Style and Function

Conceptual Issues in Evolutionary Archaeology

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Chapter 10

Style, Function, and Systematic Empiricism: The Conflation of Process and Pattern

Ethan E. Cochrane

INTRODUCTION

The theoretical distinction between style and function (Dunnell 1978b) is axiomatic in evolutionary archaeology. This dichotomy, later elaborated upon by others (e.g., Leonard and Jones 1987; O'Brien and Holland 1992), has remained an effective theoretical tool in evolutionary archaeology for over 20 years because it defines the processes responsible for patterned variation in the archaeological record. Cultural transmission and innovation are the processes that lead to stochastic variation analyzed as style (Neiman 1995); natural selection is the process that leads to directional variation analyzed as function.[1]

There is an important and often overlooked by-product of conceptualizing the style–function dichotomy in terms of transmission, innovation, and selection processes. If evolutionary style and function refer to these universal or immanent processes (see Lyman and O'Brien 1998), then style and function cannot be made into *a priori* descriptive adjectives of empirical phenomena. In other words, things are not inherently stylistic or functional; only variation resulting from a process can be explained as stylistic or functional. As explanatory labels, stylistic and functional may be applicable to different artifact classes depending on time, place, and analytical scale (see Dunnell 1995; see also Hurt et al., Chapter 4 in this volume; Maxwell, Chapter 3 in this volume; Neff, Chapter 2 in this volume, for discussion and applications). For example, in a particular environmental and cultural setting the relative frequencies of several temper classes (e.g., grog, shell, and sand) across a ceramic sequence may be a product of the differential fitness of these tempers. Natural selection may be an explanation, and the temper classes labeled functional. However, in another setting and with another ceramic sequence, frequencies of the same temper classes may not exhibit variation indicating fitness differences. Transmission may, therefore, be an explanation for the class frequencies in this setting, and the temper classes labeled stylistic.

Much more detailed explanations of artifactual variation in terms of the style–function dichotomy are exemplified in studies of ceramic temper (e.g., Dunnell and Feathers 1991; O'Brien et al. 1994) and a growing body of other successful archaeological applications (e.g., Allen 1996; Barton 1997; Dunnell 1978a; Graves and Cachola-Abad 1996; Lipo et al. 1997; Neiman 1995; Meltzer 1981; Pierce 1998), including those by authors in this volume. Nevertheless, there is continued questioning of the usefulness of this dichotomy (e.g., Bettinger et al. 1996; Schiffer and Skibo 1997). Debate over theoretical concepts in a developing science such as archaeology is desirable, and in this spirit I argue that there is a fundamental flaw in many of the attempts (e.g., Ames 1996; Sackett 1990) to dismantle the style–function dichotomy developed by Dunnell and other evolutionary archaeologists.

This flaw is the conflation of conceptual categories (style and function as universal processes) with empirical categories (style and function as the observed characteristics of particular artifacts). The conflation often goes undetected and is a component of the methodological approach Willer and Willer (1973) call systematic empiricism. A recent example should help clarify what is meant by the systematic empiricist conflation of conceptual categories (theory) and empirical categories (observation).[2]

Sytematic Empiricism: A Recent Example

In an introductory section of his work on Pacific Northwest Coast art, Ames (1996) conflates style as an empirical observation with the processes that evolutionary archaeologists reference with the term "style." Ames defines a style as "attributes of artifacts . . . shared among a group of artifacts produced by a common production system" (1996:119, quoting Davis 1990:19). It is important to notice that a style here is an empirical category defined through observation and follows the common English definition. Style is essentially a way of doing something. Applying his definition, Ames suggests that a hypothetical set of pottery decorations is a particular style and that there may be a number of causal processes, including natural selection, shaping this style's history.

According to Ames, groups of similar pottery decorations are *a priori* the empirical category style, and any explanation for changes in pottery decoration *must*, therefore, refer to style. With such an empirical tautology pottery decoration is forever and everywhere style, and changes in the frequency of pottery decorations may result from natural selection or several other processes. Because natural selection and other processes can affect style as pottery decorations, Ames concludes that evolutionary archaeology's concept of style linked to selective neutrality is defective.

In his discussion Ames has conflated a theoretical category, style referring to universal processes, with an empirical category, style referring to qualities of specific phenomena. The category style in evolutionary archaeology does not join selective neutrality (theory) with style as any set of distinguishing attributes (observation). Ames' critique of Dunnell's (1978b) and O'Brien and Holland's (1992) concept of style is based on the premise that these authors were referring to style as an empirical category, style as we understand it in English, as a set of (often aesthetic) shared attributes.

In this chapter I explore further how the systematic empiricist conflation of theory and observation distorts Dunnell's original definitions of style and function in evolutionary archaeology. In the preceding paragraphs, the style–function dichotomy and systematic empiricism have been simplified to demonstrate briefly the effects of this distortion. In the next section I argue that the systematic empiricist treatment of the style–function dichotomy is related to the confusion of natural language and scientific concepts when reading Dunnell's original (1978b) formulation. I also provide an example of systematic empiricism in the development of modern genetics. In the following section, I demonstrate the explanatory potential of treating style and function as processes or conceptual categories. Using a brief example from the archaeology and classification of monumental architecture in the Pacific, I illustrate the theoretical character of style and function. Finally, the architectural analysis leads to a consideration of how both the roles of reproductive and replicative success (Leonard and Jones 1987) and the predictions of transmission rules (Boyd and Richerson 1985) are related to style and function.

Systematic Empiricism and the Style–Function Dichotomy

In evolutionary archaeology style is a conceptual category referring to the processes that explain the distribution of artifacts. To say that a particular distribution is stylistic is to say that the variants are historically related through transmission processes predominantly unmediated by selection. Initial tests of this explanation involve, minimally, comparing observed and expected stochastic distributions with confidence intervals (e.g., Lipo et al. 1997; Neiman 1995). Expected distributions are described by patterns of drift and innovation (Neiman 1995).

To state that a set of artifacts is functionally distributed suggests that the particular distribution is the outcome when artifacts vary in relative fitness.[3] Initial tests of this explanation involve analyses of the variable performance of artifacts in specific contexts, an avenue of research followed by both evolutionary archaeologists and others (e.g., Bronitsky and Hamer 1986; Feathers 1989; Maxwell 1995; O'Brien et al. 1994, 1998; Pierce 1998; Rye 1976; Schiffer et al. 1994; Schiffer and Skibo 1997; Young and Stone 1990). Because of evolutionary convergence, functional distributions may not necessarily reflect cultural transmission within a single population. Producing testable explanations that demonstrate the variable influence of transmission only, transmission working with selection, and selection only on the structure of cultural lineages may, in fact, define the practice of evolutionary archaeology (Lyman and O'Brien 1998).

Most evolutionary archaeologists treat style and function as conceptual categories that refer to the universal processes of innovation, transmission, and natural selection. Unfortunately, in the evolutionary archaeology literature the use of style and function as conceptual categories is not always clear. Archaeologists, both evolutionary and others, consistently quote Dunnell's original definition and reinforce a strongly empirical conception of style. Dunnell wrote that "style denotes those *forms* that do not have detectable selective values" (Dunnell 1978b:199, emphasis added). Stopping here, it is easy to interpret style as an empirical category of objects if form denotes observed attributes. However, analytical problems arise when style is treated as an empirical category: how are attributes unambiguously identified as stylistic, or how can an attribute be stylistic at one time and functional at another? Analytical problems such as these may have led many archaeologists to eschew Dunnell's perceived empirical treatment of style. Indeed, the analytical problems associated with any empirical treatment of style are partly the cause of the various "style debates" in archaeology (e.g., Binford 1986; Dietler and Herbich 1998; Sackett 1985, 1986; Wiessner 1983, 1985). Complicating matters further, archaeologists undoubtedly found little use for Dunnell's discussion of function because it was not quite synonymous with the English-language definition of function as "purpose" or "use" (but see Meltzer 1981).

It is clear that any practical use of the category style must describe and potentially explain *distributions*, not objects. For example, after he defines style, Dunnell suggests that to employ the style–function distinction, "a profitable direction may lie in identifying stylistic elements by their random behavior" (Dunnell 1978b:199). The phrase "stylistic elements" may connote for some an empirical character to style, but of course an element or attribute of a single artifact cannot exhibit a random behavior. Randomness necessitates multiple observations in time and/or space. Therefore, distributions comprised of multiple observations (on one or many objects) can be described as random.

The meanings of style and function proposed by Dunnell are not equivalent to the English-language definitions of these terms. The meaning of any conceptual category in science is not established by fiat, but rather by the usefulness of that category in producing testable explanations of phenomena. Thus, the difference between evolutionary style and function and other archaeological meanings for these categories is not mere definition. The difference is in the application of these categories to archaeological explanation. Evolutionary style was successfully, albeit implicitly, applied by culture historians to produce the time-space systematics that are still useful today (Dunnell 1978b:199; Lipo et al. 1997; Lyman et al. 1997). Over the last two decades, archaeologists have continued to produce viable explanations of phenomena using the concepts of evolutionary style and function.

Conceptual and Empirical Categories: A Genetic Example

Several archaeologists (e.g., Neiman 1995; Lipo and Madsen, Chapter 6 in this volume; Teltser 1995) have noted that the evolutionary notion of style, as implicitly adopted by culture historians, is related to ideas about the selective value of genes, particularly to neutral gene theory developed by geneticists beginning in the 1960s (e.g., King and Jukes 1969; Kimura 1979, 1983). The history of research on the selective value of genes emphasizes gene neutrality as a conceptual and not an empirical category. In turn, this history underscores the relationship between evolutionary style and selectively neutral variation.

In the 1920s Chetverikov, a Russian geneticist, suggested that phenotypes are not determined simply by the one-to-one expression of gene to phenotypic character but that phenotypes depend on the interactions between genes. In other words, phenotypes depend on the "genotypic milieu" and the environment (Chetverikov 1926). Western population geneticists, however, studied the effects of genes as independent entities with inherent selective values. These geneticists took theoretical selective values and gave them empirical status. With this approach, population geneticists could explain the behavior of individual gene systems, but their models were not appropriate for empirical applications beyond Mendelian genetics. Mayr (1959:2) called this approach "bean-bag" genetics and later contrasted it with the "unity of the genotype" (Mayr 1975), his phrase highlighting the relative nature of gene interactions in producing the phenotype.

The selective value of an individual allele at a gene locus is not a fixed empirical attribute. The selective value of an individual allele depends on its genotypic milieu or the aggregate relationships of many genes and the environment. In the same vein, an individual artifact cannot be stylistic or functional in an evolutionary sense. Style and function are conceptual categories that refer to the processes that produce variation in the archaeological record. Style as a conceptual category is often confused with the systematic empiricist notion that a particular style is an empirical thing. Only carefully constructed arguments, analyses, and descriptions of empirical phenomena will convey the conceptual nature of the style–function dichotomy.

CLASSIFICATION AND THE STYLE–FUNCTION DICHOTOMY IN EVOLUTIONARY ARCHAEOLOGY

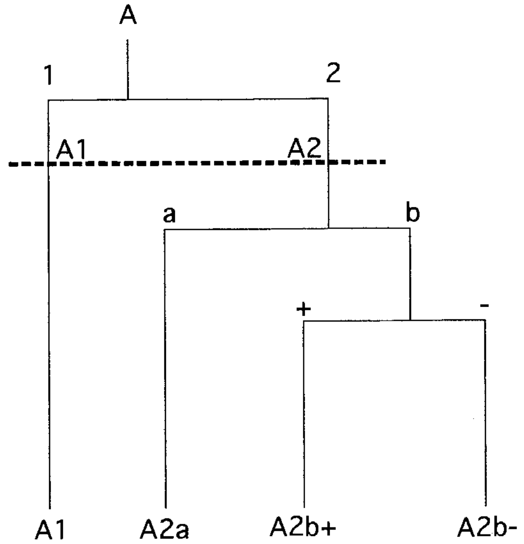
Sackett (1982:78) noted that "since classification so often serves as the idiom of thought for the working archaeologist . . . no argument about style and function is really completed until it has been translated in the language of systematics." Thus, if we use the style–function dichotomy to produce potential explanations of the empirical world, it is critically important to count phenomena with classes explicable in terms of natural selection, innovation, and transmission. To relate these processes to groups of phenomena, classification could proceed in a random fashion, combining attribute variables without purpose to form the larger classes of analysis. Such an approach is obviously inefficient. Even if the classes produced patterned variation, we still have the formidable task of describing a plausible and testable mechanism that created the variation.[4] At least two interrelated methods of classifying phenomena in evolutionary terms provide a way out of this dilemma. First, by understanding the theoretical relationships between the performance characteristics of artifacts, artifact raw materials, and the environments within which artifacts interact, we can construct arguments relating artifact classes and attributes of artifact classes to the processes of natural selection and transmission (Maxwell 1995; O'Brien et al. 1994; Pfeffer, Chapter 9 in this volume). Second, by taking a theoretically informed trial-and-error approach (Teltser 1995), we can construct paradigmatic classifications and examine frequency distributions of phenomena at various levels of classificatory precision.

In this chapter I concentrate on the second approach. Two characteristics of paradigmatic classification make it a valuable method for constructing empirical units within an evolutionary framework: (1) paradigmatic classifications are ideal for describing variation, and (2) the classes constructed are easily decomposed or refined to produce related classes of differing precision.

The first characteristic of paradigms, the ease with which they handle variation, is important because variation is a necessary component of all evolutionary change. Variation is produced through errors in transmission and innovation, and variation is a requirement for natural selection. Leonard and Jones (1987: 207) point out that "other means of classification might [serve] equally well, but few other classificatory or typological structures are so competent at describing variation" as paradigms. Paradigms are ideal for describing variation because they can produce unlimited classes. These classes are all related, as they are composed of the same intersecting dimensions, each with a potentially infinite number of modes (Dunnell 1971). Unlimited classes are not, of course, anyone's analytical dream. The point is that paradigmatic classifications provide unlimited potential for recognizing variation.

The dimensional structure of paradigmatic classifications underwrites their second important characteristic for analyses of style and function. Paradigmatic classes may be made more precise or inclusive in a systematic way such that the relationships between all classes in the paradigm are similarly changed. As Lipo et al. (1997) point out, this feature is important when examining the effect of transmission at different scales. Imagine, however, analyzing the differing effects of transmission between individuals and transmission between groups composed of those individuals (i.e., differences in the scale of transmission) with a taxonomy composed of unequally weighted attributes (Figure 10.1). Frequencies based on the classes defined at the bottom of the taxonomy do not have consistently scaled relationships to frequencies based on the classes defined at another level in the taxonomy (indicated by the dashed line in Figure 10.1). Any argument for differences in the scale of transmission and selection is logically derailed by such a taxonomy.

Figure 10.1
Taxonomy comprising nondimensional classes[1]



[1]Class criteria are noted at the taxonomic branches. Class definitions are at the bottom of the taxonomy. Dashed line shows class definitions at a more inclusive level in the taxonomy.

An example will help to demonstrate the relationship between classification and style and function when style and function refer to processes of selection, innovation, and transmission. While these processes are universal, the distribution of empirical variants can be influenced by deposition, taphonomy, scale differences in evolutionary processes (Neff, Chapter 2 in this volume), sorting (Hurt et al., Chapter 4 in this volume), and the contingent nature of history. As the chapters in this volume demonstrate, the style–function dichotomy is conceptually clean but empirically messy.

Style and Function: A South Pacific Example

I use an explanatory sketch from ongoing research on the archaeology of the Society Islands in the South Pacific to exemplify the points made so far. Initial settlement of the Society Islands may have begun ca. A.D. 600–800 (Spriggs and Anderson 1993), but evidence for an earlier human presence could be missing due to geomorphological processes and massive sampling problems (Kirch 1986). The inhabitants of the Society Islands (Tahiti, Bora Bora, and others) built *marae*, or rectilinear rock temples comprising paved courtyards, sometimes elevated, and also sometimes augmented with stone altars of variable elaboration. Stone uprights were also sometimes placed on *marae*. Other stone structures were built throughout the Society Islands, including domestic structures of different shapes and structures described ethnohistorically as archery platforms.

According to ethnohistorical sources (e.g., Henry 1928:123–147), many different kinds of *marae* were built: huge national *marae*, *marae* used by local chiefs and priests, craft-guild *marae* (e.g., canoe-builders' *marae*), and small family *marae*, to name a few. This suggests that a varied cross-section of the Society Islands population built *marae*. The construction of *marae* may have begun around A.D. 1200 and increased over time (Wallin 1993:65–70). Apparently, however, the majority of *marae* construction ceased before Western contact. Unfortunately, archaeological dates for *marae* are far too few to make anything more than these general statements about *marae* chronology (Cochrane 1998).

With a simple paradigmatic classification and a minimum number of dimensions defining construction material, shape in plan view, subsurface internal features, and internal architectural features, a classification of Society Islands stone architecture can be created. For example, using Table 10.1 and taking the modes "basalt," "rectilinear," "absence," and "altar" for the four dimensions, an architectural class is created that would likely identify some set of *marae*. If the mode in dimension I is changed from "basalt" to "basalt and coral," a different architectural class that identifies another set of *marae* is created. If additional research supports the notion that both of these architectural classes identify *marae*, they can be combined into a *marae* superclass. Actually, comparison of the descriptions (compiled by Wallin 1993) of individual *marae* in the Society Islands with the paradigm (see Table 10.1) indicates that 18 of the 144 possible architectural classes in the paradigm constitute a *marae* superclass. The 18 architectural classes that make up this *marae* superclass are listed in Table 10.2. Almost all of the remaining 126 architectural classes in the paradigm will be easily recognized as either domestic architecture or archery platforms.[5]

After classifying Society Islands architecture, a possible temporal distribution of structures identified with the *marae* superclass is represented by the curve on the left side of Figure 10.2. This distribution represents the frequency of the *marae*-building phenotypes in the Society Islands over time. This is potentially a functional distribution explained by transmission of variants whose frequencies are a product of selection (i.e., adaptation). Testing this explanation, however, requires several arguments and additional analyses. First, the population of *marae*-building phenotypes must belong to a single transmission lineage; otherwise, convergent evolution could be an explanation. Second, detailed arguments about the relative fitness of *marae*-building and non-*marae*-building phenotypes are necessary. These arguments should discuss appropriate measurable variables and the potential for evolutionary sorting of traits (e.g., Graves and Ladefoged 1995; Neiman 1997; see also Madsen et al. 1999). Lastly, the fitness of the *marae*-building phenotype at variable times is probably related to other traits (e.g., subsistence, degree of sedentism, or level of social complexity). More complex models of these trait relationships may increase the dynamic

Table 10.1
A paradigmatic classification of architecture[1]

DIMENSION I: Construction Material	DIMENSION II: Plan-view Shape	DIMENSION III: Subsurface Internal Features	DIMENSION IV: Internal Surface Features
a. Basalt	a. Rectilinear	a. Hearth	a. Altar
b. Coral	b. Round-ended	b. Shaft	b. Uprights
c. Basalt and Coral	c. Y-shaped	c. Hearth and Shaft	c. Altar and Uprights
		d. Absence	d. Absence

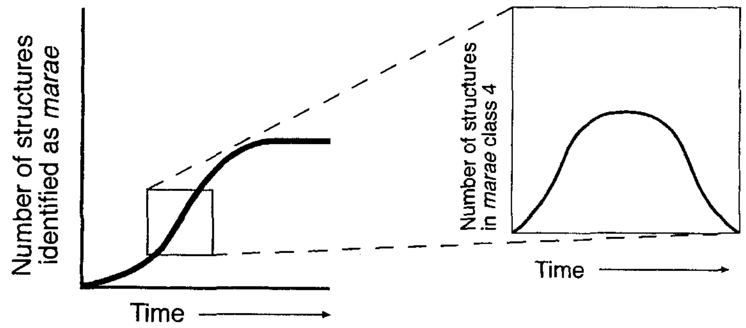
[1]Column heads identify the dimensions. Each row describes the various modes for each dimension.

Table 10.2
Classes in the *marae* superclass[1]

Marae Class	Dimension I	Dimension II	Dimension III	Dimension IV
1	a	a	d	a
2	a	a	d	b
3	a	a	d	c
4	b	a	d	a
5	b	a	d	b
6	b	a	d	c
7	c	a	d	a
8	c	a	d	b
9	c	a	d	c
10	a	a	b	a
11	a	a	b	b
12	a	a	b	c
13	b	a	b	a
14	b	a	b	b
15	b	a	b	c
16	c	a	b	a
17	c	a	b	b
18	c	a	b	c

[1]Each row is a *marae* class (1–18) included in the *marae* superclass. *Marae* class definitions are indicated by the letters in each row that correspond to particular modes of a dimension (modes listed in Table 10.1). Dimensions are indicated at the column heads.

Figure 10.2
Comparison of the functional distribution of the *marae* superclass (left) versus the stylistic distribution of *marae* Class 4 (right)



sufficiency of explanations for the frequency of *marae*-building phenotypes (see Holland 1989 for a similar argument related to changes in human fertility).

While the distribution to the left in Figure 10.2 may be functional, consider examining a single class of *marae* within the *marae* superclass. Here, the precision of the analysis is increased by using less inclusive classes. *Marae* exhibit different raw materials (e.g., coral, basalt) and internal architectural elements (e.g., altars, uprights). *Marae* class 4 (see Table 10.2), for example, contains rectilinear coral structures with altars. We could identify *marae* class 4 structures from the set of *marae* enclosed by the box on the left side of Figure 10.2 and, by plotting the frequency of *marae* class 4 structures against time, a very different distribution may result. This is shown on the right side of Figure 10.2, where coral *marae* with altars display a potentially stylistic distribution. Were it to satisfy appropriate tests, this distribution could be explained by transmission and innovation with little influence from natural selection.

To summarize, after using one classification, artifact frequencies conform to expectations of functional distributions and may be explained by the associated processes of selection and transmission. In another classification a subset of the same artifacts forms a distribution where frequencies conform to the expectations of style and may be explained by the processes of transmission and innovation. A particular piece of monumental architecture, just like any other single artifact or artifact attribute, is neither universally stylistic nor functional.

DISCUSSION

The main point of the preceding arguments and examples is certainly not new to many evolutionary archaeologists. The systematic empiricist conflation of conceptual categories and empirical categories as well as the topics of classification and grouping and explanation and generalization have been discussed repeatedly in the literature (e.g., Dunnell 1982, 1992a, 1992b; Lyman and

O'Brien 1998; O'Brien et al. 1998). Here, I have tried to demonstrate how this conflation may have misled many opponents of the style–function dichotomy. If more archaeologists explore the explanatory power of the style–function dichotomy in terms of selection, transmission, and innovation, perhaps the development of archaeological evolutionary theory will accelerate.

One area where theory development seems to be progressing is in the role of interactors and replicators in evolutionary explanations (Boone and Smith 1998; Neff, Chapter 2 in this volume; Lyman and O'Brien 1998; O'Brien and Holland 1992). Following Hull (1988) and Dawkins (1976), replicators are those entities that reproduce with some degree of fidelity (more specific labels proposed include culturgens, memes, and genes), while interactors are the entities that interact with the environment and carry one or more replicators. The actions of interactors make replication differential[6] (cf. Neff, Chapter 2 in this volume). If ideas or memes about how to make artifacts are replicators, then replicator frequency is related to interactor frequency when interactors are humans or human groups.

Leonard and Jones (1987) discuss this relationship and link the replication of artifacts and the reproduction of people to the processes embodied in the style–function dichotomy. They suggest that stylistic distributions are driven disproportionately by the replicative success of artifacts. Here a replicator, for example, the idea of building *marae* in a certain fashion, reproduces predominantly as a result of cultural transmission and confers no measurable reproductive benefit to the interactors that carry it. On the other hand, functional distributions are driven disproportionately by the "reproductive success of the bearer [i.e., interactor]" (Leonard and Jones 1987:214). In this instance a replicator may produce a phenotype with a selective advantage. The frequency of this replicator and phenotype is then a product of natural selection within a lineage or the convergence of separate lineages. In sum, "each trait has a . . . replicative fitness that may or may not affect the Darwinian fitness of its bearer" (Leonard and Jones 1987:214) depending on the natural and cultural environment.

Artifact frequencies, therefore, are sometimes influenced by the additional fitness that artifacts confer to people. When the number of people increases, more interactors are available to carry around the replicators and produce the artifacts we measure. Thus, whenever interactors are humans or human groups, human reproductive success may have an effect on artifact frequencies. This means that human reproductive success may also influence the frequency of artifacts that confer no additional fitness to the humans that carry them, resulting in the hierarchical sorting (Hurt et al., Chapter 4 in this volume; Vrba and Eldredge 1984; Vrba and Gould 1986) of neutral traits with the fitness of interactors.

Another area of active theory development is the debate over the role of cultural transmission rules in shaping trait distributions. Some argue that the style–function dichotomy fails to consider transmission rules, including various forms of bias, and guided variation (Bettinger et al. 1996; see also Boone and

Smith 1998; Dunnell 1992a:214; Richerson and Boyd 1992; Richerson et al. 1998). Various forms of bias (e.g., frequency-dependent and indirect) and guided variation reduce overall variation in the pool of cultural replicators that can be transmitted (Bettinger 1991); with insufficient innovation drift is the result. Bettinger et al. (1996:148) conclude that "there are no simple qualitative rules to distinguish these drift-induced patterns from those produced by simple adaptive processes like selection."

True, there are no simple rules, but there are several ways to begin distinguishing the different processes that produce similar patterns. For example, if a putative functional distribution is best characterized by drift, then we would expect no potential selective differences between the high-frequency variant of a trait and the other variants of the trait. As I described earlier, performance analyses of ceramics and other artifacts are well suited to this kind of question. Distinguishing the proposed functional *marae* distribution above (see Figure 10.2, left) from a pattern of drift is more difficult but would involve demonstrating the greater potential fitness of *marae*-building phenotypes from nonbuilders. If *marae* building is a "wasteful phenotype" in a variable environment (see Madsen et al. 1999) or is a form of competitive advertising (see Graves and Ladefoged 1995; Neiman 1997), then there may be good reason to expect a functional distribution.

There may be other scenarios where it is difficult at first glance to determine what processes are creating particular distributions. Sequential functional distributions describing changes in a particular technology may mimic sequential stylistic distributions if the rates of change were similar (Bettinger et al. 1996: 148). Again, we would expect the high-frequency technological variants of each functional distribution to exhibit potential selective differences (measured through performance analyses or other means). This would not be the case for sequential stylistic distributions.

Finally, putative functional distributions may result from guided variation and/or direct bias operating in consciously adapting (i.e., problem-solving) populations. In both cases naive individuals learn of traits through observing others (transmission) and exhibit traits that they feel are most beneficial to themselves (Bettinger 1991:186–190). Beneficial traits increase in frequency as in a functional distribution. There is no reason to suggest, however, that natural selection does not shape the *distribution* of phenotypes produced by problem-solving individuals (Jones 1998). Furthermore, we can test an explanation based on natural selection (in ways outlined earlier), but it is unclear how one tests the explanation that a distribution is a result of people's behaving adaptively. That explanation often appears foregone.

CONCLUSION

The distinction between conceptual and empirical categories is vital to the style–function dichotomy. With this distinction we avoid the systematic empir icist conflation of theoretical principles with empirical observations, which has led some to reject evolutionary definitions of style and function. Dunnell's (1978b) introduction of a single, specific meaning to a word that previously had many ill-defined meanings (see Conkey and Hastorf 1990:1) redefined in explicit terms the implicit way in which style was understood by the culture historians (Teltser 1995). When style and function are recast in evolutionary terms, they encompass the processes of transmission, innovation, and selection. These are universal processes that apply to any self-replicating system, genetic or cultural, where variants differ in fitness (Pocklington and Best 1997:79).

In an effort to demonstrate the application of the style–function dichotomy, I have presented an example of how a paradigmatic classification might be applied to the *marae* of the Society Islands. This example led to a consideration of the processes encompassed by the style–function dichotomy and how these processes might shape distributions of *marae*. Importantly, this example demonstrated that individual artifacts or features are not stylistic or functional; only distributions are stylistic or functional.

The *marae* example highlighted the role of style and function in two current debates in evolutionary archaeology: the replicator-interactor distinction and the role of transmission rules in shaping empirical distributions. Replicators are those units of information whose frequency is a product of transmission, selection, and innovation. The number of interactors that carry particular replicators may also be a product of natural selection as interactors with less fit phenotypes are removed from the population. Along with replicators and interactors, transmission rules can be better understood in terms of the processes embodied by style and function. Transmission, selection, and innovation can account for all the distributions linked to transmission rules, but with the added bonus of implicating tests of the putative explanations.

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NOTES

1. In this chapter I do not discuss different kinds of selection such as diversifying and stabilizing selection (but see VanPool, Chapter 7 in this volume).

2. The contrast between conceptual and empirical categories is not new to archaeology. See Dunnell (1971), Krieger (1944), Rouse (1939), Ford (1954b).

3. The simple characterization of fitness used in this chapter ignores several problems

associated with the term. The problem most germane here involves the different fitnesses measured by human reproduction and artifact replication, respectively. Additionally, methods to measure human reproductive fitness are also variable.

4. This is the same dilemma at the heart of the Ford–Spaulding debate (Ford 1954a, 1954b; Spaulding 1953, 1954) and subsequent problems identified with statistical grouping (Dunnell 1986) and quantified essentialism (O'Brien and Holland 1995).

5. I am not arguing that the efficacy of this classification is a function of its ability to identify emic groups, or classes recognized by other archaeologists in the Society Islands. However, the ability to generate groups that likely have some connection to different sets of behaviors (e.g., eating, sleeping, protection from the elements, in contrast to some form of ritual and/or larger group activity) does suggest that such a classification may be parceling out variation important to evolutionary processes.

6. Replicators may lie about without human interactors (in a book, let's say) but require a human interactor at some stage to get on with the business of replicating. Developments in artificial intelligence, however, may some day lead to "cultural change" associated with interactors that have little to do with humans (Dennett 1995).

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