

Proposed Content for Santa Fe Institute Symposium

Mark Nathan Cohen

Because I have not written directly on the subject of inequality in prehistory in several years, I refer the reader to a chapter I wrote for a symposium on the subject of inequality in 1998 (Cohen 1998). I am also adding a few of my more recent thoughts, (resulting partly from a “Conversation” melding theoretical approaches to the origins of agriculture held in Plattsburgh NY in the fall of 2007 to be published in *Current Anthropology* in 2009) that I have composed informally for this symposium.

1/ A clear distinction must be made between the emergence of largely egalitarian centralized societies with chiefs lacking the ability to use force and stratified societies with true economic disparities, based on force and indicated both in archaeological site composition (See any text book on prehistory and in differential health reflected in human skeletons. For the latter see Cohen 2007.

2/ It is now very clear that prior to the origins of agriculture and thereafter, probably until the emergence of stratified states subsistence changes were driven by demand side economics. Dietary quality and the efficient use of labor were gradually traded for lesser dietary quality greater risks of disease, generally declining health and higher labor costs. This is indicated by two independent sets of data: that from paleopathology (Cohen and Armelagos 1984; Cohen and Crane-Kramer 2007; Bocquet Appel and Naji 2006) and that from human behavioral ecology (Kennett and Winterhalder 2006 and papers in Cohen ed. 2009). Changes were necessitated by an imbalance between economic demand (largely equal to population needs) and available resources, requiring new strategies and new investments. (Once stratification occurred, lower classes ceased to exert economic demand since they had no ability to command food.)

It now appears that this may have resulted from resource changes resulting from climatic changes distinguishing the Holocene from the Pleistocene as well as from population growth. This may account for the very broad temporal parallelism not only in the adoption of agricultural economies but in the sequence of preceding of economic changes. (Richerson, Boyd and Bettinger 2001; Cohen 2009) The difference between economic demand and population in relatively recent prehistory may have been created by the emergence of “big men” whose activities may have necessitated additional “demand” for a small surplus (not related to the use of force) related to sociopolitical needs and feasting (Hayden 2001).

3/ The adoption of domestication and cultivation were not so much discoveries as necessities resulting from demand imbalance with wild resources. There often seems to have been a very long period separating domestication events from full fledged agriculture.

4/ the “big man” hypothesis is controversial; and it tends to beg the question. Why did big man appear to have emerged in many places within a narrow time

constraint, unless they were embedded in some common (presumably economic) situation?

5/ reliance on farmed fields was not a “great leap forward” so much as a necessity resulting from the declining utility and sufficiency of wild resources.

6/ Sedentism and storage, sometimes preceding and sometimes following animal and plant domestication but occurring in broadly the same time span in different regions were not so much permitted by new economies as necessitated by the need to remain in the vicinity of farmed fields and then to remain in the vicinity of storage facilities.

7/ Sedentism and storage were high risk as well as low return strategies that produced declining health. Risk-based fertility (Winterhalder and Leslie 2002) in which fertility is expected to increase with increasing economic, may account for the apparent increase in fertility that occurred broadly in the context of “Neolithic” economies (Bocquet Appel and Naji 2006).

8/ Perhaps the most serious risk of sedentary farming and storage was the vulnerability of these economies to expropriation of resources or outright conquest. Mobile populations can simply move away. Sedentary populations cannot. It is in this risk, I think, that we see the seeds of economic/class inequality and of differential biological stress by social class. The emergence of inequality seems always to have been embedded in the same sequence of economic changes, probably for this reason. It is also possible that increasing community size under sedentary conditions (for defense, an arms race in a world where arms meant people) also promoted increasing social complexity and the internal centralization of power. (Community size appears to have a causative relationship with the number and complexity of social institutions.) Interdependence of ethnic groups with different cultural systems that no longer thought of themselves as “we” may have encouraged the need for centralized power to manage social relationships and standardize interactions. (Hence the emergence of formal legal systems for example.)

Bibliography

Bocquet-Appel JP. 2002. Paleoanthropological traces of a Neolithic demographic transition. *Current Anthropology* 43: 637-650

Bocquet-Appel J-P and S. Naji. 2006. Testing the hypothesis of worldwide Neolithic demographic transition: *Current Anthropology* 47: 341-365

Cohen, MN. 1977. *The Food Crisis in Prehistory*. New Haven: Yale University Press, 1977)

- Cohen MN. 1998. The emergence of health and social inequalities in the archaeological record. eds. S.S. Strickland and P.S. Shetty (1998): *Human Biology and Social Inequality*. Society for the Study of Human Biology Symposium 39, pp 249-271. Cambridge (UK): Cambridge University Press.
- Cohen, MN 2007 Appendix p 347 in Cohen an Crane Kramer
- Cohen MN. 2009. in Cohen MN ed. 2009.
- Cohen MN ed. (forthcoming) 2009. A symposium on theories of agricultural origins. *Current Anthropology*
- Cohen MN and GJ Armelagos eds. 1984. *Paleopathology at the Origins of Agriculture*. Orlando FL: Academic Press.
- Cohen MN and G Crane Kramer eds. 2007. *Ancient Health* Gainesville FL: University Press of Florida
- Hayden, B., 2001. Fabulous feasts: A prolegomenon to the importance of feasting, in M. Dietler and B. Hayden eds. *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power, Eds.* Washington, D.C.: Smithsonian Institution Press, pp. 23-64.
- Kennett DJ and B Winterhalder. 2006. *Behavioral Ecology and the Transition to Agriculture*. Berkeley: University of California Press.
- Richerson, P. J., R. Boyd and R. L. Bettinger. 2001. Was Agriculture Impossible During the Pleistocene but Mandatory during the Holocene?: A Climate Change Hypothesis. *American Antiquity* 66(3):387-411.
- Winterhalder, B. and P. W. Leslie 2002 Risk-sensitive fertility: The variance compensation hypothesis. *Evolution and Human Behavior* 23:59-82.

The Santa Fe Institute (SFI) is an independent, nonprofit theoretical research institute located in Santa Fe (New Mexico, United States) and dedicated to the multidisciplinary study of the fundamental principles of complex adaptive systems, including physical, computational, biological, and social systems. As of 2016, the Institute is ranked 20th among the world's "Top Science and Technology Think Tanks" and 23rd among the world's "Best Transdisciplinary Research Think Tanks" according to the Global Annual Science Board Symposium. Symposium. All day. May 2, 2013 – May 4, 2013. This event is by invitation only. [Click here to download the agenda.](#) Share. SFI Calendars. Mirta Galesic Santa Fe Institute, USA Election outcomes can be difficult to predict. A recent example is the 2016 U.S. presidential election, where Hillary Clinton lost five states that had been predicted to go for her, and with them the White House. Most election polls ask people about their own voting intentions: whether they will vote, and if so, for which candidate. To utilize the advantages of a machine forecast and human forecasts, we propose a human-machine ensemble method for estimating the expected error of a machine forecast and dynamically determining the optimal number of humans included in the ensemble.