Preface

The study of the human-made world, whether it is called artifacts, material culture, or technology, has burgeoned across the academy. Archaeologists have for centuries led the way, and today offer investigators myriad programs and conceptual frameworks for engaging the things, ordinary and extraordinary, of everyday life.

This book is an attempt by practitioners of one program – Behavioral Archaeology – to furnish between two covers some of our basic principles, heuristic tools, and illustrative case studies. Our greater purpose, however, is to engage the ideas of two competing programs – agency/practice and evolution – in hopes of initiating a dialog. We are convinced that there is enough overlap in goals, interests, and conceptions among these programs to warrant guarded optimism that a more encompassing, more coherent framework for studying the material world can result from a concerted effort to forge a higher-level synthesis. However, in engaging agency/practice and evolution in Chap. 2, we are not reticent to point out conflicts between Behavioral Archaeology and these programs.

This book will appeal to archaeologists and anthropologists as well as historians, sociologists, and philosophers of technology. Those who study science–technology–society interactions may also encounter useful ideas. Finally, this book is suitable for upper-division and graduate courses on anthropological theory, archaeological theory, and the study of technology.

The idea for this book came during a Fulbright sponsored trip to Porto Alegre, Brazil, by Jim Skibo in 2004, and conversations with Adriana Schmidt Dias, Fabíola Silva, Klaus Hilbert, and the participants in the seminar. The seminar was on ceramic analysis, ethnoarchaeology, and pottery use-alteration, but much of the discussion focused on how our theoretical approach to the study of technology contrasts with agency/practice, evolution, and other theoretical models currently in vogue. This led to a discussion between us and the decision to write this book. Although we had been collaborators for over two decades, this was our first co-authored book and we would like to thank the participants of the Fulbright seminar for the provocative conversation that convinced us to embark on this enjoyable enterprise.

A number of people commented on the manuscript: Eric Drake, Nathan Hardwick, Vincent LaMotta, Fernanda Neubauer, Charles Orser, Tim Pauketat, Michael Schaefer, and William Walker. Nathan Hardwick also created the wonderful

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Chapter 2
Behavior, Selection, Agency, Practice, and Beyond

Chapter 1 outlined our theory for studying technological variability and change. In this chapter, we address other models that deal with these issues. Although there are a number of approaches to understanding the relationships between people and things (e.g., Broughton and O'Connell 1999; Fitzhugh 2001; O'Connell 1995), here we focus on three major schools of thought that are common in contemporary archaeology: Evolutionary Archaeology, what we call the "French school," and agency and practice theory. The relationship between selectionism, one variant of Evolutionary Archaeology, and Behavioral Archaeology has been explored previously (O'Brien et al. 1998; Schiffer 1996), so those arguments need to be reviewed but briefly here. We will, however, spend some time on the relationship between our model and the French school. Although we have already discussed some areas of overlap between these approaches, there is need for a more detailed discussion. Finally, we review how agency and practice theory have been applied to the understanding of material culture change. These approaches are quite compatible with our model and can be integrated in a useful way. This chapter concludes with several examples that illustrate a behavioral strategy for investigating social power.

Evolutionary Archaeology

As already noted, similarities and differences between Behavioral Archaeology and Evolutionary Archaeology (also referred to as selectionism) have been aired elsewhere (O'Brien et al. 1998; Schiffer 1996; see also O'Brien 2005 and O'Brien and Lyman 2000 for a recent summary of Evolutionary Archaeology), and others have criticized the selectionist framework from different perspectives (e.g., Arnold 1999a; Bamforth 2002; Boone and Smith 1998; Pauketat 2001; Spencer 1997; Wylie 1995, 2000). The most important area of overlap, in terms of our model, is the focus on artifacts and utilitarian performance-based interactions. Selectionists have also used a form of the life-history approach in tracing phenotypic features (O'Brien and Holland 1992:52; O'Brien and Lyman 2003b). These general life-history approaches, as we discussed earlier, are instructive but often are not specific enough to isolate discrete links in the behavioral chain that influence, for example, design and adoption processes.

Although there is neither one monolithic selectionist model nor just one behavioral model for explaining technological change, one can still identify two major incompatibilities that are relevant here. The first has to do with the nature of inference (O'Brien 2005:31; Schiffer 1996:650–652). Inference, as defined by Behavioral Archaeology, and reconstructions of the past have been deemed by selectionists as unscientific "just so" stories (Dunnell 1980, 1982, 1989; Neff and Larson 1997:77; O'Brien and Lyman 2000:346–348) because they typically rely heavily on functional principles developed through ethnoarchaeology and experimental archaeology. According to O'Brien and Holland (1995:178–179), "any search for universal laws that govern behavior is not only incompatible with an evolutionary approach but is doomed to fail." We discussed this earlier but we will note again that functional principles and various behavioral regularities are not typically universal but rather have specific boundary conditions defined by critical variables (LaMotta and Schiffer 2001:24–25). The more orthodox evolutionary archaeologists understand the notion of boundary conditions completely but are still unconvinced. According to O'Brien and Lyman (2000:347), behavioral reconstructions "may be real, or sort of real, or not at all real; we simply have no way of knowing because of the shaky ground….upon which they are constructed." They say further that, "universalities not only *do not* exist, they *cannot exist*" (O'Brien and Lyman 2000:349, emphasis in original). This is a hard-line perspective that undermines the inferential process in archaeology and even denigrates the works of some who carry the evolutionary archaeology banner (e.g., Graves and Ladefoged 1995; VanPool and VanPool 2003b).

It is true that behavioral inference is based on numerous principles – general and specific – many of which were developed in actualistic studies. For example, the foundation for the analysis of the earliest pottery on the Colorado Plateau (Chap. 3) is inferences about the intended and actual functions of the vessels. The *intended* function of the pot was inferred by isolating the technical choices based on various properties (e.g., temper size, type, and amount, and vessel shape and size). We concluded that the pot was designed to perform many utilitarian functions. This simple, yet important, inference is based on nomothetic principles developed through experimentation (e.g., Pierce 2005; Skibo et al. 1989b), ethnoarchaeology (e.g., Arnold 1985, 1993; Arnold 1991; Kramer 1982, 1997; Longacre 1991, 1999), and in ceramic ecology and ceramic science and engineering (Kingery 2001; for an overview see Rice 1987, 1996a,b). To infer the *actual* functions of the vessels, a use-alteration analysis was done, which was based on principles developed both in ethnoarchaeology and experimental archaeology (Skibo 1992; see also Arthur 2002, 2003, 2007).

A second incompatibility is selectionists' obvious uneasiness when having to deal with the nonutilitarian aspects of technology. The most convincing selectionist case studies deal with variability and change that is best explained in terms of utilitarian performance characteristics (e.g., Dunnell and Feathers 1991; Feathers 2006; O'Brien et al. 1994; Pierce 2005; Van Pool and Leonard 2002). VanPool and VanPool (2003b:107) note that, "An EA approach is ideal for explaining patterns and subsistence factors that have strong implications for replicative success, but it

is likely to be less intuitively satisfying when seeking to explain the changes in ceramic decoration and the development of social hierarchy." Selectionists do consider decoration or style but only as part of the "nonadaptive aspects of phenotypic variation" (Neiman 1995:7) that then can be used to construct historical lineages based on Darwinian principles such as drift (Neiman 1995; O'Brien and Lyman 2000, 2003). According to O'Brien and Holland (1995:190), "engineering-design analysis offers an appropriate basis from which to construct plausible… arguments relative to fitness, and thus overcome the 'just so' hurdle." This is because in the cases they have selected, we would argue, the primary performance characteristics (i.e., those that are most heavily weighted in the performance matrix) are utilitarian. These studies focus on the utilitarian performance characteristics that influence an artifact's replicative success (using their jargon). Very similar studies have been done using our model (e.g., Skibo et al. 1989b), underscoring an area of overlap mentioned earlier.

Behavioral Archaeology and Evolutionary Archaeology, however, part ways when dealing with nonutilitarian performance characteristics and what Dunnell (1989) has called "waste," which is human behavior that is not directly tied to biological reproduction and replicative success. Our model obviously handles utilitarian performance characteristics very well but, more importantly in the present context, it also easily incorporates various social and ideological factors that may also affect the design and use of any technology.

A notable exception is the study by Graves and Ladefoged (1995) in which they apply evolutionary principles to the study of ceremonial architecture, which they prefer to call "superfluous" instead of "waste" behavior. They argue that ceremonial architecture, in this case, had an important functional role by reducing risk under conditions of resource stress. Similarly, VanPool and VanPool (2003b) combine an evolutionary approach with agency theory in their investigation of ritual technology associated with the northern Mexican site of Casas Grandes. Evolutionary Archaeology is used to explain changes in subsistence and settlement, whereas agency is used to understand symbolism and the development of social inequality. The authors recognize the limitations of Evolutionary Archaeology and seek to fill the gaps with other theories. This move, we note, brings them closer to a strategy advocated here.

In the words of Dunnell (1989:46), "Evolutionary theory is not, at present, capable of explaining much of the archaeological record." Nonetheless, the historical narratives offered by selectionists, which invoke natural selection and drift, are sometimes well developed and convincing. The fundamental problem with Evolutionary Archaeology may be that many other researchers are interested in aspects of the archaeological record that selectionists consider either uninteresting or unimportant. Although there have been some attempts to stretch evolutionary theory or to combine it with other theories, for the most part Evolutionary Archaeology retains a narrow focus (Sillar and Tite 2000:15), and thus many archaeologists find it unattractive.

The one trait that many archaeologists, including us, inherited from the New Archaeology of the 1960s was optimism (see also Chap. 4). The enduring legacy of

that period is that much of the human past is potentially knowable; we just need to develop the method and theory for establishing rigorous inferences (Binford 1968). We have not lost the optimism, whereas the core of evolutionary archaeology seeks to restrict archaeological investigation to a limited range of subjects, with a correspondingly limited range of causal factors. Our goal is to develop archaeological method and theory, and to keep showing how our model can be employed to investigate all the factors involved in archaeological variation and change. We continue to have the optimism of New Archaeology that all is potentially knowable.

French School

There is not one monolithic school of thought in French archaeology regarding technology, but we use the phrase "French School" (see also Wilk 2001) as a shorthand to designate an approach that combines the use of *chaîne opératoire* with the "social production of techniques," as articulated by Lemonnier (1992, 2002a), and now integrates social agency and practice (Dobres 2000). One could argue that selectionists, and the science-based histories that they produce, are on one end of the continuum, while the French School, which tends to highlight social factors in explanations of artifact variability and change, and downplay utilitarian ones, lies at the other end. There is a good deal of overlap between the French School and Behavioral Archaeology, and much to admire in their case studies, but we would argue that the French School, nonetheless, has shortcomings that prevent it from developing a comprehensive understanding of the relationship between people and things. We turn to a comparison of the two approaches. In Chap. 1, we briefly mentioned some areas of overlap between the French School and our model. This included the concepts of *chaîne opératoire* and technological choices, both of which, in a slightly different form, play a key role in our model as well. We made the point, however, that because their model lacked the concept of performance characteristics (primary and secondary) and design compromises, their case studies often conclude that people make "illogical" choices in their technology. These differences, we argue, can be traced to a single issue: the concept of *chaîne opératoire* is too narrow. It lacks a historical perspective, and fails to take into account an artifact's life history beyond manufacture.

Lemonnier (2002a) begins the introduction to the volume *Technological Choices: Transformation of Material Culture since the Neolithic* with a quote from Quill (1985:7–8) that discusses the British tradition, in the early 1930s, of landing aircraft on a gliding approach with the engine throttled back. This technique, they believed, would train pilots to land planes in the event of an engine stall. The problem was that in this procedure, used by no other air force, pilots often lost control during landing and crashed, resulting in many deaths. In fact, more pilots died during everyday throttled-back landings than in emergency landings as a result of engine failure. Eventually, the British realized the error in this procedure and by the late 1930s they trained their pilots to use the safer "power-on" landings.

This extreme and "absurdly negative" (Lemonnier 2002a:1) example sets the tone for the entire book, which focuses on how "social logics unrelated to technology may weigh heavily on the evolution of technological systems" (Lemonnier 2002a:2). "Technology" in this case refers to what we would call utilitarian performance, and looking at this example from the strictly utilitarian perspective does indeed make the choices in landing procedure seem illogical. Social logic, according to this perspective, often trumps utilitarian logic. Because technology, in Lemonnier's (2002a:4) view, is "a complex phenomena in which wide symbolic considerations are involved from the start, it becomes tricky to separate the 'technical' from the 'social'." It is indeed "tricky" and we would add that it is even trickier with the narrowly construed *chaîne opératoire*, which derives from, and appears to be most useful for handling, ethnographic situations.

Social logic appears to trump utilitarian performance only when viewed from a present-day ethnographic perspective. In this and other cases, the *chaîne opératoire* lacks the historical perspective required to garner a more complete understanding of, for example, the manufacture and use of British aircraft during the 1930s. In our model, there is no such thing as "illogical choices." According to Lemonnier (1992:17), however, "it is as if, during its history, a society, for unknown reasons, had come to rely on one particular technique." Because behavioral chain is historical in nature, these "unknown reasons" are of great interest and potentially knowable. As Roux (2003:5) notes, the approach by Lemonnier and others "pursues a problematic scientific position by taking into account only certain kinds of evidence while ignoring others." She goes on to argue that, "different technical solutions met in the history of aviation may thus be interpreted in terms of arbitrary choices when decisive technical, economic, and environmental parameters are ignored" (Roux 2003:5). We agree with her on this point: if one focuses too heavily on the social and investigates a technology from the ethnographic present, then the researcher could be missing the underlying causes of a seemingly "illogical" choice. We would take this point a bit further by stating that even if the reason for a choice is rooted in the social, it does not mean that it is illogical or that it will defy our understanding even in the distant past. In the Kalinga metal pot example described in Chap. 1 (Skibo 1994), polishing one's pots is an illogical choice from the perspective of utilitarian performance – it takes longer to wash these vessels and eventually wears a hole in the pots. However, if one looks at it in terms of visual and symbolic performance in the context of display activities, the choice to shine the pots is quite logical. Framing an investigation in terms of logics seems to unnecessarily restrict the researcher. Consequently, we prefer the concept of "choices," which reflect various weightings of performance characteristics that can be related to any combination of social, religious, technological, and political factors.

From a historical perspective, choices build upon choices – all made in the context of people's traditional knowledge and social system (see also Sillar and Tite 2000:5). A technology that "works" (i.e., achieves acceptable levels of relevant performance characteristics) will continue to be replicated until someone or a group decides that it is no longer working at an acceptable level. Because we combine a focus on the artifact at a particular time and place with a historical understanding

of the people and their activities, we can create a more well-rounded model of the choices made and the factors – of diverse kinds – that influence them.

A complete understanding of a particular technology must also incorporate primary and secondary performance characteristics and the important concept of compromise, all of which are lacking in the French model. No design is "perfect" because of the many diverse interactions in which it must perform during its life history. Tools do not operate at some peak level and, consequently, many of the technical choices seem to be illogical. Why pick a plane-landing procedure that kills people? Because in the short term it was operating at an acceptable level that included, unfortunately, the taking of human life. It was "logical" only in terms of initial assumptions made about the safety of the procedure and the dangers of dead-stick landings. At a certain point, new information had accumulated that led to a revision of assumptions and a change in the procedure.

A fundamental problem with *chaîne opératoire* is that it does not continue through use activities and beyond. In our design model that applies to the behavioral chain, one needs to explore postmanufacturing activities to understand technical (not technological) choices. Behavioral chain, unlike *chaîne opératoire*, also takes in formation processes. In archaeology it is essential to have a behavioral chain that begins with procurement of materials for manufacture but continues after use, through deposition, until recovery by a researcher (see Chapman and Gaydarska 2007). Thus, reuse processes and other post-initial use formation processes, including those of the natural environment, enter into a complete behavioral chain. According to Lemonnier (2002a:24), "we no longer have the means of digging up those non-technical determinations of techniques that nevertheless resulted in highly efficient artefacts or procedures." Privileging the social and cultural, however, provides an incomplete picture of technology (Roux 2003) in the same way that evolutionary archaeologists tend to focus on the narrow reality associated with utilitarian performance. *Chaîne opératoire* lacks the expanded life history approach that is essential to archaeology (Bleed 2001a). Our approach privileges nothing – it is causally agnostic – and so enables the researcher to consider *all* potentially relevant factors at the interface of people and things.

The concept of *chaîne opératoire* as originally defined by Lemonnier has been adapted by some to suit research interests. Dobres (2000:155) notes that if *chaîne opératoire* is to be useful in archaeology, meaning and sociality must be inserted "into descriptions of physical sequences of material transformations." She argues that *chaîne opératoire* "highlights the sequential nature of both material and social reproduction," thus bringing in the concept of social agency (Dobres 2000:156; see also Dietler and Herbich 1998; Dobres and Robb 2005:163).

Agency and Practice

Our performance-based approach, which focuses on choices that individuals or groups make in the design, manufacture, adoption, and use of a technology, has always highlighted human agency (Sillar and Tite 2000:9). Hodder and Hutson

(2003:33–35) acknowledge that the behavioral approach does use the concept of agency especially when exploring technological change, yet they state that we have gone "too far in that direction" (Hodder and Hutson 2003:34). We give our potters, according to Hodder and Hutson (2003:34), "unrestricted latitude for experimentation." This criticism, that we believe that people who make and use technology operate like practical engineers making tests and solving problems, is often mentioned (e.g., David and Kramer 2001:141; Gosselain 1998), but it is a caricature of the behavioral approach. If the reader has gotten this far in the book, it should be clear that we do not advocate such an approach. Our concepts of performance characteristic, technical choice, and compromise include the notion that people make decisions about their technology based on their knowledge, experiences, and the social and natural environment in which they live. And the experiments that people carry out are equally contingent upon local circumstances.

When our approach isolates connections between people and things, Hodder and Hutson (2003:33) dismiss them because these interactions "silently contain modern western assumptions about the meaning of the artifacts" (see also David and Kramer 2001:141). Well, of course they do. As anthropologists we understand that the concept of culture works both ways. We are embedded in our own culture equipped with biases and agendas that can influence all we do, including reconstructing technical choices made by prehistoric potters. Because of this very problem, we introduced the concept of "behavioral significance" when trying to apply results from our laboratory experiments to studies of prehistoric pottery (Schiffer and Skibo 1987; Skibo et al. 1989b). Through these experiments, for example, we could show that large amounts of sand temper would give a pot greater thermal shock resistance, which would mean that a pot could be placed over the fire many more times without failure. The problem, however, is determining whether these differences in expected use-life are "behaviorally significant." That is, would a pottery user be able to realize this difference in use-life, and, more importantly, would the potter add large amounts of sand temper to increase thermal shock resistance? Realizing that these types of relationships are created in our lab and the whole experiment is set up by us, products of our own culture, we seek to know if these differences were actually taken into account by the pot makers and users. The short answer is, we can never know with complete certainty. We can only make inferences, which are arguments based on relevant evidence and relevant principles. Others can critique these inferences, but to dismiss them because they may contain western assumptions is lazy scholarship. All of archaeology and, in fact, all of science rest upon equally contestable assumptions. Indeed, it could be argued that the belief that traditional societies depend on different logics and that social and ideological factors dominate technological decision-making reflects the western colonialist view that "the other" is qualitatively different from us.

A more productive strategy is followed by a number of researchers who are attempting to "do" agency and practice theory with archaeological data. No one has done more for advancing agency in archaeology and especially the relationship between technology and social agency than Marcia-Ann Dobres and her colleagues (Dobres 1995, 2000, 2001; Dobres and Hoffman 1994, 1999; Dobres and Robb

2000, 2005). Agency in archaeology, however, has been defined and used in so many different ways that it has perhaps rendered the term virtually useless (Dobres and Robb 2000:10; Dornan 2002; Pauketat 2001). Dobres and Robb (2000) advocate a more restricted definition of agency, and a good deal of their work has focused on defining it in ways that make it useful to archaeologists (Dobres and Robb 2005). Despite these efforts, there is still much variability in how one defines and uses this approach (Dornan 2002). For example, Dobres and Robb combine agency theory (*sensu* Giddens) and practice theory (*sensu* Bourdieu), while others believe that this is a distinction that should not be blurred (Orser 2004:126; Pauketat 2000:114).

Advocates of agency or practice theory have, on occasion, maintained that their approach is opposed to the behavioral model. Some have argued that a behavioral approach with its so-called "essentialist" underpinnings is at odds with practice theory (Pauketat 2001). Pauketat (2001:76–79) maintains that we should focus on what people do and how they do it rather than why they do it. Following Dobres and Hoffman (1994), he argues we need to free ourselves from "behavioral essentialism" and focus instead on technology as socially negotiated practices, which he believes is quite different from a "behavioral position" (Pauketat 2001:78). He also notes that behavior is "little more than….action with predetermined courses and predictable ends analogous to other times and places" (Pauketat 2000:115; see also Pauketat 2003:41–43). This view does not indicate an understanding of the concept of boundary conditions and fails to appreciate that behavioral principles, from general to specific, are the foundation for many archaeological inferences (see also Roux 2003, 2007). We appreciate the generality of nomothetic principles and general concepts, and at the same time acknowledge the importance of local, situational, and contingent factors. An appreciation for nomothetic principles is not incompatible with a concern for local contexts. These common yet erroneous caricatures of our concept of behavior have resulted in "behavior" becoming an epithet. According to Wobst (2000:40), at the "Theoretical Archaeology Group Meetings in Durham England, presenters engendered intense negative reactions if they unthinkingly let the term 'behavior' slip into their remarks." These types of caricatures get started in such meetings, are blindly repeated in graduate seminars and discussed in hallways and coffee shops, and then become facts without many taking the trouble to read the original works. Although it is always useful to highlight differences in theoretical approaches, we strive to move beyond this polemic, seeking to engage works that employ agency and practice theory in a search for points of convergence rather than divergence.

According to Pauketat (2000:115), practice theory "is a theory of the continuous and historically contingent enactments or embodiments of peoples' ethos, attitudes, agendas, and dispositions." In this context, practices or "negotiations" (Pauketat 2000:116) are quite similar to our concept of performances of people and artifacts along a behavioral chain, which is implicit in "the relationship between people and things," a phrase at the core of Behavioral Archaeology. Walker and Lucero (2000) are comfortable in merging a behavioral model with agency in their study of prehistoric ritual and power. Their strategy is to "highlight how agents organize material

culture in pursuing various activities including raw materials acquisition, manufacture, use, and discard" (Walker and Lucero 2000:130). They see no problem in examining how agents create life histories of artifacts *nor do we* because such a perspective has always been part of our approach.

Pauketat (2001) and others also have distaste for the way we might isolate various goal-oriented behaviors. This seems to be a reference to our inferences about various technical choices such as potters designing a vessel for multiple functions, as is done in Chap. 3. In contrast, Pauketat (2001:79) suggests that we jettison such goal-oriented action and focus on practice, which is guided by, among other things, "doxic" referents (*sensu* Bourdieu 1977, 1990; Giddens 1979, 1984). Doxic referents are various forms of knowledge that include unconscious, spontaneous, nondiscursive, practical, and commonsensical. More than two decades ago, we identified (Schiffer and Skibo 1987:597–598) three essential components of technological knowledge, recipes for action, teaching frameworks, and techno-science, which are very much like the doxic referents. Recipes for action are the rules, tools, and sequence of actions that underlie the production of a technology. The teaching framework is the practices that permit the transmission of the technology intergenerationally, and techno-science is the principles that underlie an artifact's successful performance. Roux's (2003) concept of "technological fact" is also quite similar to doxic or technological knowledge. In Chap. 3, which describes the origins of pottery on the Colorado Plateau, we are purposefully focused on this type of technological knowledge. In earlier work (i.e., Skibo et al. 1989b), which included experimentation, we also investigated technological knowledge and the technical choices of cooking pots because we found the current explanations for temper, surface treatment, and other technical properties completely unsatisfactory. The explicit goal of the early experiments was to understand if these technical choices affected any utilitarian performance characteristics. Does this mean that this is the only type of knowledge that goes into the manufacture of even the most utilitarian of technologies? Certainly not, nor is this implied in our broader model that was outlined earlier (see also Schiffer and Skibo 1987, 1997; Skibo and Schiffer 2001). Our strategy focused explicitly on utilitarian performance fully realizing that other various nonutilitarian performance characteristics might also play a role in the manufacture and use of this pottery. Our earlier work on pottery was meant to fill the lacunae relating to technical choices and utilitarian performance, not to suggest – as some archaeologists have inferred – that these are the only factors important in pottery manufacture and use.

We chose to look at cooking pots in various contexts because it was a chance to flex our experimental muscle by discerning the effects of seldom-studied technical choices on utilitarian performance characteristics. For cooking pots, we argued, thermal shock resistance is a primary performance characteristic because if a pot has poor thermal shock resistance it will not survive firing during manufacture, much less repeated heating during use. A pot that does not survive long-term boiling episodes will not cook beans, and a family might go hungry. Chapter 3 provides a good example for how this argument works and how we made a case for multifunctionality (cooking, storing, brewing) in vessel design. But many other factors are involved in

the adoption of this technology that remain unexplored; perhaps these are the types of questions that practice and agency theorists call for. For example, the adoption of pottery on the Colorado Plateau did not occur simultaneously, and there is a good deal of variability in the technology that is yet unexplained.

Cooking pots turned out to be a rich technology with clear connections between technical choices and utilitarian performance, which could be explored experimentally. What if we had focused, however, on serving bowls, also a common form in the American Southwest America? Although we have not looked at this technology carefully, one can easily envision that only a few utilitarian performance characteristics – such as holding capacity and accessibility of contents – would be of primary concern in their design. Because the pots are used to serve food to family members and guests, it is likely that various sensory performance characteristics (especially visual ones) weigh more heavily in vessel design. A serving bowl is involved in a process of communication between the people taking part in these interactions in manufacture and use activities. The technical choices that went into the design of these vessels cannot be discovered by experimentation alone, because they are greatly affected by various factors relevant to a particular time and place (Sillar and Tite 2000). Someone wanting to explore these choices might start with use-alteration traces on the vessel and then move to the evidence of use across space and through time. These kinds of inferences, however, are more difficult and require much more from the archaeological record. This is why researchers who seek the meaning of artifacts often run into methodological problems and produce unsatisfactory case studies.

According to Pauketat (2001:87), "answers to ultimate 'why' questions will be found only through cumulative, painstaking, data-rich, multi-scalar studies of proximate causation." We could not agree more. The reader will note that there is a distinct difference in the following chapters that deal with modern material culture and those that focus on prehistory. That is because in modern material culture it is far easier to access the types of knowledge that the agency and practice proponents seek. Ancient technology provides a number of difficult hurdles to applying "avant-garde" approaches to archaeology (Pauketat and Alt 2005:232). Our strategy with prehistoric data is to explore the utilitarian performance characteristics first (see also Lemonnier 1992:137). Dobres (2000:36–37) has criticized this strategy, but we should note that it can access some elements of knowledge and at least provide a foundation for moving on to a more complete understanding of a technology's manufacture and use (see also Roux 2003), as is illustrated by Pauketat (2001). In the ball court study (Chap. 6), we do indeed explore several nonutilitarian performance characteristics and argue that they are important for understanding the role of this feature in the thirteenth-century Southwest, yet this line of investigation is not complete. To fully understand the manufacture and use of ball courts requires contextual data of the type that were not available to us. The work of VanPool and VanPool (2003b) and others (Douglas 1995; Newell and Gallaga 2004; Schaafsma and Riley 1999; VanPool 2003; Whalen and Minnis 1996, 2001) is making progress in this regard.

We maintain that agency and practice theory are entirely compatible with the behavioral model, and the two approaches begin to converge when people make

serious attempts to apply agency and practice to prehistoric data. It is one thing to engage in what Pauketat and Alt (2005:232) have called "avant-garde" approaches to archaeology, which has characterized much of postprocessual archaeology, but it is yet another to apply these approaches to the realities of the archaeological record. According to Dobres and Robb (2005:161), "archaeologists can only understand agency – and thus social reproduction – when we understand how it worked (and works) materially." To understand how it "worked materially" they advocate the *chaîne opératoire* approach, which for reasons outlined earlier, we believe has serious deficiencies. Dobres and Robb (2005:163), however, suggest that there is a variety of other strategies for "doing" agency including "the life-history approach to material culture and the built environment….(that) focuses on so-called performance characteristics in an attempt to unlock the choices people made in regard to making and modifying their material world." This, of course, is the approach we advocate here.

Dobres and Robb (2005) realize that in order to "do" agency, we must engage the archaeological record in ever more rigorous ways. A number of scholars, such as Cobb and King (2005), Dietler and Herbich (1998), Joyce (2000), Pauketat and Alt (2005), Sassaman (2005), Walker and Lucero (2000), and Van Pool and Van Pool (2003) have made good initial attempts at engaging the archaeological record in ways that will indeed permit us to "do" agency. Pauketat and Alt (2005:230–231) suggest that there are three "procedural fundamentals" for doing agency. First, one must have a firm grasp of archaeological variability through time and space. Second, a researcher should compare "histories of practices," which basically means to investigate a particular technology in its various social contexts of manufacture and use. Finally, they suggest that doing agency requires "tacking back and forth between lines of evidence at multiple scales of analysis." They further suggest that comparisons of this type will derive from "experimental archaeology and studies of natural formation processes, technical performance, and choice." For the latter "procedural fundamental" they refer specifically to our work, but we would argue that this approach is exactly the type of strategy that we advocate and can be seen in the following case studies.

We should note, however, that this is a procedural standard that few have been able to meet. Many, in fact, jump too soon to applying agency even when they lack a firm grasp of the archaeological variability (procedural fundamental number one). Many, including ourselves, have applauded those who have called for an archaeology that investigates all aspects of technology (gender, power, etc.), but often times we have been left unconvinced by attempts to apply these ideas to the archaeological record (see also Killick 2004:575). Few engage the archaeological record in a way that furnishes an adequate understanding of formation processes, which must precede reconstructions of a particular technology (for exceptions, see Chapman and Gaydarska 2007; Shimada and Wagner 2007). This is an exciting period in archaeology as scholars struggle to create convincing case studies tied to the archaeological record and investigate new kinds of relationships between people and things. However, we strongly caution against applying various avant-garde models borrowed from sociology, cultural anthropology, or history directly to

archaeological phenomena without significant adaptation. Our position has always been that archaeologists, because of our unique data set and perspective, should build our own method and theory (Schiffer 1975a, Chap. 7). The model we advocate here is created by archaeologists for archaeology because it starts with the basic idea that we are focused on the relationship between people and things. We are, nonetheless, encouraged by the fact that as researchers attempt to apply practice or agency perspectives to archaeology significant overlaps appear between these attempts and what behavioralists advocate. In archaeology – and especially in the study of the distant past – the rubber eventually meets the road; it is at this interface where we see the greatest potential for convergence.

Where the Rubber Meets the Road

If practice and agency are to avoid becoming the next worn-out fad tossed aside by the coming wave of graduate students feverishly scouring the social sciences to find their own niche (Conkey 2007), its advocates must demonstrate its clear connections to the archaeological record. There is nothing wrong with borrowing theory from cultural anthropology, sociology, or history, as long as we frame research questions in terms of people–artifact interactions and establish clear connections between theoretical constructs and the material realities of the archaeological record. In the example that follows, we demonstrate one way that practice theory can be used in archaeology by applying the performance-based life history approach.

We focus on practice theory, as adapted from Bourdieu, because it seems amenable to an easier convergence with archaeology (Dietler and Herbich 1998; Orser 2004:126; Pauketat 2000); yet other agency models, in a general sense, could also be substituted. Before proceeding with the example, we make three points relative to similarities and differences between our approach and practice theory. First, practice theory is more than just *habitus* (Orser 2004:131–138). *Habitus* is "systems of durable, transposable dispositions, structured structures….which generate and organize practices and representations that can be objectively adapted to their outcomes without presupposing a conscious aiming at ends…" (Bourdieu 1990:53). Pauketat (2000:115) notes that *habitus* overlaps with Saussure's *langue* and the concept of "tradition," which is a term familiar to archaeology. Practice creates tradition by "continuous and historically contingent enactments or embodiments of people's ethos, attitudes, agendas, and dispositions" (Pauketat 2000:115). Archaeological application of practice theory, however, "has focused almost exclusively on *habitus*," leading to an incomplete "understanding of social complexity" (Orser 2004:141). In an investigation of race in nineteenth-century Ireland, Orser (2004) suggests that one cannot apply Bourdieu's practice theory without the additional concepts of "capital" and "field."

Capital comes in several forms, including the traditional usage as economic capital, but Bourdieu "extends it to cover all forms of social power" (Orser 2004:133). Thus, there can be cultural capital, social capital, and symbolic capital,

which individuals or groups can obtain and use to various ends. Fields are social networks in which the struggle to accumulate capital is played out. For any group, there can be many fields that structure the struggle among actors for the accumulation and the use of social capital.

The second point is that the core concepts of practice theory, *habitus*, practice, capital, and field can be easily accommodated by our model. *Habitus* and practice in our model can be regarded as performance guided by tradition, knowledge, and local contingencies leading to choices by individuals or groups. These choices become routinized to the point where the understanding of a particular practice – for example, the problem it was originally chosen to solve – can be lost and considered just a part of tradition. Every ethnoarchaeologist has had the experience of getting the reply, "Because that's the way we do it," when they inquire about the reason for a particular practice. Our *habitus*, however, is distinctly archaeological and thus material. For us, the routinized activities of everyday life are interactions between people and things.

Field, the network of social relations, is quite similar to our concept of "*cadena*" (Schiffer 2007), which is "all interactors involved in an artifact's life history, both people and artifacts" (Walker and Schiffer 2006:71). For our model to be of use to archaeologists, the *cadena* includes not just the social groups but also the artifacts involved. Another distinguishing characteristic of *cadena*, unlike field, is that it is historical and incorporates the crucial concept of behavioral chain.

The important concept of "capital" is only of use to archaeologists to the extent that it intersects with material culture. In our model, performance characteristics play this role as they are capabilities, skills, or competences that material culture and people must have to perform their functions, whether utilitarian, social, or symbolic. We revisit the Kalinga case study (Skibo 1994) to illustrate the overlap in concepts.

The Kalinga in the late 1980s were using mainly metal (aluminum) pots to cook rice, and ceramic pots to cook vegetables and meat (see also Kobayashi 1994). The women insisted on scrubbing off all of the soot from the exterior of the metal pots so that they would maintain their luster, even though this process was arduous and removed a thin layer of metal. In an earlier study, Skibo (1994) interpreted this behavior as part of the activity associated with a symbolic performance characteristic: the shiny pots were a symbol of wealth and modernization that were proudly displayed in houses. Let us take this simple example and look at it more closely using practice *and* behavioral concepts. The *habitus* of interest here is the routinized pottery-washing activity done by all women and many young girls at least once per day. The washing activity was remarkably similar among all the women observed and left visible traces on the vessels themselves (Skibo 1992). Washing, and the resultant use-alteration traces, varied only by vessel type (rice or vegetable/meat ceramic pots and the metal pots) and the handedness of the washer. The vessels were carried by hand to and from the washing location and after cleaning were placed either on a wooden shelf (ceramic) or hung from the rafters by their handles (metal). The shiny metal pots were hung or otherwise displayed so that they were visible to visitors or guests. The original question was, Why did they go to such

bother to shine the pots and then display them in prominent locations? We stand by the answer to that question offered over a decade ago: symbolic performance. This inference can be restated in terms of practice theory and our model, which has evolved since that time.

The field or *cadena* is the set of people from the village of Guina-ang, Kalinga relatives or friends who might visit from other villages, and even more distant non-Kalinga visitors to their house including ethnoarchaeologists. The Kalinga economy at the time was almost completely dependent on subsistence agriculture and there were relatively few overt differences in economic capital. Yet, even within this relative economic equality there were some differences in household wealth measured in terms of number of rice fields, ownership of animals, and house size (Trostel 1994). Guina-ang residents were aware of what we would consider, from the perspective of a western capitalistic perspective, relatively modest differences in household wealth. Added to this is that metal pots were also more expensive than their ceramic counterparts.

Capital takes several forms in this simple case study. There are important differences in economic capital between households, and this is transferred to symbolic capital (or symbolic performance) by conspicuously hanging shiny metal pots in one's house. The primary network of conflict (field or *cadena*) is the other Guina-ang villagers who clearly understand that this overt display of metal pots represents a dominance of symbolic and economic capital (visual performance characteristic facilitating a symbolic function).

This example is an oversimplification but it also clearly illustrates overlaps between practice theory and our model. One important distinction is that our model is materially based and thus more easily applied by archaeologists. More than that, our model makes it possible, at least in principle, to link agency and practice theory rigorously to the archaeological record. We should note, however, that this example pertains to living people, and we are sensitive to the pleas of prehistorians who yearn for tangible ways to explore symbolism and power in the distant past (see Sullivan 2007).

This brings up our third and final point: practice theory or any avant-garde theory cannot be simply mapped onto the archaeological record. Orser (2004:141; see also Orser 2007), in his study of race, notes that Bourdieu's "ideas cannot be used verbatim to understand the practice of race." Likewise, Pauketat (2001:79) notes that, "there is no practice-theory cook book, nor should archaeologists simply reify Bourdieu's concepts as ready made interpretations." We concur completely because Bourdieu's model was based on twentieth-century French society and certainly does not have the material basis required for archaeological application. Bourdieu's theory is also about social power, and so we should confine our archaeological applications, at least initially, to strong cases where power and domination are readily inferred (e.g., Joyce 2000). Pauketat's case study for practice theory is the Mississippian period in the Midwestern USA, where a hike to the top of Monks Mound is all that is required to know that this thirteenth-century society had clear differences in status and social power. Orser's (2004) application of practice theory, done with the aid of textual data, takes place in nineteenth-century Ireland where

there were clear differences in social class and power. Although there are differences in social power even in relatively egalitarian societies, as is demonstrated by the Kalinga example, we caution prehistorians about applying practice theory, or any of the trendy postprocessual models, to hunter-gatherer and horticultural societies of the type that dominate prehistoric America until the requisite method and theory are developed (Killick 2004). In that spirit, we offer a final case study that illustrates an artifact-based strategy for exploring the materiality of social power (Walker and Schiffer 2006).

Logging Camps and Social Power

The model is based on the presumption that social power is embodied in the relationship between people and things. The focus is on the difference between structural power, a group's socially defined power, and actual power, which is found in the practices of people as part of a *cadena*. Social power, in this case, is measured by the ability of one group in a *cadena* to acquire artifacts or goods through any number of processes. Choice among alternative artifacts is determined by their anticipated performance characteristics, and because in any *cadena* there can be groups of people with competing agendas and performance preferences, conflict can occur (Walker and Schiffer 2006). For example, the person or group that acquires an artifact or structure may be different from groups that use and maintain that artifact or structure. In using *cadena* to study social power, one focuses first on acquisition events and the person or social unit that has the social power to acquire that artifact. One can then investigate whether other groups were disadvantaged by that artifact.

One of the best places to explore relations between the material and the social is in the historical record, especially in historical archaeology. Establishing connections between people and things among living people can be done in ethnoarchaeology and in historical contexts, but historical archaeology has the advantage of having an archaeological record and textual data. The case study focuses on logging camps that were in use in the Upper Great Lakes during the nineteenth and early twentieth centuries, the pine and hardwood lumber era (Franzen 1992, 1995; Karmanski 1989). There has been little systematic research, including excavation, at logging camps, but they are a particularly rich resource for studying structural and actual social power that is just now being realized (Drake and Drake 2007; Drake et al. 2006; Drake n.d.; Franzen 1995; Hardwick 2008).

Although we use terms from our model (i.e., *cadenas*, performance characteristics, choice), those who employ practice theory should be able to see correspondences to constructs in their framework. Lumber camps have a rather complex social structure made up of many social groups that include: company owners, foreman, auxiliary staff (e.g., cook and aids, blacksmith, animal keepers, mechanics, carpenters), and lumberjacks. We are going to focus on just two of these social groups at the extremes of the social structure: the lumberjacks and the company owners.

We also focus on just two artifacts: saunas and liquor bottles. The *cadenas* consist of the life histories of saunas and liquor bottles and the competing social groups involved. Although the interface of structural and actual social power will eventually be investigated among all the artifacts and social groups at these camps (Drake and Drake 2007; Drake n.d.; Hardwick 2008), the focus here is on two *cadenas* associated with the two artifacts.

In terms of architecture, the company/owner maintained almost complete structural control, purchasing construction materials, organizing the camp layout, and building the structures. The organization of the camp's buildings reflects a number of performance characteristics important to the owner/foreman. The lumber camps were designed as inexpensive temporary structures with very little concern for aesthetic visual performance. Camp foremen were given a sparse budget to build a camp and the emphasis was on utilitarian performance. But because the camps were built for winter habitation they had to be strong enough to withstand the weight of the snow and offer enough protection so that above-freezing temperatures could be maintained in the living quarters.

Although logging was a dangerous occupation and many men were killed or maimed on the job, it was in the company's best interest to have the loggers productive and free of illnesses that would keep them from doing their work. Thus, kitchen design and procedures were meant to be as sanitary as possible, outhouses were built, and fresh food and water were provided. The company was concerned with health only as it affected productivity, but as we see later, ethnicity-based conceptions of cleanliness led to a disjunction between actual and structural power as seen through artifact acquisition.

Many camps were built with military precision that clearly demarcated, architecturally, the social structure of the camp. The loggers were housed in a single bunkhouse and the foreman (on-site representative of the owner) often lived in a separate cabin (Drake and Drake 2007).

The structural social power differences between owners and loggers are clearly evident in acquisition events related to camp architecture. The *cadena*, then, consists of the groups involved in the life history of camp structures. The owner did all the purchasing of materials for the camp and hired laborers to do the construction. Performance characteristics weighted heavily were ease and cost of construction while maintaining a minimal level of comfort for the workers. Although the camp was deficient in visual aesthetics – many of the camps were the quintessential tar-paper shacks – that does not mean that visual performance characteristics were unimportant. The layout of the camp and the structures themselves symbolized the greater power of the owner and the subordinate status of the workers (Drake and Drake 2007).

One advantage of archaeology is that it provides an opportunity to investigate differences between structural and actual powers at the camp, and this is most evident in a special type of building, the sauna, found at many camps in the Upper Peninsula of Michigan (Drake and Drake 2007; Drake n.d.; Franzen 1992:90–91). The sauna was brought to the region by Finnish immigrants beginning about 1890, followed shortly by a number of immigrants of eastern European descent, such as

Poles, Slovenians, and Croatians (Franzen 1992:83–84). The Finns were unique, however, in that they insisted in many cases that logging camps be furnished with a sauna, which for them was important for health and sanitary reasons, or what we would refer to as utilitarian performance characteristics. It is clear, however, that the sauna, which was more of a communal ritual done weekly rather than a sanitary necessity, had symbolic performance characteristics that served to maintain ethnic cohesion (Drake and Drake 2007). So here we see that despite lacking structural power, the Finnish loggers exercised actual power over the acquisition of a type of architecture, the sauna.

As Drake and Drake (2007) note, there is evidence for both the logging company building saunas, though they deducted building costs from logger's wages, and individual loggers constructing the structures themselves on their own time. The important element is that loggers, who do not participate in any acquisition events for camp buildings, did control in some cases the acquisition and construction of the sauna. Given that the saunas were the traditional *savu* or smoke sauna, which are very simply constructed (Drake and Drake 2007; Franzen 1992:90), it was possible for Finnish loggers to build the structures themselves when they were not on "company time." The acquisition events, therefore, are the after-hours labor where the loggers acquired the materials from the local environment (rocks and timber) or scavenged it from the company. The construction of the sauna is the only camp structure acquired by the loggers, which gave them some social power in an environment of domination. It is no surprise, therefore, that Finnish loggers were behind the 1936–1937 timber worker's strike, which emphasized living and working conditions instead of wages (Franzen 1995:330). Finnish socialist and labor associations were behind the strike, which led to the end of the company logging camp (Franzen 1992:26). Eventually, the loggers gained complete control of acquisition of materials at logging camps as family-based operations became much more popular than the company camp.

A final logging camp example illustrates how social power is defined by acquisition of alcohol (Franzen 1995) and the difference between structural power and actual power. Structurally, the company provided all material possessions needed by loggers for the extended stays in the isolated camps. Food was furnished and any personal items were supplied by the company at the "van" or commissary. Here the logger could purchase items such as tobacco (for smoking and chewing) and other items, but the van did not offer alcohol, and the company banned its consumption. Various patent medicines, such as Hinkley's Bone Liniment and Dr. Kilmer's Swamp Root, were sold at the van and the "medicines'" primary ingredient was often alcohol (Franzen 1995:301). Most of the loggers wanted to drink alcohol or ingest the patent medicine but the company tried to keep consumption in check by selling the medicine in the vans where the keepers could control distribution (Franzen 1995:309). From the perspective of the company, alcohol consumed as either medicine or in the more traditional form could disrupt camp life and hurt worker productivity, and so alcohol was universally banned by the camps and medicine consumption was controlled. The workers had only marginal control of alcohol acquisition, which demonstrates the company's tremendous social power.

Archaeological evidence from logging camps, however, suggests that alcohol was consumed despite being banned (Franzen 1995). Preliminary testing at the Underhill Camp on Grand Island, a company camp operated in the early twentieth century (Hardwick 2008), found whiskey bottles around structures and in the privy. Franzen (1995), looking at surface finds at a number of logging camps, found evidence of alcohol bottles, which were likely discretely tossed out into the snow while the camp was operating.

The loggers increased their actual power by acquiring alcohol elsewhere, sneaking it into camp and then drinking secretly. What performance characteristics did the alcohol possess? Like the sauna construction, we can identify both utilitarian and symbolic performance. Clearly, the alcohol (either as whiskey or patent medicine) would provide a utilitarian function. Logging was hard, cold, and dangerous work resulting in many serious injuries. All loggers after just a few days in the woods would have to be working with a variety of minor injuries and discomforts, as well as the emotional difficulties that might have come about by living in an isolated camp away from families (Franzen 1995:328). Alcohol, either secreted into the camp or purchased at the camp van in the form of patent medicine, would have been a way of self-medication and certainly assuage these physical and emotional ailments.

The symbolic performance characteristics of alcohol purchase and consumption have to do with the ethnic attitudes toward alcohol brought to the camps by the diverse groups. For many eastern European groups, also represented at the camp, alcohol consumption was a part of daily life that they wanted to continue in the camps. Ironically, many of the Scandinavian groups, including the Finnish sauna builders, were nondrinkers.

These examples should be considered a preliminary exploration of social power at logging camps, which have a relatively simple organization, yet are composed of a complex set of power relations. Nonetheless, this case study illustrates how the acquisition model can be applied to investigate structural and actual power, and how the historical archaeology of logging camps can serve as a good testing ground for understanding social power. Structurally, the company had near-complete control of both the camp buildings and alcohol consumption, as demonstrated by who controlled the acquisition. Actual control, however, can be seen in the archaeological record as Finnish loggers built saunas, and other loggers were able to drink alcohol even though it was banned in the camps.

Conclusion

Returning to the Kalinga household introduced at the beginning of the book, the Kalinga man had minimal knowledge of pottery because he was not, like the women, immersed on a daily basis in the use of this technology. The female pottery users made choices regarding which pots to use for rice and which for vegetables, the size of the pot, and how to cook various items based on their knowledge, experience, and traditions. They chose which vessels to acquire based on performance

characteristics related to the quality of the pots and their social relationships with the potter (Aronson et al. 1994). Some vessels in the rafters were heirlooms passed down from their grandmother and mother, and each of these pots had important meanings to the user. In terms of social power, women controlled completely the acquisition of pots, which illustrates that women did have some social power in the household. But because the artifact that they controlled, pottery, was relatively insignificant economically among the Kalinga, their power was tempered as men controlled the acquisition of more valued commodities.

Just as the Kalinga man could learn these things about his wife's technology, so can archaeologists begin to unravel this sometimes complex relationship between people and artifacts. It is not easy to do even in the simplest technology, but it can be done. In the model presented and in the case studies that follow, we offer our perspective for understanding the relationship between people and things.