequence. That is, how can a seemingly small force or event (*initial sensitivity*) trigger a response resulting in massive change to the entire system? Implied in this question is the study of how to predict tipping points or bifurcations. The answer seems to lay in the comparative study of scale and long-term change trajectories and the recognition that there are fast and slow processes (*e.g.,* Cioffi-Revilla 2005). Multiple disciplines have considered the interplay between slow and fast processes; however, in our fields we tend to mix these two without recognizing that they represent different scales of analysis and impact. Slow and fast processes are nothing new to history. For instance, the French Annales School, especially Fernand Braudel (1958, 1980), made a distinction between the *longue durée*, long-term historical structures, and *histoire événementielle*, short-term events – essentially, fast and slow processes.

There is more to interpreting change than recognizing slow and fast processes. Societies sometimes resist change or change slowly in spite of the replacement or evolution of individual practices, including the interactions between these practices (Bryson 2014). Archaeologically, good examples of long-term stability come from the Valencian Bronze Age in Spain (Cegielski 2019) and the Ostionoid tradition in the Caribbean (Rouse 1992: 32). At the same time many studying the development of complex human social systems, from various disciplines, have noted the rigidity of human control hierarchies and how subject they are to collapse. There is clearly a need to reconcile this forest of different perspectives and ideas.

As Bondarenko, Korotayev, and Kradin (2003: 3) pointed out nearly two decades ago: 'It is clear that in reality one ought to speak not about a line or even a plane or three-dimensional space but about a polydimensional space, a field of social evolution.' Below, I comment further on how the idea of a polydimensional space may be interpreted in a theory of *dynamic trajectories*.

Whether viewed from complexity science or social-historical research, dynamic change occurs within a set of parameters (initial conditions) that

then produce novelty or stasis or other changes. All of these changes may occur simultaneously in a polydimensional way. One way to bring together similarities in interdisciplinary perspectives and reconcile some of the differences that exist in contemporary thinking is to develop a series of linked concepts that integrate the themes of stasis and change along three dimensions: spatial, organizational, and temporal within a theory of *dynamic trajectories*. A detailed description and testing of the theory is published in Rogers (2017). The theory has the objective of comparatively representing change and stasis, while also acknowledging scales of interaction ranging from individuals to multi-regional polities. Fig. 1 illustrates the relationship between the structural elements and each of the five change conditions. The *dynamic trajectories* theory has the following structural elements:

1. Dimension – the macrostructure of the polity, including the initial conditions such as the political hierarchy, population levels, and the economy.

2. Probability space – the context in which dynamic processes occur. Traditions and social similarities recognized over long periods among multiple polities is an aspect of the probability space.

3. Bundles – the highly variable sets of individual characteristics that exist at particular points in time. Bundles are composed of all the characteristics under study: military technology and strategy, political succession rules, religion, kinship, *etc*. Each of which is composed of nearly infinite individual strands. No study can incorporate all the potential strands in a bundle. Instead, the focus is on bundles and strands thought to have significance for a particular research problem. A useful parallel to the concept of bundles as used here is the idea of non-uniform institutional complexity developed by Frachetti (2012).

In a hierarchical sense the structural elements include the dynamic change conditions, which in turn are composed of human behaviors at the level of individuals. The three structural elements together form a kind of polydimensional space that operates through five dynamic change conditions:

1. Stasis – the system remains stable and is often resilient to disruptions, in that the functional characteristics of the system remain intact and change slowly (Fig. 1A);

2. Expansion – more strands and bundles may be added as a form of drift or directional change as happens in various kinds of innovations (Fig. 1B);

3. Contraction – strands and bundles are removed from the system as may happen in the collapse of a political system (Fig. 1C);

4. Morphing – a change condition in which relatively gradual, but distinctive changes occur as a byproduct of other changes in technology or social organization (Fig. 1D);

5. Displacement – a drastic reformulation, as may occur in the emergence or collapse of a polity or through a population migration (Fig. 1E).
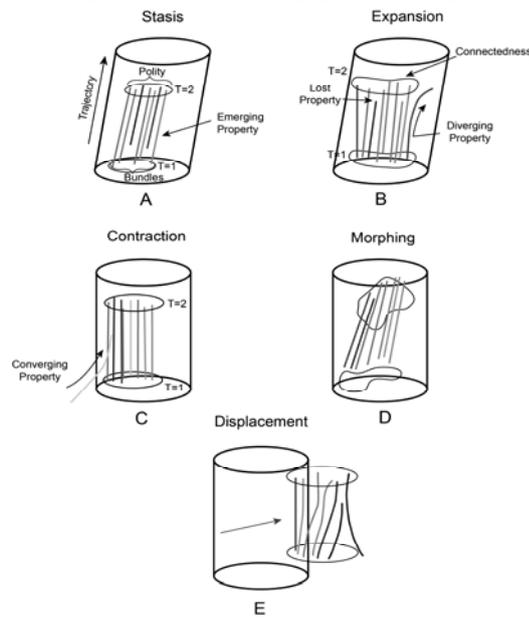
Fig. 1. The *dynamic trajectories* theory proposes three structural elements and five change conditions to account for changes observable in culture-historical sequences. Shown here are the probability spaces, overall tubes, and the five change conditions: stasis (A), expansion (B), contraction (C), morphing (D), and displacement (E). Notations 'T=1' and 'T=2' refer to the passage of time within the probability space (Source: Rogers 2017: 1335)

FORMS OF POWER AND COMPARATIVE ANALYSIS

When applied to the early polities of Central and Inner Asia the *dynamic trajectories* theory serves to describe in a more comparative way the means by which these polities came into existence and were eventually supplanted by others. Power is a central issue, but it is not the same as complexity. In discussions of social complexity, control hierarchies and the fundamental structure of how power/authority is developed and then used is almost a metaphor for complexity itself.

By the time the first large-scale polity developed in Inner Asia the social and political mechanisms of inequality were well-established. Some have argued that the volatility of the nomadic economic base prevented the generational transfer of wealth. However, recent reviews of historical sources and the use of agent-based computational models

to simulate wealth transfers illustrate the mechanisms for establishment of inequality and political control hierarchies (Borgerhoff Mulder *et al.* 2009, 2010; Rogers *et al.* 2015). Aristocratic lineages dominated political processes and were constantly engaged in expanding and consolidating authority. It should also be remembered that agricultural production is also not necessarily stable and predictable. There were wars, crop blights, droughts, floods, and more that affected sedentary agriculture.

Always of interest in the processes of polity rise and fall are the ways that differing emergent polities consolidated and then attempted to maintain control over diverse and expansive populations. The literature on the pastoralist polities provides numerous examples of development and change (*e.g.*, Bazarov, Kradin, and Skrynnikova 2004–2008; Klyashtorny and Savinov 1994; Kradin 1992). Although conflict and conquest were typical approaches, there are several specific *dynamic trajectories* strategies of expansion that provide insights to why some polities had more longevity than others (Rogers 2018). Rather than describe the various strategies, I will mention here only 'marginal incorporation.' Many of the polities that were centered in eastern Inner Asia used marginal incorporation to consolidate newly conquered regions, leaving local administration to local leaders, who were instructed to pay tribute and fulfil other demands in exchange for relatively little interference. Marginally incorporated regions often failed to pay tribute and frequently rebelled. In the Xiongnu Empire, for example, beyond the core region marginal incorporation was the predominant strategy. While marginal incorporation was common in Central and Inner Asia, it was probably the most common approach used by aggressive early states and empires globally. The examples of empires that used marginal incorporation range from the Aztec Empire of fifteenth-century AD Mesoamerica to the Hittite Empire of the fourteenth century BC. Levant and their troubled relationship with a vassal state called the Ugarit Kingdom of Anatolia (Glatz 2013).

If we more closely examine the forms of power as a bundle of strands, we are also examining the co-evolution of sources of power. Yoffee and Baines (Yoffee 2005; Baines and Yoffee 2000) describe the development of power in early states as dependent on three things: order, legitimacy, and wealth. All three are goals of the elite, but wealth is the source for insuring the other two. That is, wealth is a source of power transformed into order and legitimacy. Legitimacy is likewise a foundation of order. In Yoffee's perspective early states came about through

> the development of semi-autonomous social groups, in each of which there were patrons and clients organized in hierarchies, and ... there were struggles for power within groups and among leaders of groups. States emerged as part of the process in which these differentiated and stratified social groups were recombined under new kinds of centralized leadership. New ideologies were

created that insisted that such leadership was not only possible,
but the only possibility (Yoffee 2005: 42).

As with bundles of attributes, Yoffee and Baines proposed to exam-
ine order, legitimacy, and wealth as independent elements. This allowed
them to avoid reified social categories (tribes, chiefdoms, and states) as
a typology of social evolution. Whether viewed as change conditions af-
fecting bundles of attributes or co-evolution of power sources or non-
uniform institutional complexity, a viable way to study polity dynamics
is by examining the elements separately.

In long-held neoevolutionary interpretations of the rise of social com-
plexity three major factors stand out: population concentrations/growth,
cities, and agriculture. These factors and several others are discussed in this
volume by Tishkin and Dashkovskiy regarding the Pazyryk and by Kradin
in a more general context. Population concentrations, and agriculture are
core topics in most discussions of social evolution and underlie almost all
comparative discourse even if no formal theoretical position is articulated
(*e.g.*, Sahlins 1968; Service 1971; Adams 1975; Johnson and Earle 1987;
Sanderson 1999). Regarding cities, Yoffee (2005: 60) described their role
among the first states as '...the collecting basins in which long-term trends
towards social differentiation and stratification crystallized.' It is particular-
ly noteworthy that this blanket statement does not apply in Inner Asia, nor
in other polities established by pastoralists. Regardless of causality, in
standard neoevolutionary interpretations the three factors of population,
agriculture, and cities are understood to be linked. However, these factors
did not play a significant role in the formation of nomadic polities, with
a few possible exceptions. Following the rise of the first states in the four
core regions of the world – Andean South America, Mesoamerica, Meso-
potamia, and China – most subsequent states are 'secondary' (see Marcus
2004; Parkinson and Galaty 2007; Price 1978). The steppe polities, given
their proximity to centers of civilization in China and the Middle East,
were strongly influenced in a variety of ways by their neighbors.

There is no question that population were foundational for early agri-
cultural states. By contrast, in Central and Inner Asia nomad populations
remained relatively low, agriculture was common in only a few areas, and
cities did not exist. However, there were small urban centers typically
built after polity formation and not as the foundation for polity develop-
ment (Rogers 2017). In Central Asia the situation was somewhat differ-
ent. The long history of oasis and other urban centers and agricultural
traditions going back to the Bronze Age (Frachetti 2012) placed pastoral-
ists and urban dwellers in close proximity and influenced the nature
of urban centers built by the pastoralists on the steppe and in higher eleva-
tions (Maksudov *et al.* 2019).

If agriculture and cities are foundational for states and empires, but not
important on the steppe, then what accounts for nomadic polities? Not so

long ago the prevailing interpretation was that the nomadic polities were only ephemeral reflections of events in the core regions of civilization. Over the last three decades substantial archaeological research has reevaluated the nature of the steppe polities (*e.g.*, Honeychurch 2014; Kradin 2014; Kradin, Bondarenko, and Barfield 2003; Peterson, Popova, and Smith 2006; Rogers 2012). It is no longer viable to characterize the broader patterns of social change on the steppe as a dependency model. The nomadic polities have less formal state bureaucracies, compared to other large polities. However, the steppe polities are in other ways complex social organizations with political hierarchies and other organizational principles that allowed control of large populations spread over extensive distances. The significance of the steppe polities in Eurasian history demands a careful analysis of their internal structure, rather than consignment to a peripheral role.

Are the nomadic polities more ephemeral than polities in other parts of the world? Compared to a worldwide sample of almost entirely agricultural polities, the Inner Asian polities were no more ephemeral than similar sociopolitical formations found elsewhere (Cioffi-Revilla *et al.* 2011; Rogers 2012; Sinopoli 2006). In particular, the research by Taagepera (1978, 1979, 1997) addresses the question of polity duration on a world-wide basis. He was not focused on comparing pastoralists to agricultural societies, but his research demonstrates the volatility of most early states and empires. Empire dynamics have also been studied from a world-systems perspective to analyze scale and duration (Chase-Dunn and Hall 2000; Stein 1999). Interestingly, the steppe polities are still relegated to the periphery. Part of the reason world-systems studies seems to misrepresent the steppe polities is due to the lack of easily accessible information outside the region. Although, this situation is changing and hopefully this volume will contribute to bridging the information gap.

When viewed globally, the variations and exceptions represented by the steppe polities disrupt ideas of unilineal cultural evolution and the use of a single factor or small group of factors to account for cultural change. The approach proposed by the *dynamic trajectories* theory advocates for the comparative study of the individual strands that form bundles of characteristics across large polity samples over time.

COMMENTS ON ARTICLES

In the first article Kradin provides the intellectual context and the justification for why a volume like this has value. By reviewing the history of ideas that have defined the last 120 years of research on nomads it becomes very apparent that 'facts' are not independent of concepts. As theories change, the evidence is reinterpreted and used in new ways. As paradigms shift one thing that does stand out is the substantial amount of new, high-quality data developed through archaeology and through better access to and interpreta-

tion of original documents. Kradin also comments on each of the subsequent articles. Here, I provide an additional set of comments from a different, yet complementary perspective.

The article by Sodnompilova and Nanzatov is an especially important study for me because it provides a solid addition to the relatively sparse research on the social and symbolic concepts of space within the nomadic worldview. In my own publications I routinely refer to concepts of how the nomads perceive space. However, I have never given any details about *why* space concepts are important. Cultural concepts of space and mobility are fundamental to a variety of interpretations.

The worldview of the nomads and their symbolic principles of space at scales from the individual dwelling to vast landscapes is a critical set of factors that help to explain how and why the nomadic polities are so different from other spatially large polities founded on agriculture and cities. Along with other authors in this volume Sodnompilova and Nanzatov note that nomads have usually been viewed as a threat or as marginal people, but have less frequently been viewed as having their own cultural practices that would allow the development of complex polities on their own terms. Describing the symbolic worldview is a necessary step in recognizing the cultural foundations for creating their own independent histories.

In many cultures the shape of the dwelling (yurt or ger) is a symbolic model of the world (*e.g.*, Cunningham 1973; Deal 1987; Donley 1982; Kuckertz 1990; Sircar 1987). Naturally, dwellings and the implications for the households that inhabited them provide many other analytical possibilities (Rogers 1995). As the authors note, Leroi-Gourhan (1965) proposed an important set of mechanisms for space comprehension, including linear and concentric principles of space exploitation – four basic and four interim sides of space. Although published decades ago, Leroi-Gourhan's research deserves another look. Beyond the domestic scale there was a sacred topography. In general, east was better, more sacred; west, less good, less sacred. Because of space constraints the observations by the authors are fairly general and not all of the nomadic cultural systems used the same cosmology or kinship structures although there were many similarities.

The article by Burentogtokh, Honeychurch, and Gardner approaches the questions of culture change and interaction from a different perspective. They provide a detailed comparative analysis of the Tarvagatai and Egiin Gol valleys in the Late Bronze Age (*ca*. 1400–1000 BC) and Early Iron Age (1000/900–300 BC). To do so, they use a model of social complexity. Through their analysis we can glimpse the formation of regional communities and the mechanisms through which formerly independent groups became larger and more organized as new kinds of political groups. Based on their model, the authors propose that new transport technologies had a strong influence on more integrative social dynamics because of greater

mobility, that allowed connections with broader networks. The ability of the authors to investigate these kinds of questions comes from the fact that both of the valleys they use have been studied in detail using similar methods. As detailed information on population distributions and chronology becomes available, it is possible to address questions of social dynamics in an increasingly realistic way. Like many of the articles in this volume Burentogtokh, Honeychurch, and Gardner help demonstrate the time depth and independent development of an emerging social complexity that was uniquely a steppe process of change.

In the article by Tishkin and Dashkovskiy they ask the difficult question of how to recognize statehood among the Pazyryk. The authors develop several new interpretations, within the frameworks developed by Kradin (2018). As the authors note, various researchers use conflicting definitions of the word 'state', based on equally diverse criteria. Even so, there are general criteria that most agree are important – ranging from territorial divisions to monumental architecture. Tishkin and Dashkovskiy evaluate each of the criteria against the evidence to develop their assessment. There are many important details here. Of note is the recognition of five possible tribal concentrations, based on geographical distribution and site concentrations. Likewise, the development of distinctive Pazyryk burial practices speaks to a shared set of cultural beliefs. There is sufficient evidence to recognize the Pazyryk as a large complex polity with shared cultural traditions. Whether or not it was a state, I leave for others to ponder.

Vasyutin's article provides a detailed evaluation of nomadic governing systems and their typology. The author notes that part of the reason for undertaking this study is the vagueness many researchers use, including me. There are various reasons for being vague. It could just be sloppiness or there could be specific purposes. Given my earlier discussion of the *dynamic trajectory* theory I found Vasyutin's article useful in thinking about what components might be included in bundles and how the various strands might have been added or deleted, especially in the Turkic polities.

At the heart of Vasyutin's article is the question of state formation. Should the Turkic empires be viewed as pre-state or state? Addressing this question requires the analysis of several different components, including political, military, and administrative structures. The author views the governing institutions as complex and observes several innovative components in the transition to statehood. Essentially, he considers the Turkic polities chiefdoms, a step in the process of politogenesis falling between tribal communities and the state. To bring together his analysis, Vasyutin proposes two different models designed to describe much of the variation seen in the steppe polities and the differing dynamics that account for the observed variation.

The article by Tishin analyzes Turkic family structure during the period of AD 500 to 900. The author provides a thoughtful critique of the Marxist approach that tried to fit everything into an evolutionary framework. In earlier decades the Turks were described as first having a 'patriarchal family'. Although, apparently there was actually no documentary evidence of this. The arguments developed by earlier scholars were often based on scant evidence. The Turks of this period had movable tents, and perhaps stationary wooden dwellings. Current thinking is that the nuclear family was the basic domestic unit within the Turk polities of the sixth through tenth centuries. Although polygamy existed, it was not a part of the basic structure. The Turk example of how scholarship has changed is insightful, partly because it shows how thin the evidence can be, yet how strikingly different the interpretations may be.

The article by Seregin brings together another strand for understanding the structure of Turkic society, based on the excavation of funerary complexes from the regions of the Altai, Tuva, and Minusinsk basins. Although there are few radiocarbon dates, the burials can be generally dated from about AD 450 to the 800s. There is no consensus on which burial complexes are correlated with the early medieval Turks. Additional radiocarbon dates would resolve this issue. Based on grave goods there were clear gender distinctions and consistency in burial practices. There is also evidence for the diverse and high-status role of women, including evidence of women performing chiefly functions, based on early documentary sources.

As Seregin points out, the few documentary records available to us typically describe the social organization of only the elite members of Turkic society at the royal level. Globally, it is common for elite practices to substantially differ from those of other members of a particular society. Essentially, this means that almost all new information on Turkic social organization will come from archaeology and biological anthropology. Comparatively, there are few other cemeteries that have received this level of analysis, although the potential exists to add significant breakthroughs, especially if genomic data can be added to the analysis.

CONCLUSIONS

Reading the different articles prompts me to ask whether there should be a specific agenda? Naturally, research must continue on many fronts. To bring order to this very broad task, there are at least three focal areas that could have major impacts: First, further exploration of a more refined comprehensive theory of social interactions that moves from metaphor to ways to measure dynamics, or from representational models to explanatory models; second, we have the opportunity to develop sophisticated models that take advantage of extreme computing power and are capable

of exploring many social interactions at multiple scales. The use of agent-based models is expanding rapidly in archaeology and other social sciences (Rogers and Cegielski 2017); and third, we should apply our findings to issues of broad social concern to humans. Our studies of the steppe polities have implications for the modern world. The roots of wealth inequality, development of sustainable adaptations, the dynamics of political process, and the role of history in local heritage are among the topics that have broad value.

For a long time, archaeologists and historians have been writing about how the steppe polities represent an alternative pathway to power. If so, then how should this change our concepts of social complexity? Should we insist that urban centers and cities be prerequisites for the state and that the steppe polities are something else? Is agriculture, or access to sedentary populations with agriculture, also a prerequisite? At the very least it means that complexity is not dependent on direct agricultural cultivation or urban centers with significant population concentrations. There are multiple pathways to complexity. But saying this is only the starting point. Are there more similarities or more differences between the polities? How we see differences or similarities impacts how we assess the evidence that may be used to classify polities or study dynamic processes. I have theorized trajectories built on steppe cultural traditions and this has led me to focus on similarities rather than the differences.

The counter argument to the internal complexity of the steppe polities is a powerful one. It generally runs like this: pastoralist polities are derivative – they are tribal organizations with an overlay of borrowed ideas drawn from nearby civilizations; they do not have the basic elements understood to be foundational for complexity nor to be a true civilization; they are ephemeral and therefore less significant. All of these ideas have been effectively countered by the authors to this volume and a large body of other research.

There is a tendency when engaged in the revision of older interpretations to overstate the new perspective to emphasize its greater value. The pendulum of research paradigms swings widely. Some of the authors in this volume have emphasized definitions and a careful reading of the evidence, rather than uncritically accepting new interpretations. They have also emphasized examination of intellectual traditions and the sources of concepts before offering new interpretations. For instance, I routinely use the words polity or empire to describe the larger political organizations. Further, I intentionally use very simple definitions as a way to move the discussion towards study of the processes that shaped change and stasis over long periods of time. I have routinely used the word 'empire' uncritically, and implied that the steppe empires were also states. The Xiongnu may very well have been a super-chiefdom. I have no objection to the term.

As I focus on dynamic processes represented in strands and bundles of characteristics I have made efforts to define differences in how change occurs. Because of this focus the labels at the polity level have become less important for me. My core goal has been to understand the dynamics of how the polities functioned. Ideally, this knowledge would also better inform us about how our contemporary world works.

The contributions to this volume clearly add to both the general and specific levels of interpretation in the polydimensional space of social and cultural change. They further illustrate the value of combined archaeological, cultural, and historical approaches while taking advantage of new or refined sources of information. I look forward to seeing how new data will contribute to new and exciting interpretations.

ACKNOWLEDGEMENTS

REFERENCES

Adams, R. N. 1975. *Energy and Structure: A Theory of Social Power*. Austin: University of Texas Press.

Ahl, V., and Allen, T. F. H. (eds.) 1996. *Hierarchy Theory: A Vision, Vocabulary, and Epistemology*. New York: Columbia University Press.

Baines, J., and Yoffee, N. 2000. Order, Legitimacy, and Wealth: Setting the Terms. In Richards, J., and Van Buren, M. (eds.), *Order, Legitimacy, and Wealth in Ancient States. New Directions in Archaeology* (pp. 13–17). Cambridge: Cambridge University Press.

Bazarov, B. V, Kradin, N. N., and Skrynnikova, T. D. (eds.) 2004–2008. *The Mongol Empire and the Nomadic World.* Ulan-Ude: BNC of the RAS. *Original in Russian* (Базаров, Б. В., Крадин, Н. Н., Скрынникова, Т. Д. *Монгольская империя и кочевой мир.* Улан-Удэ: Изд-во БНЦ СО РАН).

Bondarenko, D. M., Korotayev, A. V., and Kradin, N. N. 2003. Introduction: Social Evolution, Alternatives, and Nomadism. In Kradin, N. N., Bondarenko, D. M., and Barfield, Th. J. (eds*.), Nomadic Pathways in Social Evolution* (pp. 1–24). Moscow: Russian Academy of Sciences.

Borgerhoff Mulder, M., Bowles, S., Hertz, T., Bell, A., Beise, J., Clark, G., Fazzio, I., *et al.* 2009. Intergenerational Transmission of Wealth and the Dynamics of Inequality in Small-Scale Societies. *Science* 326 (5953): 682–88.

Borgerhoff Mulder, M., Fazzio, I., Irons, W., McElreath, R. L., Bowles, S., Bell, A., Hertz, T., and Hazzah, L. 2010. Pastoralism and Wealth Inequality. *Current Anthropology* 51 (1): 35–48.

Braudel, F. 1958. Histoire et sciences sociales : La longue durée. *Annales* 13 (4): 725–753.

Braudel, F. 1980. *On History.* Translated by Sarah Matthews. Chicago: University of Chicago Press.

Bryson, J. J. 2014. The Role of Stability in Cultural Evolution: Innovation and Conformity in Implicit Knowledge Discovery. In Dignum, V., and Dignum, F. (eds.), *Perspectives on Culture and Agent-Based Simulations* (pp. 169–187). Studies in the Philosophy of Sociality 3. Springer International Publishing. URL: http://link.springer.com/chapter/10.1007/978-3-319-01952-9_10.

Cegielski, W. H. 2019. *Stability in the Valencian Bronze Age.* Ph.D. dissertation, Arizona State University.

Cegielski, W. H., and Rogers, J. D. 2016. Rethinking the Role of Agent-Based Modeling in Archaeology. *Journal of Anthropological Archaeology* 41 (March): 283–298.

Chase-Dunn, Ch. K., and Hall, Th. D. 2000. Comparing World-Systems to Explain Social Evolution. In Denemark, R. A., Friedman, J., Gills, B. K., and Modelski, G. (eds.), *World System History: The Social Science of Long-Term Change* (pp. 85–112). London: Rutledge.

Cioffi-Revilla, C. 2005. A Canonical Theory of Origins and Development of Social Complexity. *Mathematical Sociology* 29 (2): 133–153.

Cioffi-Revilla, C., Rogers, J. D., Wilcox, S. P., and Alterman, J. 2011. Computing the Steppes: Data Analysis for Agent-Based Modeling of Polities in Inner Asia. In Brosseder, U., and Miller, B. (eds.), *Xiongnu Archaeology: Multidisciplinary Perspectives of the First Steppe Empire in Inner Asia* (pp. 97–110). Bonn: Bonn University Press.

Crumley, C. L. 1987. A Dialectical Critique of Hierarchy. In Patterson, Th. C., and Gailey, Ch. W. (eds.), *Power Relations and State Formation* (pp. 155–169). Washington D.C.: American Anthropological Association.

Cunningham, C. E. 1973. Order in the Atoni House. In Needham, R. (ed.), *Right and Left: Essays on Dual Symbolic Classification* (pp. 204–238). Chicago: University of Chicago Press.

Deal, M. 1987. Ritual Space and Architecture in the Highland Maya Household. In Ingersoll, D. W., and Jr, Bronitsky, G. (eds.), *Mirror and Metaphor: Material and Social Constructions of Reality* (pp. 171–198). Lanham, Maryland: University Press of America.

Donley, L. W. 1982. House Power: Swahili Space and Symbolic Markers. In Hodder, I. (ed.), *Symbolic and Structured Archaeology* (pp. 63–73). Cambridge: Cambridge University Press.

Feinman, G. M. 1995. The Emergence of Inequality: A Focus on Strategies and Processes. In Price, D., and Feinman, G. M. (eds.), *Foundations of Social Inequality* (pp. 255–279). New York: Plenum Press.

Feinman, G. M. 2013. The Emergence of Social Complexity: Why More than Population Size Matters. In Carballo, D. M. (ed.), *Cooperation and Collective Action: Archaeological Perspectives* (pp. 35–56). Boulder, Colorado: University of Colorado Press.

Frachetti, M. D. 2012. Multi-Regional Emergence of Mobile Pastoralism and Non-Uniform Institutional Complexity Across Eurasia. *Current Anthropology* 53 (1): 2–38.

Garmestani, A. S., Allen, C. R., and Gunderson, L. 2009. Panarchy: Discontinuities Reveal Similarities in the Dynamic System Structure of Ecological and Social Systems. *Ecology and Society* 14 (1): 15.

Glatz, C. 2013. Negotiating Empire: A Comparative Investigation into the Responses to Hittite Imperialism by the Vassal State of Ugarit and the Kaska of Pontic Anatolia. In Areshian, G. (ed.), *Empires and Diversity: On the Crossroads of Archaeology, Anthropology, and History* (pp. 21–56). Los Angeles: Cotsen Institute of Archaeology.

Gunderson, L. H., and Holling, C. S. (eds.) 2002 *Panarchy: Understanding Transformations in Human and Natural Systems.* Washington, DC: Island Press.

Hayles, N. K. 1991. *Chaos and Order.* Chicago: University of Chicago Press.

Holland, J. H. 1998. *Emergence: From Chaos to Order.* New York: Basic Books.

Holling, C. S. 1973. Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics* 4: 1–23.

Honeychurch, W. 2014. Alternative Complexities: The Archaeology of Pastoral Nomadic States. *Journal of Archaeological Research* 22 (4): 277–326.

Johnson, A. W, and Earle, T. 1987. *The Evolution of Human Societies: From Foraging Group to Agrarian State.* Stanford, California: Stanford University Press.

Kay, J. J, Regier, H. A., Boyle, M., and Francis, G. 1999. An Ecosystem Approach for Sustainability: Addressing the Challenge of Complexity. *Futures* 31: 721–742.

Klyashtorny, S. G., and Savinov, D. G. 1994. *The Steppe Empires of Eurasia.* St. Petersburg: FARN. *Original in Russian* (Кляшторный, С. Г., Савинов, Д. Г. *Степные империи Евразии.* СПб.: ФАРН).

Kohler, T. A. 2012. Complex Systems and Archaeology. In *Archaeological Theory Today* (pp. 93–123). 2nd edition. Cambridge: Polity Press.

Kradin, N. N. 1992. *Nomadic Societies.* Vladivostok: Dalnauka. *Original in Russian* (Крадин, Н. Н. *Кочевые общества.* Владивосток: Дальнаука).

Kradin, N. N. 2014. Mongols Empire and Debates of the Nomadic State Origins. In Cerasetti, B., Lamberg-Karlovsky, C. C., and Genito, B. (eds.), *My Life is Like the Summer Rose. Maurizio Tosi E l'Archeologia Come Modo Dio Viviere.* Papers in Honour of Maurizio Tosi for His 70th Birthday (pp. 369–376). BAR International Series 2690. Oxford: Archaeopress.

Kradin, N. N. 2018. Nomads and the Theory of Civilizations. In Arnason, J. P., and Hann, Ch. (eds.), *Anthropology and Civilizational Analysis. Eurasian Explorations* (pp. 303–322). Albany: State University of New York Press.

Kradin, N. N., Bondarenko, D. M., and Barfield, Th. J. (eds.) 2003. *Nomadic Pathways in Social Evolution.* Civilization Dimensional Series 5. Moscow: Center for Civilizational and Regional Studies of the Russian Academy of Sciences.

Kuckertz, H. 1990. *Creating Order: The Image of the Homestead in Mpondo Social Life.* Johannesburg: Witwaterstrand University Press.

Lane, D. 2006. Hierarchy, Complexity, Society. In Pumain, D. (ed.), *Hierarchy in Natural and Social Sciences* (pp. 81–119). Dordrecht, Netherlands: Springer.

Leroi-Gourhan, A. 1965. *Le Geste et La Parole*. II. *La Mémoire et Les Rythmes*. Paris: Albin Michel.

Lewin, R. 2001. *Complexity: Life at the Edge of Chaos.* London: Phoenix.

Maksudov, F., Bullion, E., Henry, E. R., Hermes, T., Merkle, A., and Frachetti, M. D. 2019. Nomadic Urbanism at Tashbulak. In Baumer, Ch. and Novak, M. (eds.), *Urban Cultures of Central Asia from the Bronze Age to the Karakhanids* (pp. 283–305). Wiesbaden: Harrassowitz Verlag.

Marcus, J. 2004. Primary and Secondary State Formation in Southern Mesoamerica. In Bell, E. E., Canuto, M. A., and Sharer, R. J. (eds.), *Understanding Early Classic Copan* (pp. 357–373). Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Mitchell, M. 2009. *Complexity: A Guided Tour.* Oxford, UK: Oxford University Press.

Oestreicher, C. 2007. A History of Chaos Theory. *Dialogues in Clinical Neuroscience* 9 (3): 279–289.

Parkinson, W. A., and Galaty, M. L. 2007. Secondary States in Perspective: An Integrated Approach to State Formation in the Prehistoric Aegean. *American Anthropologist* 109 (1): 113–129.

Peterson, D., Popova, L., and Smith, A. 2006. *Beyond the Steppe and the Sown: Proceeding of the 2002 University of Chicago Conference on Eurasian Archaeology*. Leiden: Brill Academic Publishers.

Price, B. J. 1978. Secondary State Formation: An Explanatory Model. In Cohen, R., and Service, E. R. (eds.), *Origins of the State: The Anthropology of Political Evolution* (pp. 161–186). Philadelphia: Institute for the Study of Human Issues.

Rio, K. M., and Smedal, O. H (eds.) 2009. *Hierarchy: Persistence and Transformation in Social Formations*. New York: Berghahn Books.

Robinson, L. W. 2009. A Complex-Systems Approach to Pastoral Commons. *Human Ecology* 37: 441–451.

Rogers, J. D. 1995. The Archaeological Analysis of Domestic Organization. In Rogers, J. D., and Smith, B. D. (eds.), *Mississippian Communities and Households* (pp. 7–31). Tuscaloosa: University of Alabama Press.

Rogers, J. D. 2012. Inner Asian States and Empires: Theories and Synthesis. *Journal of Archaeological Research* 20: 205–256.

Rogers, J. D. 2017. Inner Asian Polities and Their Built Environment. *Archaeological Research in Asia* 11 (September): 1–14.

Rogers, J. D. 2018. Strategies of Empire Expansion. In Düring, B. S., and Stek, T. D. (eds.), *The Archaeology of Imperial Landscapes* (pp. 301–323). Cambridge: Cambridge University Press.

Rogers, J. D., and Cegielski, W. H. 2017. Opinion: Building a Better Past with the Help of Agent-Based Modeling. *Proceedings of the National Academy of Sciences* 114 (49): 12841–12844.

Rogers, J. D., and Cioffi-Revilla, C. 2009. Expanding Empires and the Analysis of Change. In Bemmann, J., Parzinger, H., Pohl, E., and Tseveendorj, D. (eds.),

Current Archaeological Research in Mongolia: Papers from the 1ˢᵗ International Conference on Archaeological Research in Mongolia Held in Ulaanbaatar, August 2007 (pp. 445–459). Bonn: Bonn University Press.

Rogers, J. D., Cioffi-Revilla, C., and Linford, S. J. 2015. The Sustainability of Wealth Among Nomads: Methods in Agent-Based Modeling. In Barcelo, J. A., and Bogdanovic, I. (eds.), *Mathematics in Archaeology* (pp. 431–447). London: CRC Press.

Rouse, I. 1992. *The Tainos: Rise and Decline of the People Who Greeted Columbus*. New Haven: Yale University Press.

Sahlins, M. D. 1968. *Tribesmen*. Englewood Cliffs, N.J.: Prentice-Hall.

Sanderson, S. K. 1999. *Social Transformations: A General Theory of Historical Development*. Lanham, MD: Rowman & Littlefield.

Service, E. R. 1971. *Cultural Evolutionism: Theory in Practice*. New York: Holt, Rinehart and Winston.

Sinopoli, C. M. 2006. Imperial Landscapes of South Asia. In Stark, M. T. (ed.), *Archaeology of Asia* (pp. 324–349). Blackwell Studies in Global Archaeology. Blackwell Publishing Ltd.

Sircar, K. 1987. The House as a Symbol of Identity. In Ingersoll, D. W., Jr and Bronitsky, G. (eds.), *Mirror and Metaphor: Material and Social Constructions of Reality* (pp. 297–309). Lanham, MD: University Press of America.

Stein, G. J. 1999. *Re-Thinking World Systems: Diasporas, Colonies, and Interaction in Uruk Mesopotamia*. Tucson, AZ: University of Arizona Press.

Taagepera, R. 1978. Size and Duration of Empires: Systematics of Size. *Social Science Research* 7: 108–127.

Taagepera, R. 1979. Size and Duration of Empires: Growth-Decline Curves, 3000 to 600 B.C. *Social Science History* 3 (3/4): 115–138.

Taagepera, R. 1997. Expansion and Contraction Patterns of Large Polities: Context for Russia. *International Studies Quarterly* 41: 475–504.

Thom, R. 1983. *Paraboles et catastrophes*. Paris: Flammarion.

Turchin, P. 2003. *Historical Dynamics: Why States Rise and Fall*. Princeton and Oxford: Princeton University Press.

Turner, F. 1997. Chaos and Social Science. In Eve, R. A., Horsfall, S. and Lee, M. E. (eds.), *Chaos, Complexity, and Sociology: Myths, Models, and Theories* (pp. xi–xxvii). London: Sage.

Yoffee, N. 2005. *Myths of the Archaic State: Evolution of the Earliest Cities, States, and Civilizations*. Cambridge: Cambridge University Press.