Synchrony in the New World: An Example of Archaeoethnology

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Christopher Chase-Dunn and colleagues have demonstrated cycles of synchronous growth and decline in cities in East Asia and in the Mediterranean. They argue that synchrony is rooted in systems of economic and political interdependence, cutting across broad regions of the world for long periods of history. Using a new strategy for cross-cultural research in the anthropological sciences—archaeoethnology, the cross-cultural analysis of archaeological cultures in a diachronic mode—the author examines whether settlement synchrony has occurred in the New World and if so, whether it implies widespread economic and political interdependencies across long periods of time.

Keywords: *archaeology; New World prehistory; cultural evolution; time-series analysis*

Christopher Chase-Dunn and colleagues have recently demonstrated an interesting pattern of urban dynamics in Europe, North Africa, and Asia during the past 4,000 years (e.g., Chase-Dunn & Hall, 1997; Chase-Dunn & Willard, 1993). They show, using the geographical area and estimated population of cities known from historical and archaeological contexts, that changes in city size in

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one part of this broad region anticipate and perhaps cause change in other parts of the region (Chase-Dunn, Manning, & Hall, 2000). Chase-Dunn and colleagues term this pattern "city synchronicity" and demonstrate long-term patterns of synchrony across large regions of the Old World (Chase-Dunn & Manning, 2002).

Chase-Dunn and colleagues propose several causal factors underlying city synchrony. They suggest long-distance trade could have produced economic forces strong enough to bring city growth and decline into synchrony, similar to the way the modern world system produces integration between the nations of the world (Chase-Dunn & Hall, 1997; Chase-Dunn & Willard, 1993). They also suggest that the impact of steppe nomads or epidemic diseases on population size and movement could have produced a pattern of synchrony as people centralized for defense or moved to avoid disease-ridden areas or locations on the path of nomad conquest (Chase-Dunn & Manning, 2002). Finally, they suggest that climate change could have produced a pattern of synchronous expansion and contraction of cities (Chase-Dunn, Alvarez, & Pasciuti, 2002; Chase-Dunn & Manning, 2002).

This last suggestion, that climate change could have produced a pattern of city synchrony in the Old World, is a particularly interesting one, as it matches ideas coming from other areas of social science research (e.g., Kick & Jorgensen, 2003; Lamb, 1995). If climate changes were extensive enough to affect all of Eurasia, we might expect these changes to have affected the New World as well. The purpose of this article is to examine whether there is evidence of settlement synchrony in the New World during the past 4,000 years and, if so, whether synchronous change correlates with change in the Old World. Such a finding would support the idea that climate change is a primary cause of city synchrony.

METHOD

To demonstrate city synchrony in the Old World, Chase-Dunn and colleagues relied on data from a variety of well-established sources, particularly Tertius Chandler's (1987) remarkable compendium of city data. Unfortunately, these sources are inadequate for the New World except for the relatively recent past, and even newer sources (e.g., Modelski, 2003) lack good data for the prehistoric New World. I chose, instead, to rely on the information presented in Volumes 5, 6, and 7 of the *Encyclopedia of Prehistory*

(Peregrine & Ember, 2001-2002). From the information in these volumes, I coded a set of "cultural complexity" data, recently published with a full description of my coding methods (Peregrine, 2003). These data have already been used in several published studies (e.g., Peregrine, 2001; Peregrine, Ember, & Ember 2004) and appear to be both valid and reliable. Thus, they appear to be a good set of data for this study.

Chase-Dunn and colleagues use estimates of individual city size and population in their analyses. This was not possible for the New World as only a handful of prehistoric cities have been investigated closely enough to provide such data, and the literature on others can only provide gross estimates. Similarly, there are large areas of the New World where archaeological and historical research is only beginning to build a firm knowledge base (for example, West Mexico and southern Central America). The data set I employ here uses "archaeological traditions" rather than individual cities as the basic units of analysis. Archaeological traditions are amalgams of archaeologically described societies that are similar in their political and economic forms, are bounded in time and space, and were created to provide roughly comparable units for doing cross-cultural archaeology, or archaeoethnology (Peregrine, 2001).

Because my units of analysis are different from those employed by Chase-Dunn and colleagues, I had to employ a somewhat different method of analysis as well. I chose to use the percentage of cases with settlements larger than 400 people as my dependent variable. This may not seem urban, but anthropologists have demonstrated that settlements with more than 400 people require formal mechanisms to maintain peace and stability (e.g., Chagnon, 1975). Because most New World societies did not have state forms of government, I suggest that using settlements of greater than 400 people illustrates variation in New World population centralization better than relying on the criteria used by Chase-Dunn and colleagues (they define cities as having more than 10,000 residents).

I coded cases in a time series with 100-year intervals for the period from 2,500 to 500 years ago. I also divided the New World into three broad regions for comparison: North America, Mesoamerica (including Central America), and South America. To test whether my coding method produced results similar to Chase-Dunn and colleagues, I coded a set of Old World archaeological traditions using settlements with more than 400 residents indicative as incipient urbanization. Figure 1 offers a plot of the results

(showing percentage of archaeological traditions with such settlements). Comparing Figure 1 with the same time period in Figure 5 demonstrates that the two methods produce reasonably similar results with one caveat, that the percentage method works poorly for highly urbanized areas, such as West Asia, during this period, as there tend to be few if any cases that lack cities.

RESULTS

Figure 2 plots the percentage of cases with settlements with more than 400 residents across time for North America, Mesoamerica, and South America. There does appear to be evidence for a pattern of settlement synchrony. Specifically, Mesoamerica and South America appear to show a synchronous pattern of growth and decline from about 2,100 to 1,100 years ago, with South America lagging behind Mesoamerica by roughly 200 years. After about 1,500 years ago, Mesoamerica and North America begin a pattern of synchronous counterchange, with the percentage of settlements with more than 400 people declining as the percentage in North America grows.

Further evidence for New World synchrony is shown in Figures 3 and 4. Figure 3 is a time-series plot showing the cross-correlation of the percentage of cases with settlements of more than 400 inhabitants between Mesoamerica and South America and demonstrates a statistically significant correlation with a lag of 200 years. Thus, the percentage of cases with settlements of more than 400 people in South America increases in a way similar to that in Mesoamerica but about 200 years later. Figure 4 shows a similar plot for the period between 1,500 and 500 years ago for Mesoamerica and North America and demonstrates a statistically significant negative correlation with a time lag of roughly 100 years. Here the percentage of cases with settlements of more than 400 people in North America increases as those in Mesoamerica decline.

DISCUSSION

What might explain these patterns of synchrony? As noted earlier, Chase-Dunn and colleagues propose four explanations for the Old World: long-distance trade, invasions of steppe nomads,

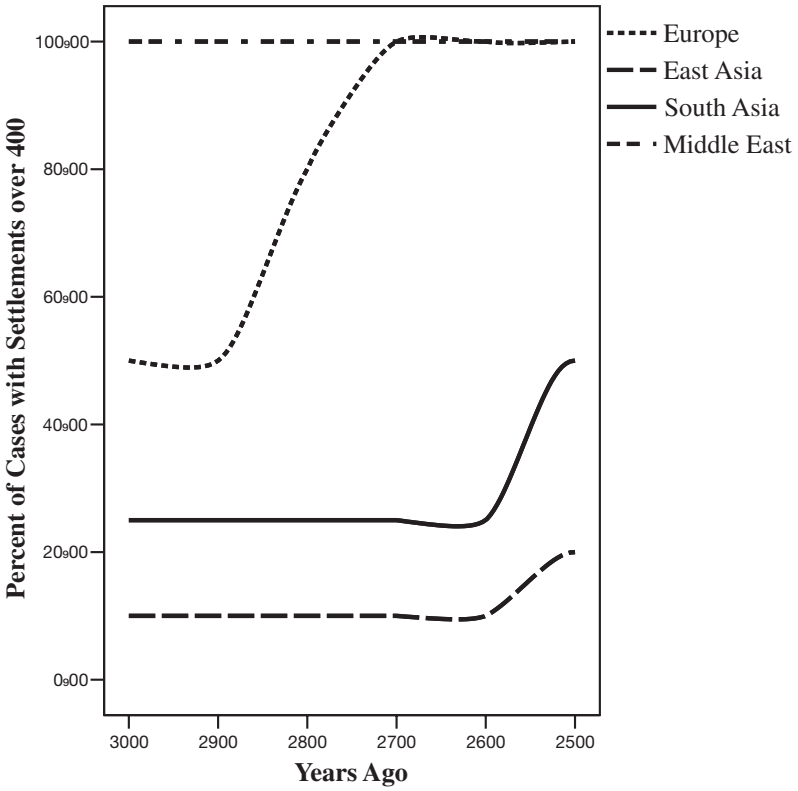

Figure 1: Percentage of Archaeological Traditions in the Old World With Settlements With More Than 400 Residents for the Period Between 3,000 and 2,500 Years Ago

epidemic diseases, and climate change. Of these, both invasions of steppe nomads and epidemic diseases are unlikely causes of New World synchrony. Although warfare and conquest certainly played a role in population centralization in the New World and sometimes did involve nomadic groups such as the Chichimecs, these all occurred (as far as we know) on a limited scale, regional at the largest (LeBlanc, 1999). No evidence of large-scale conquest covering more than a fairly limited geographic region has been found in the New World until the very end of the period examined here. The same appears true for epidemic diseases. Although there is evidence for some epidemic diseases in the prehistoric New World (venereal syphilis and tuberculosis, for example), there is little evidence that they caused widespread disruptions of any kind until

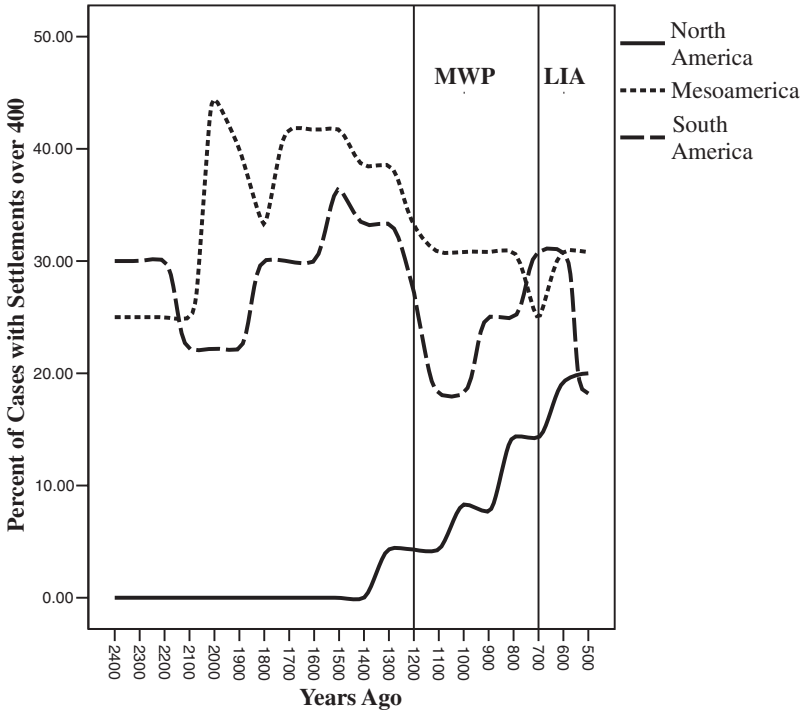

Figure 2: Percentage of Archaeological Traditions in the New World With Settlements With More Than 400 Residents for the Period Between 2,500 And 500 Years Ago

NOTE: Reference lines show the start of the Medieval Warm Period (ca. 1,200 to 700 years ago) and the Little Ice Age (ca. 700 to 200 years ago).

the time of European contact or perhaps just before (Ramenofsky, 1987). Neither epidemic disease nor conquest (by steppe nomads or others) appears to be an adequate explanation for the apparent patterns of New World settlement synchrony.

What about long-distance trade? There appears to be abundant evidence that long-distance trade was occurring between these three regions of the New World during the time period under consideration. Trade between the southwestern United States and Mexico was continuous across a long period of time (Ericson & Baugh, 1993). Indeed, the northern Mexico site of Casas Grandes (Paquimé) was apparently established largely to facilitate this trade (Di Peso, 1974; Schaafsma & Riley, 1999). There is less evidence for trade between Mexico and the southeastern United

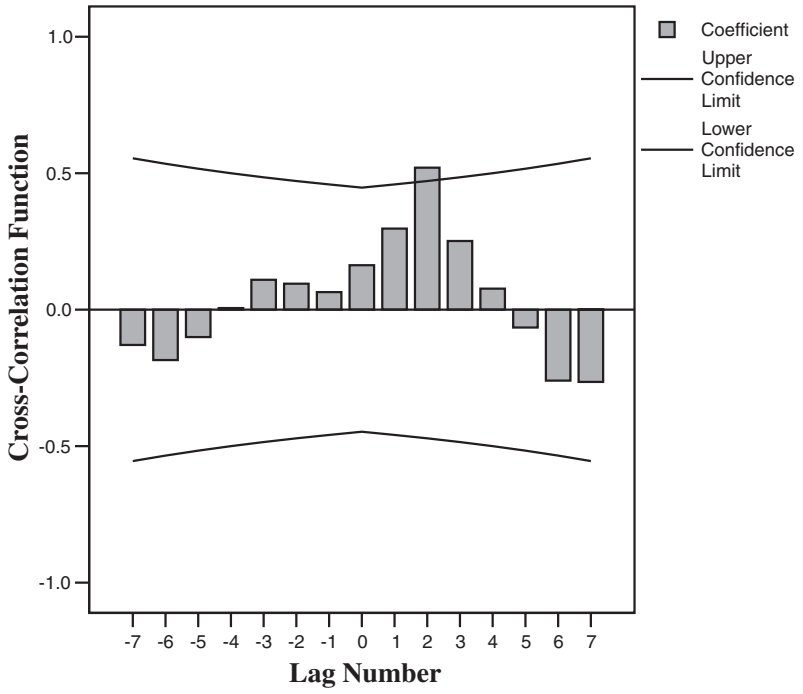

Figure 3: Time-Series Plot Showing the Cross-Correlation of the Percentage of Archaeological Traditions With Settlements With More Than 400 Residents in Mesoamerica With the Percentage in South America for the Period From 2,500 to 500 Years Ago

States, but evidence does exist (Barker, Skinner, Shackley, Glascock, & Rogers, 2002). There is also unambiguous evidence of trade between Mexico and South America. For example, Ecuadoran shell fishers obtained *Spondylus* shells in home waters and transported them by sailing canoe along the Pacific Coast from the southern Andes to perhaps as far north as West Mexico (Paulsen, 1974).

These and other examples suggest that long-distance trade did occur between the three primary regions of the prehistoric New World and therefore could provide a mechanism to explain New World synchrony. But was trade ever extensive enough to influence urbanization in this way? The answer depends on the theory of cultural process to which one subscribes. I believe that even modest interregional trade can have profound impact on the societies who are engaged in it (Chase-Dunn & Hall, 1997; Peregrine, 2000).

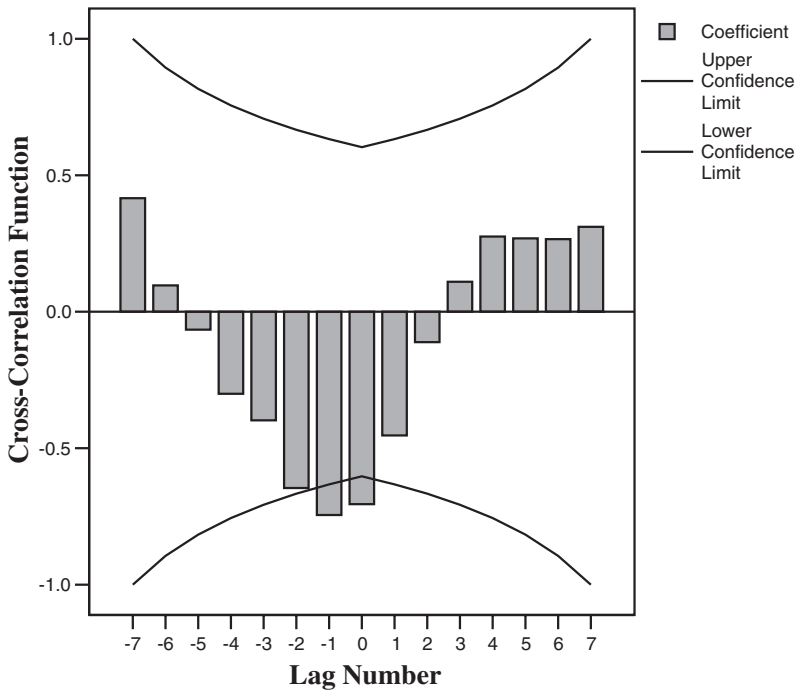

Figure 4: Time-Series Plot Showing the Cross-Correlation of the Percentage of Archaeological Traditions With Settlements With More Than 400 Residents in Mesoamerica With the Percentage in North America for the Period From 1,500 to 500 Years Ago

Others disagree (Wallerstein, 1995). Despite disagreements, there are valid theoretical perspectives within which long-distance trade could explain patterns of settlement synchrony (Smith, 2000), and thus long-distance trade should not be excluded as a possible explanation.

Many scholars have proposed climate change as an important factor in New World political evolution and devolution (de Menocal, 2001; Polyak & Asmeron, 2001). Two climatologic events in the past several thousand years have attracted the particular attention of archaeologists because of their apparent intensity and worldwide effect: the Medieval Warm Period (MWP), circa 1,200 to 700 years ago, and the Little Ice Age (LIA), circa 700 to 200 years ago (Fagan, 2002, 2003; Jones et al., 1999). The MWP is an era in which much of the northern hemisphere experienced mild winters and decreased precipitation that produced periodic and sometimes

severe drought (Lamb, 1995). In contrast, the LIA is an era of increased precipitation, harsher winters, and cooler summers in the northern hemisphere that ended, perhaps suddenly, because of anthropogenically induced warming associated with the Industrial Revolution (Fisher & Koerner, 2003; Lamb, 1995).

How well do these two important climatologic events correlate with patterns of settlement synchrony? In the New World, the correlation seems modest at best (Figure 2). Although Mesoamerica and South America both show a decline in the percentage of cases with settlements with more than 400 residents at the beginning of the MWP, their decline started at least a century earlier, and both experience significant change within the period. A marked downward dip in Mesoamerica is associated with the onset of the LIA, but this is quickly reversed, and the opposite seems true for South America. North America appears to experience a slow, steady increase in the percentage of cases with cities during both periods. It seems that neither of these fairly substantial periods of climate change is unambiguously correlated with changes in urbanization in the New World.

In the Old World, correlations with the MWP and LIA seem stronger. Figure 5 presents data on city size for the Old World for the period between 4,000 and 500 years ago and is intended to offer a comparison with Figure 2. As can be seen in Figure 5, there is a period of higher mean urban population clustered around the beginning of both climatologic events. Yet, as in the New World, there is also great variation within each climatic period. In both world areas, these dramatic climate events appear to promote changes in patterns of urbanization, yet the patterns differ in the two world regions, and there appears to be variation within climatic regimes that are not apparently explained through climate change. Climate change, then, appears to affect the pattern of settlement synchrony, particularly at the onset of climatic change. But climate change, at least on this scale, does not appear to be a good predictor of the direction or intensity of synchrony, nor is it a predictor of all changes in patterns of urbanization, as synchronic changes still occur in the absence of apparent climate change.

CONCLUSION

The evidence discussed above implies several interesting conclusions. First, there was a pattern of settlement synchrony in the

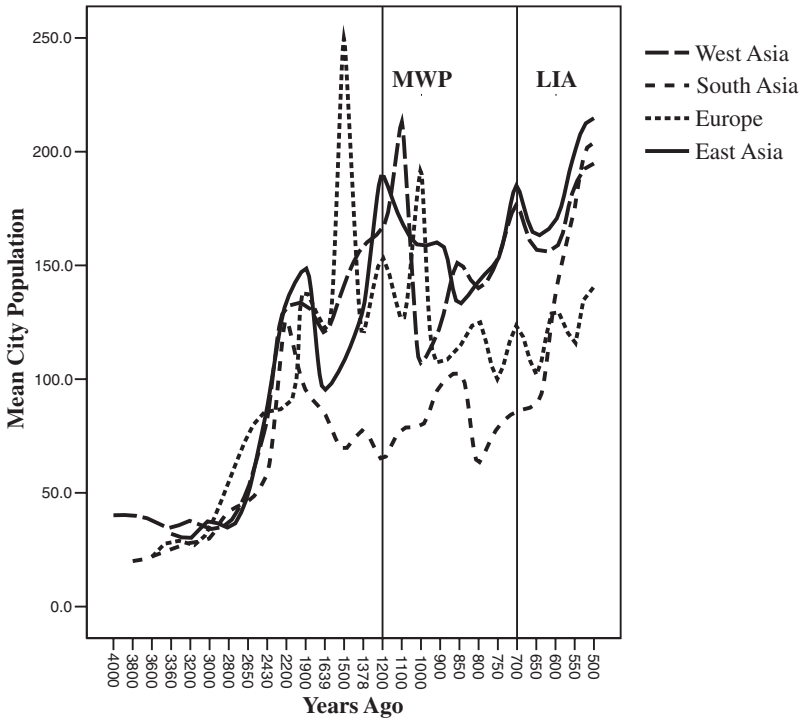

Figure 5: Average City Size (Settlements With More Than 10,000 Residents) in the Old World for the Period Between 4,000 and 500 Years Ago

SOURCE: The Institute for Research on World-Systems (http://irows.ucr.edu/research/citemp/ccr02/citypop5.xls)

NOTE: Reference lines show the start of the Medieval Warm Period (ca. 1,200 to 700 years ago) and the Little Ice Age (ca. 700 to 200 years ago).

prehistoric New World, just as there was in the Old World. This suggests that settlement synchrony is a phenomenon that has occurred repeatedly in human history and is perhaps of some importance in understanding human social dynamics. Second, the pattern of settlement synchrony in the New World does not always correspond to that in the Old World, so the two patterns are not directly linked. This may mean that large-scale or global climate change is not a key variable in understanding the causes of settlement synchrony, although local or regional climate changes may still play an important role. Third, the presence of synchrony in the New World implies that macroregional processes, such as long-

distance trade, had more impact on New World societies than is commonly thought. This seems a conclusion that warrants further investigation.

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