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Cultural transmission in the ancient Near East: twenty squares and fifty-eight holes

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ABSTRACT

Board games have a wide and complex distribution in the ancient world. Two board games from antiquity that were transmitted across the borders of empires and city states and played for nearly two millennia show only minor changes in the appearance of the board. This lack of branching for antique board games can be explained by the abstract characteristics of the games and the dominance of certain cultures in antiquity. A historical analysis of their transmission process supports this hypothesis.

1. Introduction

Because human culture is acquired and not innate, cultural transmission theory provides a conceptual framework for understanding how cultural information is exchanged between individuals (Mesoudi et al., 2006; Henrich et al., 2008). Set within a Darwinian framework, where variation is introduced and selective processes operate to winnow that variation, transmission models can help explain change, or stasis, in culture over time. Cultural transmission models focus on the exchange of information between individuals and the short- or long-term cumulative outcomes of multiple iterations of transmission. Most models also examine the role that various factors have on transmission, such as the context of transmission events, the content of the information, and various biasing mechanisms that may be in place (e.g., prestige or conformist biases).

Like other aspects of culture, the production of material culture involves individuals acting on acquired cultural information. In this respect, cultural transmission models offer archaeologists a powerful framework for understanding both the production of new material cultural variants (i.e., invention or innovation), or alternatively, the persistence of variants over long periods of time. The theory also provides predictions for which transmission systems are best suited for particular kinds of information (e.g., complex vs. simple) and how these different systems should affect the rate of change in material culture over time (e.g., Eerkens and Lipo, 2005, 2007).

Games present an interesting context in which to examine long-term transmission processes. To our knowledge, games have not been examined within this framework. Most archaeological applications of transmission focus on clearly functional items (e.g., projectile points, pots) or clearly stylistic elements such as art (e.g., decoration) within a range of settings, but focusing especially on material culture in small-scale societies (e.g., Bettinger and Eerkens, 1999; Henrich, 2004; Kohler et al., 2004; MacDonald, 1998; McClure, 2007; Shennan and Wilkinson, 2001; though see Basalla, 1988 for historical examples). Generally, these items are made and used individually. In this sense producers and users have the ability to experiment and modify the technology before transmitting information about them to others. Board games are played by multiple people, and in this regard there is coordination necessary between players that might hinder experimentation or modification before transmission.

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This study focuses on spatial and diachronic variation in two different board games played in ancient city-states of NE Africa and SW Asia. We use a cultural transmission framework to study two different game boards twenty squares and fifty-eight holes, that have been excavated from a number of sites spanning some 1400 years between the late third and early first millennia BC.

2. Cultural transmission theory

Transmission models describe how information is passed (i.e., taught and learned) between individuals and examine the cumulative effects of these processes over space and time. Information can be transmitted vertically, between generations, and horizontally, between individuals within a generation. Information can be transmitted between two individuals (one-to-one) or between many individuals (e.g., one-to-many, or many-to-one). As well, a number of biases have been examined within transmission processes, such as conformist and prestige biases. Such biases are especially important where individuals have a choice of potential models to copy, and choose, for example, the most common type or the types used by especially prestigious individuals. Moreover, certain copying strategies can also result in "piggybacking" of cultural traits, where packages of information are passed together and traits become linked (e.g., Mesoudi and O'Brien, 2008). The reasons why people might adopt various strategies in acquiring information are beyond the scope of this paper but basic discussions appear in Cavalli-Sforza and Feldman (1981) and Boyd and Richerson (1985).

Social learning can be combined with individual learning, or experimentation. Individuals may decide to modify or augment (i.e., innovate) information that has been acquired. Together, different modes of transmission (e.g., vertical vs. horizontal; one-to-one vs. one-to-many) within different learning contexts combine with various transmission biases and individual learning to create the milieu of transmission. Information sets are subject to evolutionary processes, and may gain in popularity or become abandoned altogether. Importantly, cultural transmission models decouple "adaptation" or fitness from inheritance. Thus, cultural transmission can help explain why adaptive traits gain in popularity, but also why seemingly maladaptive behaviors are transmitted and persist within a population (e.g., riding a motorcycle without a helmet) or why adaptive or beneficial behaviors sometimes do not (e.g., boiling drinking water).

As archaeologists, we are usually unable to see or control for individual transmission events. Instead, we focus on net cumulative results of many transmission events at the population or group level and over centuries or longer. Based on data collected from populations of artifacts, we can surmise what must have been the dominant mode of transmission for a particular trait. Because transmission theory makes predictions about what processes ought to be dominant within certain contexts and for certain content, we can test transmission theory in a scientific fashion.

At the group or population level, terms have been given to describe dominant modes of cultural transmission. For example, when vertical transmission of information dominates (i.e., from one generation to the next), and there is a source of new variants, such as copying error or intentional innovation, a subsequent branching of different 'species' of traits emerges. This process has been referred to as phylogenesis, and results in a distinctive spatial and temporal structure in artifact traits (Collard and Shennan, 2000). Alternatively, if horizontal transmission dominates (i.e., transmission of information between peer groups) a different pattern emerges where similarity in cultural traits is related to the intensity of contact or trade between peer groups, often related to geographic proximity. This process is often referred to as ethnogenesis (Jordan and Shennan, 2003). Finally, ecological factors may lead to innovations that are similar from one group to another because of their respective environments but without contact or exchange between those groups. This process of convergence may obfuscate previous branching developments and complicate the theoretical explanations.

Ecological, ethnogenetic and phylogenetic processes are used to explain both cultural transformation and transmission, and can operate simultaneously with differing degrees of influence. Indeed, ethnogenesis and phylogenesis are sometimes considered opposite ends of a transmission continuum providing relative rather than exclusive explanations for the distribution of traits in historical or archaeological artifacts, as studies of basketry and other material culture have demonstrated (Guglielmino et al., 1995; Jordan and Shennan, 2003; Tehrani and Collard, 2002; Welsch et al., 1992).

Likewise, the operation of different biasing processes may also leave a distinctive signature among artifacts in the archaeological record (Eerkens and Lipo, 2007). Neutral drift models, where new variants are innovated and transmitted at random have been simulated (Lipo, 2001; Neiman, 1995), and provide a baseline to compare the effects of other biasing mechanisms (e.g., Eerkens et al., 2005). Results from such simulations allow archaeologists to contextualize patterns in variation among artifacts. For example, results show that conformist transmission will minimize the production of variation, promoting stasis among artifact shape and size over space and time. Likewise, piggybacking (a type of indirect bias) will cause artifact attributes to be linked during transmission, causing significant statistical covariation (e.g., board shape and the material from which a board is made). Prestige bias, on the other hand, will promote widespread similarity in space over short periods of time, but variation in artifact shape and size will vary much more over time.

Transmission theory predicts that conformist transmission should dominate when promotion of a single group identity is important, for example, through a common iconographic or religious form (Aldenderfer, 1993; Kohler et al., 2004; McClure, 2007). Some have suggested that such identity-marking and/or religion are especially important as means to promote trust between potential partners who seek to form cooperative alliances where free-riding or cheating is otherwise possible (e.g., Henrich et al., 2010; Sosis and Ruffle, 2004). As well, conformist transmission should dominate when technologies are complex or the costs of failure are especially high such that it is difficult for individuals to tinker or experiment with technologies after they have acquired information about them. As well, trait piggybacking should be higher when conformist transmission is in effect.

In sum, transmission theory makes specific predictions about the spatial and temporal distribution of artifacts, and their associated attributes, in the archaeological record. Modeling and empirical research provide baseline data sets to contextualize archaeological data, that is, to test such predictions. Together, these lines of reasoning comprise a scientific means to examine the archaeological record, where theory can be tested with empirical data.

2.1. Board games as cultural traits

Board games consist of playing materials (e.g., board, pieces, dice), playing rules, and a context in which a game proceeds. Like most aspects of material culture from archaeological contexts, our understanding of ancient board games is incomplete. The archaeological record is particularly useful for documenting playing materials. However, the rules of ancient games are typically unknown today. In some cases, certain aspects of the rules can be partially worked out or ruled out through texts and analogies to