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CROSS-CULTURAL COMPARATIVE APPROACHES IN ARCHAEOLOGY

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■ **Abstract** Cross-cultural comparative approaches have been used widely in archaeological research, yet to date none seem to have achieved their full potential. Synchronic cross-cultural comparisons have provided a number of material correlates of behavior, as well as a few causal and noncausal associations that allow behavior to be inferred from material remains. However, large areas of material culture, such as ceramics and lithics, have not yet been subject to extensive comparative analysis, and thus large areas of archaeological research that might be aided by synchronic comparative findings have been left unassisted. Diachronic cross-cultural comparisons have been used extensively to chart and analyze cultural evolution. However, these comparisons are typically based on grab-bag samples and only rarely employ statistics to aid in the discovery or testing of evolutionary patterns. New research tools providing a statistically valid sampling universe and information resources for coding archaeological data are being developed to facilitate cross-cultural comparisons.

INTRODUCTION

One of the basic problems faced by archaeologists is that our subjects cannot speak to us. We must listen to them through the material remains they left behind, and even these cannot tell us how or why they were made or what they mean. Although a few archaeologists have run away from this problem by suggesting that archaeological sites are little more than mirrors reflecting ourselves and not the past (Shanks & Tilley 1992), most archaeologists maintain a deep concern for interpreting and understanding those who went before. To understand the past, archaeologists must find ways of making material remains speak, speak reliably, and speak in a language we can understand. In this paper I suggest that cross-cultural comparisons provide a powerful method for making the archaeological record speak to us, and I review both past uses and future directions of cross-cultural comparisons in archaeology.

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COMPARATIVE ETHNOLOGY VERSUS ETHNOGRAPHIC ANALOGY

Ethnographic analogy has been the primary method used to make the material record speak from the very beginnings of archaeology. Indeed, because we can never actually see the past, one could argue that analogy must be a part of archaeological interpretation (Bloch 1953, p. 48). However, the attempt to construct systematic methods for applying ethnographic information to the interpretation and analysis of the archaeological record has only occupied archaeologists since the 1950s (see Wylie 1985 for an overview of pre-1950s use of analogy).

One of the first to propose a systematic method for constructing analogies was Graham Clark (1951, 1953). He suggested that analogies might be most accurately and appropriately drawn from ethnographically-known cultures with subsistence technologies and ecological settings similar to those of the archaeological culture of interest. Wylie (1985, p. 71) terms this a "neo-evolutionist" approach, as it has its roots in an older method of drawing analogies from cultures in similar positions within an evolutionary typology [particularly Morgan's (1877)], but adds to it the idea that environment may play an important role in shaping a culture.

In 1961 Robert Ascher took up Clark's ideas and summarized problems many had found with them, including their overt environmental-determinist assumptions. He suggested that a method of "direct historic" analogy might be more appropriate than a neo-evolutionist one. By direct historic analogy Ascher (1961, pp. 323–24) meant that analogies should be drawn only from ethnographic cases that could be directly linked to the archaeological cultures being interpreted. Ascher believed that where cultural continuity could be demonstrated, features of prehistoric lifestyles could be expected to be retained, and hence, analogy would be more appropriate than in cases where cultural continuity could not be demonstrated.

Many archaeologists remained critical of the use of analogy. One reason was that a method similar to Ascher's, called the "direct historic approach" to archaeology, had been in use in North America for over 30 years and was beginning to be critically questioned (Trigger 1989, pp. 300–1). The direct historic approach proposed that archaeologists work back into the past from historically known cultures, basing interpretations on the previous period (see Steward 1942). It was quickly realized, however, that once one went past the latest prehistoric period, one was still completely removed from empirical analogy to known peoples and one ran the danger of compiling interpretive mistakes as one moved further into the past (Trigger 1989, pp. 391–95). Gary Feinman and his colleagues (Feinman et al 2000) recently illustrated this problem by demonstrating that reliance on direct historic analogy limits our understanding of variation and change in prehistoric Puebloan sociopolitical organization by disallowing interpretations suggesting prehistoric Puebloan groups were organized differently from contemporary ones, even though the archaeological record shows periods of dramatic change.

In the 1970s a movement, linked to the "new" archaeology and its emphasis on "middle-range" research (i.e. research focused on linking artifacts and artifact

patterns to human behaviors), was initiated involving field research among living peoples designed specifically to develop means to interpret the archaeological record. Many saw this approach, termed "ethnoarchaeology" or "living archaeology," as the answer to the long-standing problem of ethnographic analogy in archaeological interpretation (Gould 1980, Gould & Watson 1982). It didn't take long, however, for archaeologists, even proponents of ethnoarchaeology, to realize that this method had many of the same problems the direct historic approach had (Wylie 1982). As one moved into the past, one still became completely removed from empirical analogy to known peoples, and as in the case of Puebloan sociopolitical organization mentioned above, one might not know when one was inappropriately limiting the range of possible interpretations.

It is interesting that in all this discussion and debate about the use of ethnographic analogy in archaeological interpretation, few have put forward the idea that findings from cross-cultural research might provide an appropriate source for drawing inferences (Peregrine 1996a). As McNett (1979, p. 40) succinctly put it "one is rather at a loss to explain why this method has not been used more for archaeological purposes." One reason McNett (1979, p. 41) offers is that archaeologists are simply unaware of the findings of cross-cultural research. McNett (1979) and Ember & Ember (1995) have compiled empirical findings of cross-cultural research with implications for archaeological interpretation. Both provide excellent overviews of the literature, and I only offer a brief summary here.

RESULTS FROM CROSS-CULTURAL RESEARCH

Cross-cultural research, as used here, refers specifically to the statistical testing of theories or hypotheses against data from a large (often worldwide) and clearly defined sample of societies. As Ember & Ember (1995, p. 88) put it, underlying cross-cultural research is the fundamental assumption "that if an explanation (theory or hypothesis) has merit, measures of the presumed causes and effects should be significantly and strongly associated synchronically." The importance of this approach is that if one can find a strong association in a worldwide sample of cultures, then one can assume that the association fits human behavior in general and not just the customs of a particular culture or historically related group of cultures (Sanderson 1990, pp. 211–12). Also, particularly important for the archaeologist, there is no a priori reason for this generalization not to hold for prehistoric cultures as well (but cf. Ember & Ember 1995, pp. 95–96).

It is important to point out that cross-cultural research is not only different from other methods of cross-cultural comparison [e.g., the California and Indiana schools of ethnology (see McNett 1979, pp. 42–46)], but it is also quite different from the theoretically based attempts to predict associations between behavior and material culture that have been used in archaeological interpretation. These theoretically based arguments were developed to avoid the presumed problem of the ethnographic record lacking information on material culture and/or being so

heavily biased that material culture indicators of behavior are necessarily flawed (McNett 1979, pp. 46–54). A good example is a paper by Christopher Peebles and Susan Kus (1977) in which the authors suggest archaeological correlates of social ranking and chiefdom political organization. Based on the theoretical works of Service (1962) and Fried (1967), Peebles & Kus suggest that an important archaeological indicator of ranking and chiefdoms will be the presence of communal storage facilities used for redistribution. Unfortunately, a cross-cultural study of the New World (Feinman & Neitzel 1984) has shown that redistribution is actually rare in rank and chiefdom societies and, when it is present, is a highly diverse activity, possibly lacking in material indicators. Peebles & Kus's indicator was flawed because the theory they based it on was flawed. The method of cross-cultural research avoids this problem by empirically testing for indicators, differences, and correlations. The tremendous value of the cross-cultural method is precisely this: Material indicators of behavior are both developed through theoretical modeling and empirically demonstrated to hold true across a range of cultures (Ember & Ember 1995, pp. 105–6).

Cross-cultural research is based on several underlying assumptions that are also important to understand. First, it is assumed that cases for comparisons are drawn from a statistically valid sample representing the entire range of variation in the subject of interest. A number of such samples have been developed for cross-cultural research, including the Standard Cross-Cultural Sample (Murdock & White 1969) and the Human Relations Area Files (HRAF) Probability Sample (Naroll 1967). The entire HRAF Collection of Ethnography is itself a more than 30% sample of the ethnographic record. Second, it is assumed that the units of analysis are comparable. Whereas ethnologists claim to compare cultures, the actual units of analysis are most commonly individual communities within a larger cultural system, typically called "focal communities," each with specific pinpointing dates (see Ember & Ember 1988, 2001). Finally, cross-cultural research relies on the use of inferential statistics to determine empirically whether apparent associations or trends are indeed present (Ember & Ember 1998, 2001).

Ember & Ember (1995) outline two kinds of archaeologically useful findings from cross-cultural research. The first of these are material correlates of human behaviors (Ember & Ember 1995, p. 98), which McNett (1979, pp. 59–64) discusses as "proxy measures" of human behaviors. For McNett, these are the most important findings that cross-cultural research has to offer—ways to view human behavior by using material remains as proxy measures of those behaviors. For the Embers, material correlates are certainly valuable for archaeological interpretations in and of themselves, but they are more valuable when used to apply causal and noncausal associations to the archaeological record.

Causal and noncausal associations refer to situations in which one variable can be used to predict variation in another (Ember & Ember 1995, p. 97). Causal associations suggest a causal relationship between the variables (i.e. that variation in one causes variation in the other), whereas noncausal associations suggest simple covariation (either direct or inverse) between them. In either case, these

are the most powerful findings for archaeological interpretation, because if two variables can be shown to be significantly associated in a diversity of cultures, then it would be difficult to argue that the same relationship would not hold for prehistoric cultures as well (see Wylie 1985, p. 101 for a discussion). Indeed, this is exactly the kind of predictive ability many involved in ethnoarchaeology are seeking (see, e.g., Gould 1980, pp. 109–10; Gould & Watson 1982, pp. 357–58, 363), but have apparently either missed or neglected in the results of cross-cultural research.

A few examples may serve to illustrate this point. In terms of causal and noncausal associations, the causes of variation in postmarital residence have been the subject of intense cross-cultural study, and a number of the identified predictors might be applicable to the archaeological record. For example, bilocal residence among foragers is predicted by three conditions: sudden depopulation, small community size, and high rainfall variability around a low mean (Ember 1975). Finding evidence of these conditions would allow an archaeologist to hypothesize bilocal residence in an archaeologically known foraging population. In nonforaging populations severe depopulation from disease appears to predict bilocal (or, more accurately, multilocal) residence (Ember & Ember 1972). Ember (1975) suggests that the likelihood of matrilocal versus patrilocal residence for foragers can be estimated based on the relative importance of fishing (a predictor of patrilocal residence) and gathering (a predictor of matrilocal residence) to subsistence. Thus, careful analysis of subsistence with regard to cross-cultural predictors might allow an archaeologist to hypothesize the type of postmarital residence practiced by the peoples occupying a given archaeological site or region.

In terms of material correlates of behavior, a well-known one is that between total living floor area and population (Naroll 1962). Replications by other researchers (e.g., Brown 1987, Peregrine 1994) suggest that the correlation is robust and that archaeologists can confidently predict site population by estimating 6 square meters of floor area per person. This finding has been used extensively in archaeology to estimate the population of sites and regions. Though perhaps the most widely used, the relationship between floor area and population is not the only material correlate discovered through cross-cultural research that has potential utility in archaeology. For example, several studies have demonstrated strong associations between house form and aspects of social organization, particularly postmarital residence. Specifically, dwellings with floor areas larger than roughly 80 square meters are likely to be matrilocal, whereas those with floor areas less than 40 square meters are likely to be patrilocal (Brown 1987, Divale 1977, Ember 1973). The internal divisions within houses also appear to correlate with social organization (Kent 1990). The presence of wealth differences, for example, correlates with multi-room dwellings (Whiting & Ayres 1968, Blanton 1993), and room size within multi-room dwellings appears to correlate with postmarital residence (James 1994). Clearly, an abundance of information about the social organization of prehistoric societies can potentially be obtained through material correlates.

DISCUSSION OF SYNCHRONIC CROSS-CULTURAL COMPARISONS

Cross-cultural research has generated a number of useful predictors and material correlates of behavior, but clearly more can be done. There has been virtually no research on material correlates of the two most prevalent items in the archaeological record: ceramics and lithics (but see Odell 1988, 1998). Only a handful of studies have focused specifically on behaviors associated with artistic styles and decoration (e.g., Fischer 1961, Blanton 1993). Very little research has been done on causal models or material correlates of religious beliefs and practices (but see Kamp 1998, Peregrine 1996b, Swanson 1960). Although finding material correlates for such things as religious beliefs may seem an impossible task—as Marc Bloch (1953, p. 194) put it, "there can be no psychology which confines itself to pure consciousness"—there must be material behaviors associated with such things as religious beliefs, and the task is to discover them. However, the task is also to use these findings, and to date, archaeology has not done a very good job at that. Cross-cultural research holds a unique and important key to the archaeological record, a key to unlock the voices of the material record, a key that allows these objects to speak to us from the past, and we should be more aggressive about using its results (see Blanton & Taylor 1995).

Thus far, the discussion of cross-cultural research has referred only to the ethnographic record, but what of the archaeological record? Much of archaeological interpretation involves comparison of archaeological materials across sites and regions. Indeed, such vital areas of archaeological interpretation as culture history, relative dating, and diffusion, to name only a few, are rooted in the comparison of archaeological materials between sites and regions. The point I would like to emphasize is that such comparisons are almost universally made along the lines of ethnographic analogy; that is, they are uncontrolled comparisons. Causal and non-causal associations, developed through rigorous statistical analysis, have not been developed based on archaeological cases, and only rarely have material correlates of behavior been discovered [e.g., alteration in habitation with sedentarism (see Kent 1999)]. Thus, although systematic, controlled comparisons have been common using the ethnographic record, they have been rare using the archaeological record.

DIACHRONIC CROSS-CULTURAL COMPARISONS

That the archaeological record has not been used as the ethnographic record has is not surprising—the two differ in important ways. After all, finding material correlates for behavior is impossible if one does not know the behavior was present in the first place. However, the archaeological record has been used for systematic comparison of a kind that is difficult, if not impossible, to perform within the ethnographic record: the comparison of a single society over time. In most cases the

limited time depth of the ethnographic record prevents such diachronic comparisons, and if they are possible at all, the length of time over which stability and change can be examined is quite brief. The archaeological record, on the other hand, is uniquely suited to such diachronic analyses and, indeed, has been the subject of systematic diachronic comparisons for at least 150 years.

Diachronic cross-cultural comparison was a staple method among the founders of anthropology. In *Principles of Sociology*, for example, Herbert Spencer (1896–1899) attempted to construct a general law of cultural evolution in part by providing examples of various stages of cultural evolution that included pre-Columbian Mexico, Pharonic Egypt, and the Roman Empire, among others. Similarly, Edward Tylor, in *Primitive Culture* (1871), used diachronic comparison to trace cultural "survivals" and build evolutionary sequences. Lewis Henry Morgan also attempted to use diachronic comparison, in *Ancient Society* (1877), to establish a universal sequence of cultural evolution. Unfortunately, these early attempts at diachronic comparison were doomed to fail because the archaeological data available to these scholars were crude and lacked absolute dates, preventing the establishment of an empirical sequence of change. This lack of true diachronic data was a significant flaw in the work of the early evolutionists, a flaw that was rightly seized upon by Boas and his students, who launched a damning criticism of both comparative analyses and evolutionary theory [a critical perspective that continues to this day (see, e.g., Nisbet 1969, Hodder 1982, Shanks & Tilley 1992)].

Although the paucity of data and the Boasian reaction against these early evolutionists halted diachronic cross-cultural comparisons for a time, a second generation of evolutionists followed with comparisons based on better data and more rigorous theory (see Hallpike 1986, Harris 1968, Sanderson 1990, Trigger 1998 for reviews). Foremost among these scholars was Vere Gordon Childe, whose *Social Evolution* (1951) provides something of a blueprint for diachronic cross-cultural comparisons using archaeological data. His basic position is that "archaeology can establish sequences of cultures in various natural regions. And these cultures represent societies or phases in the development of societies. Potentially, therefore, archaeological sequences reveal the chronological order in which kinds of society did historically emerge" (Childe 1951, p. 17). To unleash this potential, Childe (1951, pp. 22–29) suggested that archaeologists needed to focus their efforts on clarifying archaeological sequences based on what can be most clearly observed in the archaeological record: technology and economy. Such changes in technology and economy, Childe argued, led to changes in other aspects of culture and, in turn, to cultural evolution. To illustrate this point, Childe (1951, pp. 166–79) examined and compared the archaeological sequences of temperate and Mediterranean Europe, the Nile valley, and Mesopotamia and concluded that innovation and diffusion are the major processes underlying cultural evolution. He also pointed out that it is only through diachronic comparison that diffusion can be empirically examined and measured (Childe 1951, p. 170).

In the United States the cultural anthropologist Julian Steward argued along similar lines. He posited that "a legitimate and ultimate objective [of anthropology] is

to see through the differences of cultures to the similarities, to ascertain processes that are duplicated independently in cultural sequences, and to recognize cause and effect in both temporal and functional relationships" (Steward 1949, p. 3). Steward made suggestions about methodology for accomplishing this objective similar to those put forward by Childe, but also argued, in a manner similar to Murdock (1957), that synchronic comparison could also yield valuable information about cultural regularities. Steward's major contribution to diachronic cross-cultural research was an examination of Karl Wittfogel's hypothesis that the control of irrigation facilities led to the rise of states. Steward (1949, 1955, 1977) compared cases of state origins in Mesopotamia, Egypt, North China, Peru, and Mesoamerica and found support for the idea that control of irrigation systems was an important element in the emergence of centralized authority. Although Wittfogel's irrigation hypothesis has since been heavily criticized, Steward's cross-cultural attempt to evaluate it proved influential.

Whereas Childe and Steward planted the seeds for diachronic cross-cultural comparison using the archaeological record, Elman Service's *Origins of the State and Civilization* (1975) brought the method to fruition. Service compared five historically known cases of state origin and six archaeologically known cases to test a variety of theories of state origin against the data. Although his sample was a grab-bag and his methods of analysis wholly informal [Service (1975, p. 18) tells us, rather matter-of-factly, "There is no problem here that requires any statistical or sampling procedures because the instances of state formation that are documented well enough to be useful are so few"], Service conducted a clear and direct diachronic comparison of archaeological sequences in order to identify repeated patterns and processes—exactly the type of analysis envisioned by Childe and required by cross-cultural research. And although some of Service's conclusions have not fared well (e.g., his identification of redistribution as a central process in the origins of chiefdoms), the work itself has been tremendously influential.

What Service, Steward, Childe, and others (e.g., Adams 1966, Fried 1967, Parsons 1966, White 1959) demonstrated is that diachronic cross-cultural comparison is the most appropriate way to study cultural evolution (see Yoffee 1993 for a more recent discussion). It is only through diachronic comparison that presumed causes can be demonstrated to precede presumed effects, and it is only through diachronic comparison that evolutionary processes can be identified and studied over time.[1] These conclusions are in no way groundbreaking; indeed, historians and evolutionary biologists had been working under this assumption for generations, but as a consequence of the Boasian reaction against comparative research, it took

[1]A somewhat contradictory perspective is offered by Robert Carneiro. Carneiro (1962) argued that Guttman scaling can be an effective tool for examining cultural evolution, particularly with synchronic data. Carneiro (1970) put forward a methodology for performing such analyses (which included a list of 618 traits to be used in scaling) along with some promising results, but few have followed-up on his ideas.

anthropology much longer to recognize the necessity of comparative methodology (see Harris 1968, Sanderson 1990 for further discussion).

In recent years more sophisticated cross-cultural research using the archaeological record has produced innovative studies of cultural evolution in an explicitly comparative framework. For example, in *Ancient Mesoamerica: A Comparison of Change in Three Regions* (1992) Richard Blanton and his colleagues examined the evolution of complex societies in Mesoamerica. They compared and contrasted the evolutionary sequences in the Valley of Mexico, the Valley of Oaxaca, and the eastern Maya lowlands specifically because "controlled comparison and contrast… can illustrate very well some of the critical features pertinent to the dynamics of early complex societies" (Blanton et al 1992, p. 35). Such comparison allowed Blanton and this colleagues to draw several strong conclusions about cultural evolution in Mesoamerica, for example, that population pressure was not a primary factor in the evolution of complex polities, and that early states in Mesoamerica had strong commonalities that only became varied in the Classic and Postclassic periods, especially as market systems developed and expanded (Blanton et al 1992, pp. 222–42).

Similarly, in *How Chiefs Come to Power* (1997) Timothy Earle used diachronic cross-cultural comparison to examine the evolution of chiefs in Hawaii, the Andes, and Denmark. Unlike Blanton and his colleagues, Earle's cases are wholly independent of one another, coming from different parts of the world and from time periods when interaction was nonexistent. Thus, Earle's cases are explicitly intended to elucidate common processes in cultural evolution (Earle 1997, p. 17). What Earle found is that while these cases vary significantly in most ways, within each of them chiefs can be seen to be actively manipulating sources of power for their own benefit. Thus, what Earle identified as a primary process in cultural evolution is the development and manipulation of available power sources by emergent political leaders. As he put it, "The multiplicity of lines of social evolution should not obscure the common principles and processes of power politics. Attempts to extend and resist central power characterize social evolution.…" (Earle 1997, p. 211).

Whereas these examples certainly do not represent all the diachronic cross-cultural comparative studies that have been performed by archaeologists (other examples include Connah 1987, Kirch 1984, Lamberg-Karlovsky & Sabloff 1979, Tainter 1988, Trigger 1993, Wenke 1980), they do illustrate that these and other comparative studies using the archaeological record are not truly controlled in the way sound cross-cultural studies are. The examples given here lack a valid sample representing the entire range of variation—Blanton and his colleagues examine only well-known Mesoamerican cases, and Earle restricts his analysis to cases on which he has personally worked. The units of analysis employed are not necessarily comparable: Although it might appear that the Valley of Oaxaca, the Maya lowlands, and the Basin of Mexico are roughly similar, two (the Valleys of Oaxaca and Mexico) were politically unified, but the other (Maya lowlands) was not; similarly the Teotihuacan polity was apparently expansionistic, whereas

the Oaxaca and Maya lowland polities were less so. Thus, one might reasonably question the comparability of these regions, at least in terms of political evolution. Finally, neither study employs statistical techniques to determine unique and significant patterns or associations. Thus, these comparisons, while insightful and well-conducted, are nonetheless informal, and their results must be taken as largely subjective.

DISCUSSION OF DIACHRONIC CROSS-CULTURAL COMPARISONS

The lack of truly controlled diachronic cross-cultural comparisons in archaeology is a significant one, for it has become clear that diachronic cross-cultural comparison is the best means to study cultural evolution.[2] Diachronic cross-cultural comparison can examine change over a long period of time to determine empirically whether unilinear trends are present and test explanations for those trends by determining whether presumed causes actually precede presumed effects. Similarly, multilinear evolutionary processes, those that create the specific features of different societies within the larger, unilinear trends, can be tested diachronically to see if presumed causes precede assumed effects. Diachronic cross-cultural comparisons can also be employed to examine patterns of migration, innovation, and diffusion and to investigate the roles of these processes in cultural evolution. A synchronic study of a given region might suggest that a trait diffused through cultures in a region, and might suggest the nature of the source and path of the diffused traits. Only a diachronic study can demonstrate diffusion empirically, pinpoint the source of a given trait, and chart the path of its diffusion through time. However, diachronic cross-cultural comparison as it is being performed in archaeology today appears incapable of rigorously or objectively producing such results. What the examples reviewed above seem to lack are the very things that give cross-cultural research its strength: valid samples, clearly defined units of analysis, and appropriately employed statistics (but see Graber 1995 for one example of a statistical method).

NEW DIRECTIONS

Within the past decade, problems inherent in doing diachronic comparison of the archaeological record have begun to be addressed by the Human Relations Area Files (HRAF). As a first step in developing diachronic comparative methods for archaeology, HRAF commissioned a sampling universe of archaeological cases with comparable cases. Such a sampling universe must meet several conditions. First, the cases included must all be equivalent on some set of defining criteria.

[2]Again, Carneiro (1962, 1970) offers an interesting alternative to this position.

Second, the criteria used to define cases must be sensitive enough to variables of interest that patterns within and among them can be recognized. Third, the universe should include all possible cases. Fourth, the universe must allow random samples large enough for hypothesis tests, taking into account the loss of cases owing to missing data. Fifth, the universe must allow the use of basic information for stratified or cluster sampling, or for eliminating cases with specific characteristics in all cases.

The *Outline of Archaeological Traditions* (Peregrine 2001) was designed to fulfill these criteria and to serve as a sampling universe for comparative archaeological research. The *Outline of Archaeological Traditions* is an attempt to catalogue all archaeologically known human societies, covering the entire globe and the entire prehistory of humankind, using comparable units of analysis termed "archaeological traditions." An archaeological tradition is defined as a group of populations sharing similar subsistence practices, technology, and forms of sociopolitical organization, which are spatially contiguous over a relatively large area and which endure temporally for a relatively long period. Minimal areal coverage for an archaeological tradition can be thought of as something like 100,000 square kilometers. Minimal temporal duration can be thought of as something like five centuries. However, these figures are meant to help clarify the concept of an archaeological tradition, not to formally restrict its definition to these conditions. At present, the *Outline of Archaeological Traditions* defines a sampling universe of 298 major archaeological traditions, but it is designed to be a work in process, to be revised and updated as new information about human prehistory is generated and as existing information is synthesized and reinterpreted.

As a second step in developing a diachronic comparative methodology for archaeology, HRAF has developed the *Encyclopedia of Prehistory* (Peregrine & Ember 2001), a nine-volume work providing descriptive information and basic references for all the cases in the *Outline of Archaeological Traditions*. It is designed to be a basic tool to assist a researcher in initiating a diachronic cross-cultural comparative project. There are three types of entries in the *Encyclopedia of Prehistory*: major tradition entries, regional subtradition entries, and site entries. The major tradition entry is a general summary of information about a single major tradition. It provides descriptive information about the environment and culture of the people whose lifeways comprised the tradition. Although the geographic and temporal range of the major tradition entry was stipulated for authors, they were given the freedom to define regional subtraditions and sites on the basis of their own interpretations of the archaeological record. Regional subtradition and site entries, then, focus on archaeological areas and locales that are conventionally distinguished in the archaeological record for a given major tradition.

Finally, HRAF has also developed the Collection of Archaeology to parallel the Collection of Ethnography, arguably the most widely used tool in cross-cultural research. Like the Collection of Ethnography, the Collection of Archaeology provides indexed, searchable, full-text primary source documents for comparative research. (The documents are available on the World Wide Web at institutions that

belong to the nonprofit HRAF consortium.) The cases for which primary sources have been included in the Collection of Archaeology have been selected by random sampling from the *Outline of Archaeological Traditions* and thus provide a statistically valid sample of cases for comparative archaeological research. With this resource, archaeologists may finally begin to undertake objective and rigorous diachronic comparative studies.

AN EXAMPLE

Despite the suggestion by Giddens (1984), Lowie (1966), Nisbet (1969), and others that there are no unilinear trends in cultural evolution, and of Shanks & Tilley (1992) that if unilinear trends are identified they are simply the product of contemporary politics, generations of anthropologists have noted that human cultures do appear to have changed over time in fairly common ways (see Trigger 1998, pp. 159–85). Over the past 40,000 years societies appear to have become larger in scale, more complex in terms of social and political roles and statuses, and more integrated in the means by which these different roles relate (Blanton et al 1992). Even the staunch historical particularist Goldenweiser admitted that "there is an element of truth in the conception that the development of culture has been an unfoldment, that the different aspects of culture are interconnected, that certain phases of culture cannot materialize unless certain other phases have preceded them" (Goldenweiser 1937, pp. 519–20). And yet, as Goldenweiser and others (e.g., Nisbet 1969, pp. 195–96) have pointed out, empirical data demonstrating these trends are lacking. With the research tools now being developed for diachronic cross-cultural comparative research, however, the empirical data are becoming available.

To demonstrate empirically that unilinear trends in cultural evolution do exist, I coded all the cases in the *Outline of Archaeological Traditions* dating from the last 40,000 years on Murdock & Provost's (1973) 10-item index of cultural complexity. The variables comprising the index are listed in Table 1. Each is scored on an ordinal scale, and for this particular study the original five-point scales were recoded into three point scales for ease of coding. Scale values for each variable are summed for each case to create its index score. These data are preliminary, as they are the product of a single coder (myself) and hence have not been subject to a reliability analysis [although the scale itself has (see Chick 1997, pp. 294–95)]. The validity of the index as a single measure of cultural complexity has also been the subject of some debate. Chick (1997) questions whether it is more an index of technological complexity and societal scale than cultural complexity, although Levinson & Malone (1980, pp. 31–37) have demonstrated that it correlates with a number of other measures of cultural complexity. Finally, the data are based on information gleaned from draft entries submitted for publication in the *Encyclopedia of Prehistory*. These had not been revised by the authors and so may contain erroneous information. However, one would expect such errors to be random rather than systematic across the nearly 300 entries consulted, and hence any errors are

TABLE 1 Scales comprising the Murdock & Provost (1973) index of cultural complexity, recoded for use with archaeological cases

Scale 1: Writing and records
1 = None
2 = Mnemonic or nonwritten records
3 = True writing
Scale 2: Fixity of residence
1 = Nomadic
2 = Seminomadic
3 = Sedentary
Scale 3: Agriculture
1 = None
2 = 10% or more, but secondary
3 = Primary
Scale 4: Urbanization (largest settlement)
1 = Fewer than 100 persons
2 = 100–399 persons
3 = 400+ persons
Scale 5: Technological specialization
1 = None
2 = Pottery
3 = Metalwork (alloys, forging, casting)
Scale 6: Land transport
1 = Human only
2 = Pack or draft animals
3 = Vehicles
Scale 7: Money
1 = None
2 = Domestically usable articles
3 = Currency
Scale 8: Density of population
1 = Less than 1 person/square mile
2 = 1–25 persons/square mile
3 = 26+ persons/square mile
Scale 9: Political integration
1 = Autonomous local communities
2 = 1 or 2 level above community
3 = 3 or more levels above community
Scale 10: Social stratification
1 = Egalitarian
2 = 2 social classes
3 = 3 or more social classes or castes

TABLE 2 Linear regression of cultural complexity with years before present

Sample	R	Adjusted R-square	Significance
1	−0.557	0.291	0.000
2	−0.464	0.183	0.017
3	−0.469	0.187	0.016
4	−0.706	0.480	0.000
5	−0.525	0.252	0.002
6	−0.509	0.230	0.007
7	−0.392	0.107	0.087
8	−0.416	0.143	0.022
9	−0.419	0.143	0.029
10	−0.355	0.097	0.046

likely to reduce the probability of finding a statistically significant trend in the data.

To determine if a unilinear trend in cultural complexity is present through human history, I conducted a regression analysis with the cultural complexity index as the dependent variable and the midpoint of the time period of each archaeological tradition as the independent variable. I ran 10 regression analyses in all, each on a 10% random sample drawn from the 283 valid cases. The results are listed in Table 2. All but one demonstrate a statistically significant linear relationship between cultural complexity and time in years before present. I argue that this empirically demonstrates the reality of unilinear trends in cultural evolution. One cannot discount this study, as the Boasians did with previous studies coming to similar conclusions. Here the data are neither synchronic nor biased—they are diachronic and current, and the analyses were performed on statistically valid samples. Nor can one reasonably argue that the trend is an artifact of a particular social or political agenda, as the information the analyses were based on was provided by over 200 scholars working in over 20 different nations. Unless they all share the same social and political agenda (which seems unlikely, given Shanks & Tilley's arguments that the past is unique to each nation and, ultimately, to each individual), then their different perspectives should have created a random or nearly random pattern—certainly not a statistically significant linear relationship.[3]

[3]Before accepting this result, however, it should stand the test of a replication by another scholar. It is important, then, to realize that research tools are currently being developed that will allow other scholars to test this result. I suggest that these new research tools may usher in a new era of research on cultural evolution, one in which true diachronic cross-cultural comparative studies can be performed with relative ease and with methodological sophistication. I, for one, look forward to seeing the results of such studies.

CONCLUSIONS

Cross-cultural comparative approaches have been used widely in archaeological research, yet to date none seem to have achieved their full potential. Synchronic cross-cultural comparisons have provided a number of material correlates of behavior, as well as a few causal and noncausal associations that allow behavior to be inferred from material remains. However, large areas of material culture, such as ceramics and lithics, have not yet been subject to extensive comparative analysis, and thus large areas of archaeological research that might be aided by synchronic comparative findings have been left unassisted. Diachronic cross-cultural comparisons have been used extensively to chart and analyze cultural evolution. However, these comparisons are typically based on grab-bag samples and only rarely employ statistics to aid in the discovery or testing of evolutionary patterns. New research tools providing a statistically valid sampling universe and information resources for coding archaeological data are being developed to facilitate cross-cultural comparisons. One example of research employing these tools was presented here, and a unilinear trend in the evolution of cultural complexity was identified. Thus, although the contributions of cross-cultural comparative approaches to archaeology have been modest to date, their future appears promising.

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