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Agency, practice, and chronological context: A Bayesian approach to household chronologies

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ABSTRACT

This article proposes a methodological change within social archaeologies of household agency and practice, specifically a move to prioritize the development of precise household chronologies. Chronological precision can allow scholars to historicize household practice and remain anchored in social, political, and economic context, and thus, chronology is a vital part of archaeological studies of agency at the microscale. Given the field's recent focus on detailed stratigraphic excavations, microstratigraphy, and the reconstruction of genealogies of practice, I suggest that the easiest way to improve chronological precision is Bayesian statistical modeling of a large number of stratified radiocarbon determinations from household contexts. I illustrate the value of such an approach through the case study of the Structure 122 household at Xaltocan, Mexico. I create a precise chronology using Bayesian statistical modeling of 14 AMS radiocarbon dates from stratified deposits, which allows me to not only determine the precise timing of individual deposits, but also to interrogate previous findings of ethnic shift with broader political-economic changes. This sample, while small, hints that chronological imprecision may have led to the incorrect attribution of transformations in practice to elite, imperial actors, and demonstrates how Bayesian household chronologies may help archaeologists better identify agential practices.

1. Introduction

Over the past few decades, social archaeologists have made significant advancements in the interpretation of household practice by innovating theoretical frameworks and field and laboratory methods. This work has enabled a more "peopled" and ever more detailed window into change and continuity in the past. However, precise chronological methods have lagged behind, leading many interpretations to be ahistorical and free-floating in time. This article proposes a methodological change within social archaeologies of household practice, specifically a move to prioritize the development of precise household chronologies. I suggest that the easiest way to do so, particularly given the field's recent focus on detailed stratigraphic excavations, microstratigraphy, and the reconstruction of genealogies of practice and social memory through time, is Bayesian statistical modeling of a large number of stratified radiocarbon determinations from household contexts. This method is exemplified through the case study of the Structure 122 household at Xaltocan, Mexico. The resulting level of precision obtained through Bayesian modeling of a suite of 16 stratified radiocarbon dates facilitates the contextualization of household practice with relation to broader processes of political, economic, and social change in Postclassic central Mexico. It also allows more adequate identification and fuller understanding of household agency and strategy.

2. Chronology and temporality in household practice

In recent years archaeologists have been increasingly concerned with reconstructing the historically contingent practices of agents (Dobres and Robb, 2000; Johnson, 1989; Joyce and Lopiparo, 2005; Silliman, 2001; Smith, 2001; see Sahlins, 1981 for the development of the approach within cultural anthropology). Theories of agency and practice—the foundation of these discussions—are often applied in social archaeological approaches to the household. These theories posit that people in the past were agents with goals and intentions, but who lived in a social and historical context only partly of their own making (Bourdieu, 1977; de Certeau, 1984; Giddens, 1984). This contextual focus owes a debt to Marx (1977 [1852]), who wrote, "Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past." In such a "peopled" approach,

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the precise context in which households were situated matters, for people exercised agency, made choices, employed strategies and tactics, and engaged in practices in particular places at particular points in time. As Johnson (1989:207) articulated 25 years ago, "when seeking to understand human agency, the archaeologist must be prepared to describe the antecedent historical conditions, the *habitus* from which the actor draws, in a synchronic and normative way in order to gain understanding of those actions." Moreover, as Joyce and Lopiparo (2005) more recently suggested, theories of agency and practice possess a recurring conceptual lexicon that includes chains, networks, and citations. People in the past may have exercised agency by recapitulating, rejecting, or altering previous practices that form structure.

Similarly, scholars have begun to examine genealogies of practices and practices of stratigraphy-making, such as cutting into, covering, re-entering, or erasing previous deposits—in other words, the materiality of deposits created during daily and ritual activities (Mills and Walker, 2008b; McAnany and Hodder, 2009; Pauketat and Alt, 2005). Crucially, they have begun to interpret these practices in terms of their social significance. As McAnany and Hodder (2009:20) relate, "layering can be seen as a construction of genealogies and histories, memories and relationships." Thus, memory has necessarily been implicated in the reconstruction of such social stratigraphies (see also Tringham, 2000).

Finally, archaeologists (Beck et al., 2007; Bolender, 2010; Haslam, 2006; Harding, 2005; Lucas, 2008, 2005; Knapp, 1992a) have recently shown a renewed interest in archaeological time and the tempo of change. This work has often been in conversation with the *Annales* school, in particular, the work of Braudel (1972), a linking that has been fruitful because of shared interests in theories of chronology, continuity, and change, spatial and temporal scales, and the outcomes of human action (Knapp, 1992b:4). Concepts such as lifespans, events, and the "instant" or single moment in time profitably encourage explicit consideration of the "individual actions behind even cumulative material remains" (Haslam, 2006:408).

As Mills and Walker (2008a) noted, we can identify a recursive relationship between theory and method in these investigations—between fieldwork and analysis techniques and the scale and precision of our interpretations of practice. In accordance with these research goals, scholars have paid closer attention to sequence and spatial context using detailed excavations of houses, spatial multi-element soil chemical analysis and microartifact analyses, and the mapping out of Harris Matrices (e.g. Boivin, 2000). Mills and Walker (2008a,b) and McAnany and Hodder (2009) both identify micromorphology as one technique for reconstructing genealogies of practice and social practices of stratigraphy making—the work identifying the layering of plastic floors and walls following monthly and seasonal periodicity at Catalhoyuk, for example. This kind of scholarship uniting social theory and analytical rigor is clearly needed in archaeology.

However, the word chronology has been conspicuously and surprisingly absent from this research centered on practice, context, sequence, and stratigraphy. For example, McAnany and Hodder (2009) discuss 'memory processes' evident in continuities in the organization of domestic space at the Neolithic site of Çatalhöyük, but fail to anchor such processes in an absolute chronology. Certainly there is analytical significance in the length of time that such spatial continuities were maintained, the historical moment in which they were rejected, the amount of time that elapsed between the hiding or hoarding of objects and subsequent cutting to retrieve those objects, the length of the period between a monumental construction and its covering over or 'entombment' (McAnany and Hodder), or the historical timing of such covering. Yet with the exception of historically anchored culture contact situations, where chronological precision comes more easily, other such genealogies of practice tend to be chronologically unmoored and free floating, at worst, or based on broad, ceramic phases at best. Indeed, a review of post-processual literature on time reveals that many scholars have seemingly rejected chronology in favor of temporality. Lucas (2005:10) argues that chronology is theoretically problematic because it "presents time as a uniform, linear phenomenon which has tended to define the model for historical explanation in a similar uniform, linear way." Explanations based on chronology, according to Lucas, tend to be totalizing ones.

The often-chosen alternative—temporality—views time as relational, not linear, and related to the varying rhythms and tempos that emerge with human action, seasons, ecological cycles, and so on (Cobb and Drake, 2008; Boivin, 2000; Ingold, 1993). However, even Lucas acknowledges that chronology remains an essential part of archaeological research, and indeed, many scholars situate their research within broad ceramic phases—the Pre-Pottery Neolithic A, or the Late Postclassic, for example. And while most scholars examining temporality avoid discussions of chronology for fear of creating linear and totalizing explanations, in fact, chronology and temporality can be used in a complementary way (see Gardner, 2001). For example, O'Sullivan and Van de Noort (2007) employ a wide range of wetland archaeological remains, from wooden trackways to fishtraps to a wooden trough, most of which have precise chronological data, to consider cultural biographies, seasonal and temporal rhythms of dwelling, and social memory.

However, outside of historical contexts where archaeologists can draw on documentary calendar dates and create mean ceramic dates using chronologically specific artifact wares with maker's marks (e.g. Armstrong and Hauser, 2004), archaeologists—particularly American archaeologists—have not developed precise chronological interpretive methods for household agential practice. Where precise chronological methods for household archaeology do exist, such as the Southwest, where dendrochronology is fruitful (e.g. Schlanger and Wilshusen, 1996), theories of agency and practice have not been used in combination. In other words, there has not been a significant relationship between the development of method and theory, as has been the case for studies of stratigraphy and genealogies of practice.[1] The work of British archaeologists studying monumental landscape features—specifically southern British Neolithic long cairn, long barrow, and causewayed enclosure sequential contexts—demonstrates the potential of such an approach (Whittle et al., 2007a, 2007b, 2008, 2011). These scholars have shown that archaeologists can understand the timing of human practice in an unprecedented way using Bayesian statistical modeling of a large corpus of radiocarbon dates from sequential contexts.

The Bayesian approach to radiocarbon dating (Buck et al., 1996) is a way to combine archaeological knowledge on the nature of the sample, archaeological context, and stratigraphy, called "prior information" in Bayesian terminology, with explicit, probabilistic modeling of date estimates. The use of *a priori* knowledge in the interpretation of data is the fundamental difference between Bayesian and classical approaches to statistical inference (Buck et al., 1996:17). This combination of archaeological knowledge and probabilistic modeling results in better estimates for dates and finer chronologies. For example, archaeologists can use knowledge that a group of samples comes from a stratigraphic sequence—sample A is older than sample B, which is older than sample C—in order to create more precise probabilistic date ranges for each date. In situations where the error ranges of samples overlap, specifying the ordering of samples via Bayesian modeling may

[1] Archaeologists employing theories of agency and practice at Çatalhöyük have begun to use Bayesian modeling of radiocarbon dates (Cessford, 2005). However, their results so far have not been very precise, and chronological context has not played a significant role in interpretation at the site (e.g. McAnany and Hodder, 2009).