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An evolutionary model of social change in the Middle Ohio Valley: Was social complexity impossible during the late woodland but mandatory during the late prehistoric?

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ABSTRACT

We present an evolutionary model of social change in the Middle Ohio Valley during the Fort Ancient period (AD 1000–1650), primarily relying on an application of Winterhalder's (1986) and Kelly's (1995) evolutionary ecology model of cultural responses to environmental variability. We predict changes in social organization, political complexity, and patterns of stylistic similarity. As the environmental background for our model we employ recently published moisture data. By iteratively applying the synchronic Winterhalder–Kelly model we are able to predict a sequence of general trends that agree with much current interpretation of Fort Ancient development. Specifically, the model leads us to expect increasing village size, the development of regional traditions, and the development of leadership roles and a region-wide style Horizon around AD 1400. However, our model provides the ability to make testable predictions that deviate from the accepted cultural history and predicts that the Middle Ohio Valley and the groups referred to as Fort Ancient were far from homogenous.

Introduction

We present an evolutionary[1] model for the development of the Middle Ohio Valley village agricultural societies collectively referred to as Fort Ancient (ca. AD 1000–1650) (Carskadden and Morton, 1977; Essenpreis, 1982; Graybill, 1981; Griffin, 1966; Henderson, 1992; Mills, 1906; Prufer and Shane, 1970). Our focus is on explaining increases in social complexity, variability in inter-community interaction, and changing patterns of material culture similarity leading up to the Madisonville Horizon (ca. AD 1400/1450), a region-wide increase in trade and interaction represented by homogenization of style and increasing Mississippian influence (Henderson, 1992).

Ecological and evolutionary theory is absent from most previous analyses of Fort Ancient social change. Most explanations have not specifically taken environmental *constraints* into account in their models (e.g., Cook, 2008; Pollack and Henderson, 1992; Prufer and Shane, 1970). While climate and other environmental parameters have factored into a few analyses (Graybill, 1981; Greenlee, 2002; Kennedy, 2000) it has not often been approached from the integrated framework offered by evolutionary ecology (EE). In constructing our model we draw primarily upon models built under the umbrella of EE (e.g., Dyson-Hudson and Smith, 1978; Kelly, 1995; Winterhalder, 1986, 1990; Winterhalder and Goland, 1997), but also incorporate insights from evolutionary archaeology (a.k.a., selectionist archaeology) (e.g., Dunnell, 1996a, 1999; Dunnell and Greenlee, 1999; Madsen et al., 1999; Lipo et al., 1997; Rindos, 1980, 1984) and Gene-culture Coevolution (e.g., Boyd and Richerson, 1985; Soltis et al., 1995; Richerson and Boyd, 2005). We suggest that by using EE to analyze Middle Ohio Valley Fort Ancient development we can integrate many of the previous models of Fort Ancient social change and provide specific, testable predictions that can account for not only the central tendencies (norms), but also the spatial and temporal variability that tend to be underemphasized in previous models.

The study of behavioral variability is crucial to an evolutionary approach to culture, and patterns of environmental variability can significantly affect cultural responses. In order to model the social response of the prehistoric Middle Ohio Valley village agriculturalists, we must first reconstruct the environmental context. To be successful, we need high temporal and spatial resolution. Climate

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[1] Throughout this paper we use the term evolutionary to refer to the broad array of approaches that are derived from Darwinian Theory. Under this umbrella we include Evolutionary Ecology, Evolutionary Archaeology, Gene-culture Coevolution, among others. Our presentation relies on each of these to varying degrees.

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proxy data for the Middle Ohio River Valley is limited. The available data often have coarse temporal resolution (150 years or greater Shane et al., 2001). However, recently a source of high-resolution climate proxy data has become available. This resolution is provided by the Palmer Drought Severity Index reconstructions of Cook et al. (1999, 2004). We use these data as the environmental background for our model. By aggregating these data into 50-year periods we can model not only trends in central tendency (mean), but also trends in environmental variability (spatially and temporally, i.e., inter-group correlation and standard deviation).

With this environmental background, we apply Winterhalder's (1986) model as modified by Kelly (1995) to predict changes in the prehistoric record. Winterhalder's (1986) model uses temporal variation (standard deviation) and spatial variation (inter-group correlation) in resource abundance. By mapping both means and standard deviations we can visualize the two axes of Winterhalder's model for the entire Ohio Valley.

Previous models of Fort Ancient social change

The term "Fort Ancient" was coined by Mills (1906, p. 135) to connote the similarity of material culture among sites in southern Ohio (Baum, Gartner, and Fort Ancient specifically), particularly in contrast with Hopewell artifacts from the same region. Fort Ancient currently also serves to connote contrast with Middle Mississippian societies. Middle Mississippian refers to those groups that are often interpreted as "chiefdoms," occupying the Middle and Lower portions of the Ohio Valley (initially defined by Holmes (1886), and refined for the Fort Ancient region by Griffin (1966)). Fort Ancient has come to be used in reference to village-based, tribal, maize agriculturalists of the Middle Ohio Valley during the Late Prehistoric period (Carskadden and Morton, 1977; Essenpreis, 1982; Graybill, 1981; Griffin, 1966; Henderson, 1992; Prufer and Shane, 1970).

Most previous models of social change among Fort Ancient societies in the Middle Ohio Valley (ca. AD 1000–1650) can be grouped into three general categories: (1) external (Griffin, 1966; Prufer and Shane, 1970); (2) internal (Pollack and Henderson, 1992; Rafferty, 1974); and (3) internal/external (Cook, 2008; Cowan, 1987; Essenpreis, 1978; Robertson, 1980). Each type of model calls on different types of causal agents and they were generally formulated within different paradigms ranging from Culture History to Processualism to recent approaches reconsidering migration and other historical dimensions alongside general evolutionary models.

External models attributed Fort Ancient social composition to migration and diffusion, explanations which were commonplace in the Culture Historical period (Trigger, 2006). Initial understanding of Fort Ancient origins relied primarily on migration (Griffin, 1966), a trend that continued until the end of the Culture Historic period (Prufer and Shane, 1970). Griffin (1966) argued that Fort Ancient began as an adaptation originating in the lower Ohio and Middle Mississippi River valleys that was adapted to a less agriculturally productive environment (i.e., the Middle Ohio Valley). Prufer and Shane (1970) furthered this argument by asserting that Fort Ancient material culture was distinct from Late Woodland groups who were argued to have occupied a different part of the local landscape, mainly uplands and rockshelters as opposed to floodplains. With limited material for comparison, it was easy to see major distinctions between Late Woodland and Fort Ancient material assemblages (see Essenpreis (1978)). There are some marked differences between Late Woodland and Late Prehistoric assemblages, which are still poorly understand, but all current models now recognize various degrees of local contributions.

Internal models of Fort Ancient development were common among Processualists and marked a fundamental shift in interpreting culture change. Instead of invoking diffusion and migration the emphasis was on fit with the local environment, continuity with preceding groups, and the functional dynamics of settlement systems (Trigger, 2006). Increasing knowledge about the Late Woodland period also helped refine explanatory accounts. The fullest articulation of the internal-only model of Fort Ancient development was provided by Pollack and Henderson (1992), but the model had been developing for some time (e.g., Essenpreis, 1978; Graybill, 1981; Rafferty, 1974). Pollack and Henderson (1992) posited that Fort Ancient was an entirely *in situ* development representing a gradual increase in social complexity (based partially on a model outlined by Johnson and Earle (1987)). Though their stated aim was to construct a model of social development for northern Kentucky, this has come to be the most widely cited sequence for the whole Fort Ancient territory and their model incorporates Ohio Fort Ancient data. Kennedy's (2000) internal examination of the general contraction of the entire Fort Ancient area over time concluded that with the onset of the Little Ice Age (LIA) and the attendant reduced agricultural productivity, with populations aggregating in areas with the most productive soils and access to reliable trade routes along the Middle Ohio River.

Internal/external models have been applied to Fort Ancient intermittently from the late 1970s and early 1980s (Essenpreis, 1978; Graybill, 1981). These approaches are generally non-typological and are rooted in what could be considered a more mature form of Processualism, that consider cultures as systems that do not develop in isolation (e.g., Crumley, 1979). The most recent internal/external model (Cook, 2008), builds on these studies by further taking into account that general processes can couple with approaches that examine what elements are unique to a society and the significance of migration in more current sociocultural models (see Cobb (2005) and Pauketat (2003)).

The initial internal/external model of Fort Ancient social change was developed by Essenpreis (1978), who argued that Fort Ancient represented different responses to internal and external stimuli, with some groups adhering more closely to their Late Woodland forebears while others shifted their settlement system toward that of Middle Mississippians with whom they more intensively interacted. The latter was represented by the Madisonville Phase, for which a key piece of evidence was the platform mounds at the Marietta site (Essenpreis, 1978). When one of these mounds was shown to be Middle Woodland in age (Pickard, 1996), many researchers abandoned this model; however, there is at least one case of a Fort Ancient temple-style mound (Baum; Mills, 1906). A combination of Late Woodland and Middle Mississippian "influences" on Fort Ancient development has been discussed by various other researchers as well (e.g., Brose, 1982; Cowan, 1987; Robertson, 1980).

Working in the eastern portion of the Fort Ancient region, Graybill (1981) utilized an internal/external model of social change when he argued that larger settlement sizes and the appearance of palisades in Late Fort Ancient sites on the eastern periphery of the Fort Ancient region was in part caused by the effects of the LIA on northern Iroquoian farmers. Iroquoian populations experiencing decreased agricultural productivity associated with a deteriorating climate were argued to have initiated raids on their southern neighbors triggering changes in settlement organization and distribution, such as consolidation into larger villages surrounded by palisades (Graybill, 1981, p. 168).

In the most recent example of an internal/external Fort Ancient development model, Cook (2008) focuses on interactions among people across culture–historical taxonomic boundaries as influencing the development of social complexity in the Middle Ohio Valley, specifically in the Miami Valleys of southwestern Ohio in relation to neighboring Middle Mississippian groups. The internal part of the model looked at the growth of populations and the need