

*Why Breaking Down Boundaries  
Matters for Archaeological  
Research on Learning and  
Cultural Transmission*

AN INTRODUCTION

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THE TOPICS OF LEARNING and cultural transmission resonate among anthropologists. The question of how and why behaviors, beliefs, and ideas are learned and shared among a group of people and transmitted from one generation to the next lies at the heart of our discipline. It is foundational to the understanding of cultural persistence and change. What factors influence people to perpetuate or deviate from the behaviors of other group members? How are social group boundaries produced, maintained, and changed by the cumulative outcome of these decisions? Archaeologists are well positioned to study the material consequences of these processes. Indeed, archaeological research in many domains—including style, artifact distributional patterning, and chronology construction—depends on understanding the mechanisms and manifestations of cultural transmission. Therefore, three key avenues of research—the socially organized nature of learning, cultural transmission, and cultural boundaries—form the basis of this volume. The boundaries we describe, however, are not only those found within and between societies that we study (past and present); they are also found within and between communities of scholars who study them.

This introductory chapter is divided into three sections. The first discusses the broad relevance of learning and cultural transmission research across anthropology's subfields, including archaeology. The second provides a rationale for our volume's title, explaining why breaking down

boundaries between approaches is imperative to continuing a holistic anthropological tradition. The third and final section characterizes the variability in this volume and highlights key findings from its various case studies.

## **Learning and Cultural Transmission as an Anthropological Subject**

We focus on learning and cultural transmission both for their broad relevance, which transcends subdisciplinary boundaries within anthropology, and because of the current resurgence of anthropological interest in the subject. Despite periodic calls to action and long-term research by educational and psychological anthropologists (e.g., Lancy 1982; Lave 1982; Lave and Wenger 1991; Spindler and Spindler 1982; Weisner and Edwards 2002; Whiting 1941; Whiting and Edwards 1988; Wolcott 1982), until recently few anthropologists have concentrated on the subject of learning. As Herlich and Dietler (this vol.) note, anthropological linguists have been an exception, with their sustained research in language acquisition and socialization. Yet even this subfield has grown in new directions in recent years with the recognition of the vital linkages between language and identity, cultural memory, and traditional ecological knowledge (e.g., Maffi 2001).

Renewed research on learning and cultural transmission is evident, for example, in recent anthropological studies of situated learning (Lave and Wenger 1991; Wenger et al. 2002), childhood and play (Bock 2004; Bock and Sellen 2002; Edwards 2000; Lancy 1996; cf. Hirschfeld 2002), parenting (Hewlett and Lamb 2005), food taboos (Aunger 2000), disease transmission (Hewlett and Amola 2003), and craft skill learning (Shennan and Steele 1999), and the impact of nearly thirty years of research in the gene-culture coevolutionary (Cavalli-Sforza and Feldman 1981; Stone and Lurquin 2005; cf. MacEachern 2000) and dual inheritance approaches to cultural evolution (Richerson and Boyd 2005; Boyd and Richerson 1985). Such research has important practical implications for, and applications in, formal educational structures and other organizational systems (e.g., Brown and Duguid 2002; Wenger et al. 2002; Wolcott 1982), epidemiology, an understanding of variation in parenting practices and food preferences, as well as cultural and linguistic preservation and revitalization efforts, among many examples.

A brief historical overview of Americanist archaeological research on learning and cultural transmission provides an indication of archaeologists' long-held interest in the subject. Before the rise of the New Archaeology in the 1960s, several thinkers in archaeology independently grappled with issues of social organization and its materiality (e.g., Martin and Rinaldo 1950) and the complexity of understanding artifact distributions in terms of how techniques of producing material culture are learned and cultural group boundaries are formed (e.g., Colton 1942; Gifford 1960; see also Lyman and O'Brien 2004). Others conceptualized "schools" of production (e.g., Smith 1962) that today would probably be described as "communities of practice." Several germinal studies from the New Archaeology emphasized learning frameworks and intergenerational transmission to explain ceramic stylistic patterns in the North American Southwest and elsewhere (see Longacre, this vol.). Research on style and social boundaries, which has proliferated in recent decades, has brought to light considerable variability in the materialization of social identity and its relationship to the transmission of "ways of doing" (see summaries in Bowser 2000; Degoy, this vol.; Hegmon 1992, 1998; Stark 1998, 2003). In particular, this research focuses on why people imitate or differ from the stylistic choices of other individuals, as fundamental processes underlying continuity and transformation in culture and cultural boundaries.

One productive outgrowth of the postprocessual critique that swept through archaeology in the 1980s and 1990s has been the development of a more historically informed framework that has been variously termed "historical processualism" (Pauketat 2001, 2004) or "processual plus archaeology" (Hegmon 2003). This modified Americanist framework incorporates Bourdieu's practice theory, with its emphasis on *habitus* and practical knowledge that is embodied through daily practice (Dietler and Herbich 1998; Hegmon 1998; Stark 2003:211–13; also see Bourdieu 1977, 1990, 1998). While the history of *habitus* as a concept precedes Bourdieu's work (Sterne 2003:377–81), and Bourdieu's conceptualizations remain a matter of some debate (e.g., Lau 2004), these ideas have gained wide intellectual currency across the humanities and social sciences.

Applications of contemporary social theory, especially concepts of agency and practice theory, have now become established in mainstream Americanist archaeology (e.g., Dornan 2002; Hegmon 1998; Pauketat

2001). Similarly, “social archaeology” emphasizes how daily practices reinforce and transform social identities and social structures, cross-cutting and integrating British and Americanist approaches to practice theory (Meskell et al. 2001). Practice approaches in archaeology have direct relevance for research on cultural transmission, because they emphasize the relationship between practice and social reproduction. These approaches emphasize historical contingency and examine how people constitute their worlds and cultures through practice. Archaeological case studies focus on how the social and cultural contexts of daily practice constitute an intergenerational process of social reproduction and transformation. As a few examples, we cite research in North America (e.g., Pauketat and Alt 2005; Sassaman 2005), South America (e.g., Bowser and Patton 2004; Hastorf 2003), the Near East (Hodder and Cessford 2004), and the Mediterranean (e.g., Frankel 2000).

The Francophone intellectual tradition that is sometimes called the Anthropology of Techniques approach (e.g., Audouze 2002; Lemonnier 1992, 1993; Olivier 1999:180–82; Schlanger 1998) developed independently in the 1960s and 1970s. It emphasizes how and why techniques of production are learned and transmitted, and has roots in work by Andre Leroi-Gourhan and Marcel Mauss. Despite admirable efforts by Pierre Lemonnier, Francois Sigaut, and others, this approach remains relatively poorly known in British and Americanist archaeology (Audouze 2002:277–79; Stark 1998:5–7) and somewhat undertheorized (Roux 2001:282). Its focus on *techniques* or *les faits techniques* has significant parallels to anthropological archaeological approaches that emphasize practice theory and to related approaches that focus on agency and identity (e.g., Dietler and Herbich 1998; Dobres and Hoffman 1994; Hegmon 1998; Stark 2006:19–23). Beginning in the 1990s, international symposia, conferences, and other collaborations have fostered enduring intellectual exchange among Francophone and Anglophone scholars in this area of research (Stark 2003:198–200). Still, few scholars from either intellectual tradition in archaeology read each other’s literature (outside, perhaps, Paleolithic archaeology); fewer still seek points of intersection.

British archaeology has often paralleled, rather than intersected, Americanist archaeology. Whereas Americanist archaeology has had a traditionally close and increasingly problematic (e.g., Gillespie and Nichols 2003) relationship with cultural anthropology, British archaeologists have developed

a more autonomous form of theory that uses comparative ethnographic data but departs from cultural anthropological theory. Recently, productive collaborations have developed between British and American archaeologists who use Darwinian approaches; this is especially evident in the growing body of work on cultural transmission using a dual inheritance framework (see Collard and Shennan, this vol.; Shennan 2002a).

The chapters in this volume point to several new directions in archaeological research on learning and cultural transmission. The first lies in the development of situated learning theory, which emphasizes the inherently social contexts of learning, and asserts that knowledge derives largely from people's participation in daily life (e.g., Crown 2001:451; Lave 1982, 1993; Lave and Wenger 1991; Maynard et al. 1999; Minar and Crown 2001). This framework assumes that shared knowledge of, and participation in, certain activities creates communities of practice. The approach has salience for anthropologists who are interested in learning, socialization, identity, social reproduction, and the negotiation of power relationships in communities of practice, be they virtual (e.g., Wilson and Peterson 2002), linguistic (e.g., Garrett and Baquedano-Lopez 2002), archaeological (e.g., Huntley 2006; Sassaman and Rudolphi 2001; Van Keuren 2006), or contemporary craft making (e.g., Bowser and Patton, this vol.; Gosselain, this vol.).

So, too, does the renewed archaeological focus on the ontology and social organization of learning and apprenticeship (e.g., Crown 2001, 2007; Minar 2001; Minar and Crown 2001; Van Keuren 1999), including the archaeology of childhood (e.g., Kamp 2001; Smith 2005). A few archaeologists have systematically studied the mechanics and archaeological evidence of learning (see Shennan and Steele 1999; Crown 2007:198), and a number of ethnoarchaeologists have studied learning and apprenticeship in their research across the globe (see reviews in P. J. Arnold 2000:114; David and Kramer 2001:311–21; Stark 2003:204). Wallaert-Pêtre (2001) has focused on how different learning frameworks may emphasize intergenerational conformity or allow for innovation in pottery manufacture.

Other major directions in recent archaeological research are based in Darwinian theory, with its roots in evolutionary biology. Different Darwinian evolutionary approaches are often conflated, and Collard and Shennan (this vol.) provide a useful review of these approaches and

their applications in archaeology. Three styles characterize Darwinian approaches in cultural and biological anthropology: evolutionary psychology, dual inheritance approaches, and human behavioral ecology (Smith 2000). Among archaeologists, the dominant Darwinian approaches are selectionist archaeology, dual inheritance approaches, and human behavioral ecology. Selectionist and dual inheritance archaeologists dominate archaeological approaches to cultural transmission and concentrate their efforts on modeling long-term patterns of cultural evolution. However, as Collard and Shennan explain, selectionists and dual inheritance archaeologists differ significantly in their conceptual frameworks.

Selectionists view cultural behavior (including material culture) as part of the human phenotype, and they explain cultural variation in the same way as biologists account for morphological variation in species, namely by drift, mutation, and selection (e.g., Dunnell 1992; O'Brien and Lyman 2004; cf. Bamforth 2003; Boone and Smith 1998). As such, anthropological theory is largely irrelevant for selectionist archaeologists. By contrast, dual inheritance archaeologists build from anthropological theory as well as evolutionary theory. Unlike selectionist archaeologists, they operate from the premise that cultural evolution involves some processes that are not usually taken into account in work on biological evolution. Particularly, they consider cultural transmission to be driven by individuals' decisions to imitate the behaviors of other individuals based on imperfect knowledge of a trait's usefulness and many other possible biases (see Mills, this vol.; Shennan 2002a; cf. Gosselain, this vol.). Furthermore, dual inheritance approaches specifically focus on questions of how cultural norms and boundaries are formed (e.g., Castro and Toro 2004; Henrich 2001; Henrich and Boyd 1998; Henrich and McElreath 2003; McElreath et al. 2003) and how cultural and historical conditions may affect learning and cultural transmission (e.g., Tehrani and Collard 2002).

In seeking common ground for this volume, we have chosen to use terminology commonly employed in Darwinian approaches to examine different forms of cultural transmission. In principle, this terminology should provide working definitions for characterizing and comparing cultural transmission, particularly for studying apprenticeship and other learning frameworks (see also MacEachern 2002:135–37; Shennan 2002b). In the particular scheme we adopt, three vectors of transmission characterize transfers of knowledge: two that focus on intergenerational transmission (vertical,

oblique), and one that involves the transfer of knowledge within a generation or peer group (horizontal). More specifically, in *vertical transmission* cultural knowledge moves from parents to children within the family; primarily occurring throughout infancy and early childhood, this process reflects parent-child proximity and attachment, is powerful, and is thought to be relatively conservative (Cavalli-Sforza et al. 1982:20; Guglielmino et al. 1995; Hewlett et al. 2002:314–25). In *oblique transmission*, cultural knowledge moves from “a member of a given generation to a member of the next (or later) generation who is not his or her child or direct descendant,” such as formal teacher-student interactions (Cavalli-Sforza and Feldman 1981:54). *Horizontal transmission* involves the transfer of knowledge between members of the same generation or age group, whether these individuals are related biologically or not, such as in peer-group learning (Cavalli-Sforza et al. 1982:20; Guglielmino et al. 1995:75–85). This terminology has been useful in characterizing the dominant vectors, or pathways, by which many skills, social biases, health practices, linguistic conventions, and so forth are transmitted, or learned.

This volume’s case studies focus on how social boundaries are constituted at various scales (e.g., within the nuclear family, the artisan workshop, or the language group) and by multiple processes of transmission (also see Mills, this vol.). These processes are not mutually exclusive; multiple processes are likely to operate simultaneously in a single context, and different processes may be important at different stages of an individual’s lifetime in a kind of “life history.” For example, in the case of Ituri food taboos (Aunger 2000), a shared family environment and associated intergenerational transmission processes are paramount in children’s learning food taboos in the first stages of life, while extrafamilial learning from other adults within the group is paramount later in life. So it is, too, with pottery-making traditions that ethnoarchaeologists document in this volume (Bowser and Patton; Gosselain; see also review in Stark 2003).

Despite epistemological and ontological contrasts, many archaeologists share common research interests in learning and cultural transmission as an anthropological research subject. We believe it is important to acknowledge various intellectual traditions that have explored aspects of this subject. However, we also recognize boundaries that currently obstruct progress in the archaeological study of learning and cultural transmission. The following section examines and challenges these boundaries.

## Breaking Down Boundaries

One rationale for organizing this volume is the recognition of tensions between Darwinian and non-Darwinian approaches to the study of cultural transmission within and beyond the social sciences. Similar tensions hold across these theoretical boundaries within archaeology, leading to polarization and fragmentation in the field. This situation, we believe, arises from an emphasis on different temporal scales as well as from genuine theoretical differences within archaeology that interfere with theoretical discourse. Some archaeologists may find the prospect of merging research interests from these disparate intellectual traditions implausible. However, we argue that continued dialogue, collaboration, and cross-training can link microscale and macroscale processes to provide bridging arguments between archaeological evidence and the larger-scale processes of cultural continuity and change.

When it comes to temporal scale, most ethnographers and ethnoarchaeologists study microscalar patterning in cultural transmission and focus on the local level within generations, or across two to three generations at most. These microscalar approaches emphasize the complexity of interactions within and across permeable group boundaries. In contrast, some Darwinian archaeologists employ macroscale approaches to both time and space; their interest in short-term transmission processes lies primarily in its potential for modeling longer-term patterns (Kuhn 2004:566; see also Eerkens and Lipo, this vol.). Early dual inheritance models assumed the existence of well-differentiated groups with relatively little contact between them (see recent summaries in Richerson and Boyd 2005; Shennan 2002a). However, a number of recent dual inheritance studies of archaeological and ethnographic material culture explicitly evaluate the effects of intergroup contact, as well as short-term cultural and historical changes. These studies have focused on two processes through which new cultural traditions appear—cultural phylogenesis, produced by changes within cultural boundaries, versus ethnogenesis, or changes introduced by interactions across cultural boundaries—and have endeavored to gauge the relative importance of each process in any particular case, recognizing that both processes are likely to operate simultaneously, though to varying degrees, depending on the cultural and historical context (see reviews in Collard and Shennan, this vol.; Jordan and Mace,

this vol.; Tehrani and Collard 2002:443–44; Shennan 2002a; Collard et al. 2006a).

A major point of theoretical divergence between social theoretical approaches to cultural boundaries and dual inheritance theory lies in explanations of cultural similarities and differences. Social theorists see similarity and difference as meaningfully constituted; that is, social or cultural boundaries are formed not only by people's decisions to conform to the behaviors of other people in their own group but also by their motivated decisions to differ from other behaviors, as strategies of signification and negotiation of social relationships and social identity (e.g., see Bowser 2000:241–44). In contrast, dual inheritance theory assumes that cultural similarities and differences arise through innovation, random change, and different mechanisms of transmission that involve imitation of others rather than through meaningfully constituted strategies of signification; in this view, social norms, including symbolic culture, are unintentional byproducts of these other processes (see Richerson and Boyd 2005: ch. 6–7). Some chapters in this volume offer strategies for integrating these previously disparate approaches. As an example of how these approaches may be integrated, to explain the resistance of Native peoples to the adoption of colonial culture, Mills (this vol.) defines “negative prestige-biased transmission” as a mechanism to explain cultural differences within a dual inheritance framework. Likewise, Bowser and Patton rely on a different style of evolutionary theory (i.e., human behavioral ecology) that holds that group markers signal group membership and promote cooperation, a concept that leading dual inheritance anthropologists have so far rejected (Boyd and Richerson 2005:118).

We maintain that these theoretical and methodological differences within archaeology can be bridged to reach a more fruitful interchange in research on learning and cultural transmission. Precedents for intellectual interchange exist. Use of ethnographic, ethnoarchaeological, and experimental data to model patterns of cultural transmission offers stronger links between archaeological data and evolutionary processes than hypothetical examples do (Bamforth 2003:583), as seen in dual inheritance approaches in this volume. Methodological approaches like cladistics allow for testing and developing these linkages using large datasets that are otherwise unwieldy. These cases from different cultural and historical contexts can be considered from multiple theoretical orientations,

and newly defined ethnographically informed processes such as Mills's "negative prestige-biased transmission" could perhaps be evaluated and modeled. Studies of cultural transmission could be enriched and expanded by consulting the large ethnographically based literature on social analytical units (e.g., Gosselain 1998; MacEachern 1998, 2001; Stark et al. 1998; Welsch and Terrell 1998; and chapters in this vol.), and on learning and cognitive development beyond and within archaeology (e.g., Greenfield et al. 2003; Crown 2007:198–207; see also Herbich and Dietler, this vol.).

We hope that breaking down some boundaries between various approaches represented in this volume will move the field toward more nuanced and well-grounded understandings of learning, cultural transmission, and their material correlates. Highlighting variability in paradigmatic approaches and in the mechanisms that guide these processes is necessary to resolve theoretical issues concerning how cultural transmission works. Like Shennan (2002a:35–38) and Smith (2000:32), we support the use of more ethnographically based research focused on the local scale to explore specific mechanisms of cultural transmission and to establish their linkages to the broader historical patterning that dual inheritance anthropologists commonly model (Jordan and Shennan 2003:71). For archaeologists, in particular, this requires undertaking more primary research focusing on patterning in material culture from well-documented ethnographic and ethnoarchaeological contexts.

## **New Directions in Studies of Cultural Transmission**

This volume includes new case studies and new methodologies for studying the material manifestations of cultural transmission. Its geographical coverage is broad (see fig. 1.1), ranging from the indigenous Americas (Mills; Jordan and Mace; Bowser and Patton; Chernela; Eerkens and Lipo) to Africa (Wallaert; Herbich and Dietler; Gosselain), the Near East (Roux), and South Asia (Degoy). Case studies cover periods from the prehistoric or precontact and colonial periods to the ethnographic present. Research strategies include archaeological, ethnoarchaeological, and ethnographic approaches. In addition, the volume's contributors

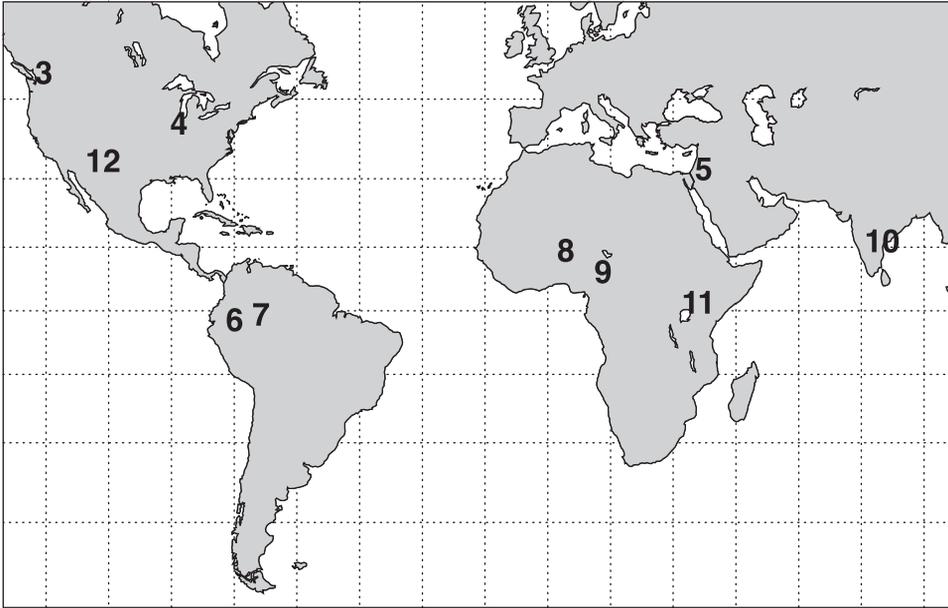


FIGURE 1.1 Research locations identified by chapter number:

- 3 Late nineteenth-century Gulf of Georgia (Jordan and Mace)
- 4 Woodland period Illinois (Eerkens and Lipo)
- 5 The southern Levant in the fifth to third millennia BC (Roux)
- 6 Ecuadorian Amazon (Bowser and Patton)
- 7 Central northwestern Amazon (Chernela)
- 8 Southwestern Niger (Gosselain)
- 9 Cameroon (Wallaert)
- 10 Andhra Pradesh (Degoy)
- 11 Kenya (Herbich and Dietler)
- 12 Late precontact and colonial Zuni Pueblo (Mills)

bring various international perspectives—British, French, Belgian, and American—to their studies.

Theoretical and conceptual approaches in this volume vary widely. Some case studies draw directly from the Anthropology of Technology/Techniques et Culture framework (e.g., Gosselain, Degoy, Wallaert), while others make explicit links with cognitive and experimental psychology and interdisciplinary conceptual frameworks (e.g., Roux, Wallaert). Three chapters focus on dual inheritance approaches (Eerkens

and Lipo; Jordan and Mace; Collard and Shennan), and three contributions explicitly integrate social theory and Darwinian frameworks to differing degrees (Bowser and Patton; Jordan and Mace; Mills). That these approaches occasionally clash is clear from critiques within this volume by Gosselain and by Herbich and Dietler. Yet a shared set of research interests reflected in these theoretically divergent case studies underscores our call for cross-disciplinary dialogue and the need to bridge boundaries. The following section elaborates some points of commonality.

### Some Shared Themes

The chapters in this volume use diverse theoretical approaches and methodologies to examine processes of cultural transmission and factors that such processes involve. All these approaches require the study of three interrelated aspects concerning the social organization of learning and practice: (1) factors that influence people's decisions to perpetuate or deviate from the behaviors of other group members within a group; (2) group boundaries that are produced as the cumulative outcome of those decisions; and (3) how cultural transmission occurs within and between groups through time.

Kuhn (2004:566) recently noted that studies of intragroup variation are relevant and researchable across several different theoretical frameworks that characterize current archaeological thought. Deciphering the range of circumstances in which the knowledge (or use) of traits is restricted to a limited subgroup or category of individuals within a larger social group is important to arguments about the circumstances under which a trait may become widely transmitted or disappear. Several of this volume's case studies focus directly on sociocultural contexts of within-group identity formation, and the formation of communities of practice. Laure Degoy's detailed analysis of Andhra Pradesh potters (South India) shows how ceramic technological traditions reflect and generate nested levels of social affiliation below the level of ethnolinguistic group, including caste and (in some cases) subcaste divisions, political faction, and de facto endogamous units. Both Gosselain and Chernela show how people use the teaching process to cast or create alliances back through previous generations.

Brenda Bowser and John Patton integrate situated learning theory with a life history approach to study the developmental cycle through which Achuar and Quichua potters in the Ecuadorian Amazon move from peripheral to full membership in their community of practice, and the stylistic influence of close matrilineal kin, mothers-in-law, and political allies varies during different stages of the potters' lives as shifting strategies of signification of group membership, particularly political alliances. Despite considerable intragroup variation in patterns of stylistic transmission, and imitation of many stylistic elements across group boundaries, the intergroup social boundary between Achuar and Quichua factions is signified by pottery style. In Janet Chernela's study of the patrilineal, patrilocal Baniwa, carving skills and knowledge of ancestral decorative motifs on manioc grater boards pass from father to son, signifying social identity and embedding group history in the ancestral landscape. The grater boards and knowledge of their cultural meanings cross group boundaries with the women who move to new communities to marry.

Some studies focus directly on factors involved in the intergenerational transmission of knowledge. H el ene Wallaert research on apprenticeship among Dii Cameroon potters identifies factors involved in the apprenticeship process from one generation to the next, and Gosselain's work in Niger offers examples of legitimate peripheral participation (following Lave and Wenger) as well as instances of directed instruction. Chernela's ethnographic research on Amazonian grater boards offers a case of vertical transmission that discourages innovation through its emphasis on adhering to a template with little latitude for variation. In Valentine Roux's Levantine study, both the size of the producer community and stability or instability in the social and political climate within which the artisan works are factors that determine how and whether traditions are transmitted intergenerationally. In Herbich and Dietler's study, Luo potters learn their craft as adults in a patrilocal society, through postmarital resocialization and oblique transmission (from mother-in-law or senior co-wife). Even when the mother is herself a potter, social pressure discourages daughters from picking up the craft. Bowser and Patton find strong evidence of matrilineal transmission in a matrilineal society, as well as stylistic influences by mothers-in-law.

Case studies in this volume also focus on social barriers or impediments that prevent the transfer of technical knowledge between groups. In

discussing conditions under which horizontal transmission does or does not occur, Roux emphasizes the size and relative openness of the learning network and the nature of the transmitted trait as important factors. Mills's analysis of colonial period Zuni identifies social and historical factors that prevented the transmission of particular culinary practices like wheat bread at early points in the colonization process, and how these factors changed through time. Gosselain uses his Nigerien data to examine cases in which particular artisan groups actively obstruct transmission of the Bella style.

Such ethnographically based research provides insights on microscale processes involved with intergenerational and horizontal transmission of knowledge. But archaeologists' interest in a deeper time scale requires the development of different methods to model these processes. Collard and Shennan's overview of Darwinian biological concepts, models, and analytical techniques is rich with examples of applications to cultural data, both archaeological and ethnographic. Their examples, like the chapter by Jordan and Mace, include findings that are contextualized and interpreted within cultural and historical frameworks, contrary to stereotypic beliefs that Darwinian approaches fail to contextualize their data in these terms. Collard and Shennan's chapter provides a broad background against which the chapters by Eerkens and Lipo, Jordan and Mace, Bowser and Patton, and Mills (as well as others) can be read.

How variation arises, and the rate at which it does so, is an inherent part of archaeological inquiry. Toward that end, a complementary pair of studies in this volume considers the accuracy with which knowledge is replicated: while Wallaert details mechanisms in the apprenticeship process that minimize copying errors, particularly the effect of having master artisans as models, archaeological and experimental research by Jelmer Eerkens and Carl Lipo demonstrate the impact of minor copying errors through time that occur even in the most conservative of technological traditions. Eerkens and Lipo's methodology can be used to test for randomness in archaeological and ethnoarchaeological data in any theoretical paradigm, or to test for different scenarios like those observed by Wallaert. Rather than assume that temporal trends in stylistic variation can be explained as copying error—an analogue for processes of mutation and random drift from a biological perspective—they develop and apply a methodology to test the difference between random and nonrandom change through time in metric variables, supplementing

Neiman's (1995) methodology for working with nominal variables. Jordan and Mace work back through time, applying matrix-based correlation methods, correspondence analyses, and cladistics to ethnographic data to understand the origins and transmission of cultural diversity among Northwest Coast Salish speakers. Like the phylogenetic methodologies discussed by Collard and Shennan, this approach can be used to develop models of cultural change and continuity that can be tested further using archaeological and other datasets. Ethnoarchaeologists could contribute to the testing and development of these methodologies using their fine-scaled data on material culture made by known producers and collected over broad geographic areas and over time in known historical and cultural contexts.

Time depth also figures in two chapters directly concerned with the context of change. With an archaeological and ethnohistoric perspective covering nearly six centuries, Mills uses her study to underscore the importance of understanding particular top-down factors in each setting; examining the role of Spanish colonial mandates in the first centuries after contact and the influence of a changing economic structure in the nineteenth and twentieth centuries, for example, is crucial to untangling processes of cultural transmission. Roux takes advantage of her archaeological material to follow the disrupted transmission, in spite of its cost-benefit advantage, of a Near Eastern ceramic production technique. Her conclusion that the fifth to third millennium BC adoption and abandonment of the wheel-fashioning technique in the southern Levant reflected both demographic forces and sociohistorical factors suggests the need to better understand the conditions under which different kinds of technological change occur.

## Parting Thoughts

Our goal is to provide a balanced approach to the varying approaches to learning and cultural transmission in archaeology, and to bring focus to points of difference and complementarity. We argue for the value of multiple theoretical and methodological approaches and emphasize the need to find common ground; this requires elaboration of our discussion concerning areas of theoretical intersection, complementarity, and convergence and the concomitant potential for collaborative research. We are not the

first to call for bridging this divide in archaeology (e.g., Kuhn 2004:566), anthropology (e.g., Bliege Bird and Smith 2005), or the social sciences more generally (e.g., Bailey 2003), but doing so remains a challenge. We include chapters from different perspectives, some of which are oppositional, others that identify theoretical parallels and intersections between Darwinian and other approaches, offering new ethnographically based studies and empirical evidence of complex learning behaviors that Darwinian anthropologists have called for to operationalize and test dual inheritance models of cultural transmission (e.g., Flinn 1997:35; Smith 2000:32). Thus, our goal is to build bridges across paradigmatic boundaries.

We developed this volume to honor the memory of Carol Kramer, with whom we share a philosophical commitment to anthropological holism, a respect for ethnoarchaeological research strategies, a belief in the power of empirical data, and an abiding interest in cultural transmission. Some chapters in this work reflect her legacy more closely than do others; case studies vary in their scale of analysis, their methodologies, and their theoretical frameworks. We believe that Carol envisioned an inclusive archaeological world, with room for a variety of frameworks and approaches that share the goal of knowledge production. It is in the spirit of intellectual tolerance that we organized this volume; we hope that its contents will encourage others to extend her intellectual legacy through a continued pursuit of research on aspects of cultural transmission.