IMAGINING COMPLEX *SOCIETIES*

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The societies in which most humans live have changed dramatically over the past 10,000 years. At the end of the last ice age, all humans lived in hunting and gathering bands where nearly everyone was related, generalized reciprocity was the norm, families produced almost everything they needed, and group decision-making was consensual. In contrast, today most of us live in industrial nation-states where we will never meet most of our compatriots, economic exchange is the norm, families produce only the tiniest fraction of the goods and services they need, and political decisions are made through bureaucratic governments.

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THESE CHANGES make clear that the complexity of many human societies – as defined by their scale, functional differentiation, and control structures – has increased dramatically in recent millennia. How and why this occurred is one of the central questions of anthropology, but despite sustained attention we are still a long way from a truly scientific understanding. In this essay I'll offer my own view of the problem and what I think is needed to move research in this area forward.

My point of departure is Bruce Trigger's *Understanding Early Civilizations* (2003), the most detailed comparative analysis of early state societies yet produced. Trigger chose to work with a sample of early civilizations that developed independently, had never been subservient to other societies, and for which both archaeological and written sources are available. As a result, he did not compare the earliest state societies in various world regions, but the earliest ones for which a well-rounded picture is possible. Thus, he examined the Aztec (1100 – 1519 CE) as opposed to the Teotihuacan

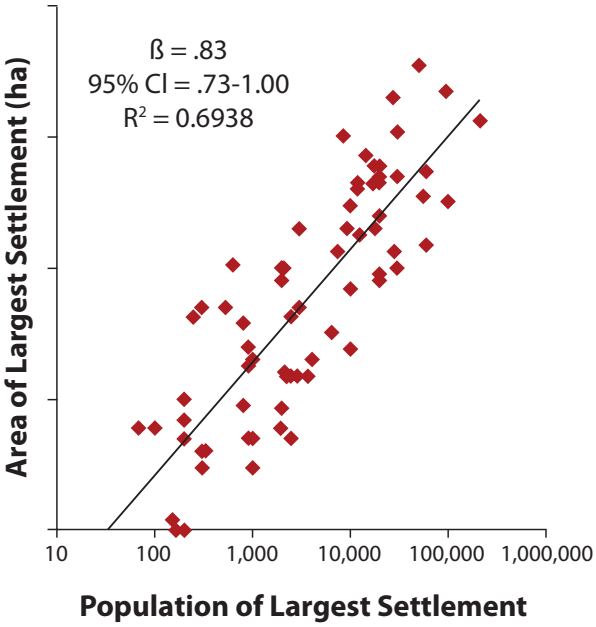

Figure 1 Population vs. settled area of the largest settlements in archaeological traditions from around the world. The fit line is a power law with exponent β. (Data from Ortman and Blair 2012)

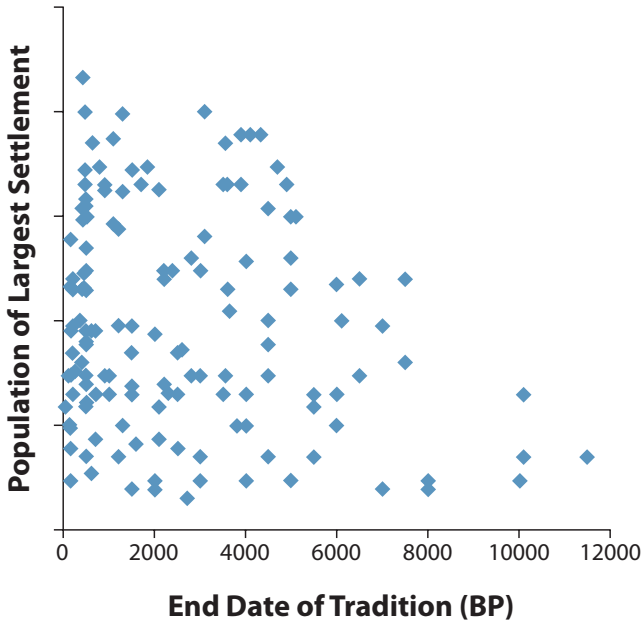

Figure 2 End dates and largest settlement populations of archaeological traditions from around the world. (Data from Ortman and Blair 2012)

(100 BCE – 750 CE) period in Central Mexico, the Early Dynastic III (2500 – 2350 BCE) as opposed to the Uruk (3400 – 3100 BCE) period in Mesopotamia, and so forth. In his view, the disadvantages of working with civilizations from more recent periods were outweighed by the advantages of examining the richer available evidence for the symbolic and cognitive aspects of each society, in addition to their economic and sociopolitical structures.

His basic findings are striking. First, the economies of early civilizations were highly variable and reflected the process of local adaptation to the specific environments in which each emerged. Second, the political organizations of early civilizations also varied, falling into one of two basic types: *city-states,* where a large number of farmers lived with elites in urban centers and full-time craft specialists produced goods that were distributed to all through markets; and *territorial states,* where most farmers lived outside of urban centers, and craft specialists produced goods primarily for the elite. Third, the religious beliefs of early civilizations did NOT vary. In all these societies, relations between humans and the forces of nature were imagined as parallel to relations between commoners and rulers. Anthropomorphized forces of nature required material sacrifices in order to persist and fulfill their roles in maintaining the *natural* order; and in the same way, elites required surpluses and labor from commoners in order to fulfill their roles in maintaining the *social* order.

To the extent that variation across independent cases implies latitude in adaptive possibilities, and uniformity implies constraints, these findings imply that the strongest constraint in the emergence of early civilizations was beliefs that supported new scales of social coordination. This is in strong contrast to the view, enshrined in many approaches to human behavior, that the primary constraints were material or technological. Trigger's results suggest instead that the way forward in our efforts to understand social complexity is to focus on the process by which beliefs that support complexity were invented and adopted within societies. In other words, we need a better understanding of how human society itself emerges from shared abstract ideas, or what I would call *cultural models.* When viewed from this perspective, many traditional explanations for the emergence of complex societies turn out to depend on and presuppose this more fundamental process. It is clear that agricultural intensification, economic and bureaucratic specialization, technological advances, and warfare were all involved; but what is it that makes people feel it is safe to invest in farmland or to depend on others for the goods and services they need; that it is natural to hand

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over surpluses to rulers; or that it is appropriate to kill people who have never harmed them directly? Trigger's results suggest human imagination was much more central to this process than we have previously considered.

Articulating how abstract ideas that promote social coordination are invented and spread through society is a challenging task, but due to progress in several fields it is becoming possible to sketch an outline of how it might occur. The first point to recognize is that economies of scale are intrinsic properties of human social networks. This has been amply demonstrated for contemporary urban systems (Bettencourt, et al. 2007; Bettencourt, et al. 2010), and it is also apparent in the archaeological record. For example, Figure 1 plots the population vs. the settled area of the largest site in archaeological traditions from around the globe. The power law fit to these data, which span five orders of magnitude, exhibits the precise economy of scale, in the form of area per person, predicted by urban scaling theory (see Bettencourt 2012); but in this case, each point represents a settlement that developed in a different cultural tradition, with a different technological and economic base, and in a different part of the world. These data make a strong case that as human social networks grow, they necessarily lead to systems that require fewer resources per person, and produce more per person. In other words, the benefits of scale for human groups have always been there.

If this was all there is to the problem of social complexity, one might expect all human societies to have grown consistently in scale and complexity over time, but this is not what has happened. Figure 2, for example, plots the age of various archaeological traditions against the population of the largest settlement in each tradition (a reasonable proxy for overall complexity, see Chick 1997; Naroll 1956). The chart shows that the range of complexity in human societies has grown exponentially since the end of the last ice age, but many societies have remained simple over this period. It's also important to emphasize that societies where complexity accumulated were not always located in more productive areas, or in areas where agriculture had been practiced the longest (Ortman and Blair 2012). So why has complexity accumulated only in certain societies, despite the intrinsic benefits of scale?

The answer derives from the fact that what is good for groups is not always good for the individuals comprising them. For example, both multi-cellular organisms and social insect colonies are functionally-specialized and hierarchically-organized collectives that are highly successful in maintaining and transmitting accumulated knowledge, in the form of genetic instructions, to the next generation; but they also have little regard for the fates of most cells or insects (Maynard Smith and Szathmary 1999). This same pattern is apparent, in an attenuated way, in human societies. For example, economist George Steckel and anthropologist Jerome Rose (2002) examined health indicators for Prehispanic New World societies and found that the median health of individuals declined as societies grew more complex. This suggests social complexity emerges from mechanisms that promote coordinated behavior even if it is not in the best interest of each individual. In

Figure 3 This image from the Codex Borgia (Postclassic Central Mexico) shows maize growing from the body of a sacrificed spirit being.

the case of multi-celled organisms and insect colonies, the solution was to make the coordinating individuals (cells, insects) genetic clones or siblings. That way, genes that promote cooperation could spread even if the most cooperative individuals left no offspring. What was the solution for humans?

I think the solution has a two-part answer. First, humans do possess some groupish predispositions that have evolved since the genus *Homo* became distinct from our living ape relatives. Psychologist Jonathan Haidt (2012) argues that these *moral instincts* – especially concerns over care, fairness, loyalty, authority, and sanctity – co-evolved with the human capacity for language and culture. Economists Sam Bowles and Herb Gintis (2011) have also shown that the conditions faced by early humans were appropriate for the evolution of these predispositions. As a result, it appears reasonable to conclude that the characteristics of early, small-scale human societies reflect the mix of selfish and groupish instincts characteristic of human nature. If so, the subsequent accumulation of social complexity in some societies would seem to derive from the ways particular cultural models, invented by particular humans in specific contexts, interfaced with human moral and emotional instincts.

Given this first part of the answer, the second part derives from neuroscientist Antonio Damasio's (1994) model of human decision-making. His model has the following elements. First, humans possess evolved hormonal and neural circuits that

Figure 4 Marble cylinder seal from Uruk-Warka, depicting the king as the good shepherd, feeding flowers to domestic animals

induce responses to various stimuli automatically. Think of what happens when you touch a hot stove, get thirsty or hungry, or are startled by a sudden movement or sound. The cascades of responses, including those related to our moral instincts, are known as *primary emotions.* Second, our nervous system continuously monitors our body state and stores "images" of the body states associated with our experiences. If you've ever gone for a hike without water, "images" of the resultant thirst and anxiety become part of your memory of the experience. These images of body-state responses are known as *secondary emotions*. Third, humans form intuitions regarding potential courses of action through "gut feelings," which is to say, by associating specific instances with models of our previous experience, including their associated secondary emotions. As a result, human preferences typically derive from the implied emotional outcomes of alternative courses of action.

Damasio's model gets us part of the way to an explanation for coordinated behavior, but there is one final, crucial step where human imagination takes center stage, recruiting human nature in the service of social goals. The key insight comes from the linguist George Lakoff and philosopher Mark Johnson (1980), who demonstrated that abstract human thought is fundamentally metaphorical: We typically use the imagery of relatively concrete domains of experience to form intuitions about more abstract domains, especially in the social, political, and ecological realms. Most important, the source domains of these conceptual metaphors ultimately derive from our basic bodily experience, including associated secondary emotions. For example, contemporary Americans often imagine a nation as a body in forming opinions about social policies, and psychological experiments show that body-state imagery influences this process (Landau, et al. 2009). Also, in my own research on Tewa Pueblo origins, I've found that imagining the community as a garden, with women as corn plants and men as clouds, was central to the emergence of an inter-community ceremonial system that supported permanent villages and community-level specialization (Ortman 2012) (also see my video presentation at www.santafe.edu/imagine). These observations suggest that social complexity ultimately emerges from people behaving in terms of the body-state imagery of their shared social metaphors. (If you habitually imagine your community as a family, and you have experienced loving parents, then surely your leaders have your best interests at heart.) In social insects, chemical circuits encoded by genes induce coordinated behavior automatically; in humans, culture achieves similar results by linking models of the social, political, economic, and ecological worlds to our automatic and evolutionarily-ancient emotional response systems, including moral instincts. And the more deeply-ingrained these metaphors are, the more effectively they channel human behavior.

This is not to deny that human societies maintain competing models of the social world, that some individuals behave

Watch Scott Ortman's presentation at www.santafe.edu/imagine

in accordance with dominant models simply because it is the path of least resistance, or that others actively resist these norms. There is also still a lot to learn about why specific metaphors are persuasive in certain contexts and not in others. Humans are not ants. Nevertheless, deeper reflection on the role of human imagination reveals its fundamental role. Put simply, the earth could not support as many people as it does today if humans had not invented the concept of government from our basic experiences of family life, or the concept of money from our experiences trading small and precious objects. All good ideas seem obvious once someone has them, but the cultural models that subsidized the accumulation of social complexity, and which seem natural to us today, were not self-evident to our distant ancestors. Instead, these models had to be invented and promoted. Once invented, they could spread for a variety of reasons, but they didn't have to. As in biology, I suspect that both material and cultural (aka political) constraints – cultural genotypes, if you will – influenced the process of invention and adoption, and there was significant path dependence (Wagner 2011).

These details aside, the research reviewed here suggests that a fundamental factor in the emergence of complex societies was new cultural models that recruited the emotional concerns and moral instincts of farmers and herders in support of hierarchical and functionally-specialized organization. For example, in Uruk, Mesopotamia, the world's first city-states were founded on the idea of the king as the good shepherd: The king protected and provided for his human flock, and it was thus right and natural for his subjects to obey him (Algaze 2008:128-129) (Figure 4). Many readers will recognize that this imagery continues to play a role in all three of the world's major monotheistic religions. In other parts of the world, the specific imagery was different (among ancient Maya people, for example, the king was maize), but in all cases these cultural models emphasized the benefits of hierarchical and functionally-specialized organization while hiding its disadvantages, thus tipping the scales of moral intuitions and public sentiment in favor of larger-scale social coordination. And there is little doubt that these societies have been spreading ever since, for better and for worse.

At this point, the outline sketched here is little more than a qualitative framework. Much work remains to be done to translate this framework into a quantitative and testable model and to assess the influence of cultural models in comparison with other factors that clearly were involved in the emergence of complex human societies. This will take time, hard work, and good collaborators. But if we are ever to understand the fundamental nature of human societies and why they seem to be becoming more complex all the time, I believe this is the direction in which we should be working. ■

SFI Omidyar Fellow Scott Ortman is author of Winds from the North: Tewa Origins and Historical Anthropology *(University of Utah Press, 2012) and is also the Lightfoot Fellow at the Crow Canyon Archaeological Center.*

References

Algaze, G., 2008, *Ancient Mesopotamia at the Dawn of Civilization.* University of Chicago Press, Chicago.

Bettencourt, L. M. A., 2012, The origins of scaling in cities. *Santa Fe Institute Working Papers 12-09-014.*

Bettencourt, L. M. A., J. Lobo, D. Helbing, C. Kühnert, and G. B. West, 2007, Growth, Innovation, Scaling, and the Pace of Life of Cities. *Proceedings of the National Academy of Sciences of the U.S.A.* 104:7301-7306.

Bettencourt, L. M. A., J. Lobo, D. Strumsky, and G. B. West, 2010, Urban Scaling and Its Deviations: Revealing the Structure of Wealth, Innovation and Crime across Cities. *PLoS ONE* 5(11):e13541.

Bowles, S. and H. Gintis, 2011, *A Cooperative Species: Human Reciprocity and Its Evolution.* Princeton University Press, Princeton.

Chick, G., 1997, Cultural Complexity: The Concept and Its Measurement. *Cross-Cultural Research* 31(4):275-307.

Damasio, A., 1994, *Descartes' Error: Emotion, Reason, and the Human Brain.* G. P. Putnam, New York.

Haidt, J., 2012, *The Righteous Mind: Why Good People are Divided by Politics and Religion.* Pantheon Books, New York.

Lakoff, G. and M. Johnson, 1980, *Metaphors We Live By.* University of Chicago Press, Chicago.

Landau, M. J., D. Sullivan, and J. Greenberg, 2009, Evidence That Self-Relevant Motives and Metaphoric Framing Interact to Influence Political and Social Attitudes. *Psychological Science* 20(11):1421-1427.

Maynard Smith, J. and E. Szathmary, 1999, *The Origins of Life: From the Birth of Life to the Origins of Language.* Oxford University Press, Oxford.

Naroll, R., 1956, A Preliminary Index of Social Development. *American Anthropologist* 56:687-715.

Ortman, S. G., 2012, *Winds from the North: Tewa Origins and Historical Anthropology.* University of Utah Press, Salt Lake City.

Ortman, S. G. and L. Blair, 2012, *Expanding the Atlas of Cultural Evolution.* In *The Principles of Complexity: Life, Scale, and Civilization,* Santa Fe Institute, Santa Fe, New Mexico. August 6-8, 2012.

Steckel, R. H. and J. C. Rose (editors), 2002, *The Backbone of History: Health and Nutrition in the Western Hemisphere.* Cambridge University Press, Cambridge.

Trigger, B. G., 2003, *Understanding Early Civilizations.* Cambridge University Press, Cambridge.

Wagner, A., 2011, *The Origins of Evolutionary Innovations.* Oxford University Press, Oxford.