# STYLE AND FUNCTION: A FUNDAMENTAL DICHOTOMY

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Our understanding of the archaeological record has been developed under the culture history paradigm. Its fundamental structure is shown to be stylistic; this characteristic, coupled with historical factors, is seen as the major reason why evolutionary processes have not been extensively employed in explaining cultural change. Consideration of an evolutionary approach suggests that such processes as natural selection have considerable explanatory potential, but it is also suggested that a substantial segment of the archaeological record is not best understood in terms of adaptation. The potential of an evolutionary approach cannot be realized without making a fundamental distinction between functions, accountable in terms of evolutionary processes, and style, accountable in terms of stochastic processes.

AN INCREASINGLY LARGE NUMBER of archaeologists are committed to a scientific approach that is linked at some level with both ecological and evolutionary concepts. In the last two decades, archaeology has moved decisively in the direction of more sophisticated analysis and procedural rigor. In particular, quantitative analysis, recognition of the relevance of probability sampling, and multidisciplinary efforts have made lasting contributions. Methodologically, archaeology has become more scientific.

Far less success is evident if our explanation and understanding of the archaeological record are considered. There have been changes to be sure. New discoveries have extended our knowledge of the archaeological record. New dating methods have revolutionized chronology. The application of specific ecological concepts has enriched our appreciation of space and population. But the character of our understanding of the past has not changed appreciably. And evolution, an important ingredient in the initial formulation of the processual approach, has yet to assume a major role in constructing either specific explanations or a more comprehensive understanding of the past.

I am inclined to attribute this failure to some high level deficiencies: (1) the absence and/or inappropriate formulation of disciplinary goals; (2) the failure to *invent* any specifically archaeological theory of universal scope; and (3) the persistent use of concepts developed under older paradigms that did not espouse scientific or evolutionary goals. Certainly there are more mundane reasons for a lack of progress, not the least of which is the necessity of acquiring new, better controlled data for many critical problems.

The issue that I want to address is whether the archaeological record can be effectively explained within an evolutionary framework that is also scientific, and if so, precisely what aspects of the record lend themselves to this treatment. At the same time, it is important to outline why we have not made substantial progress in this direction, to identify the problem areas, and to suggest at least the general direction in which solutions might be sought.

## SOME PARAMETERS OF THE GENERAL PROBLEM

Archaeology is still largely atheoretical. Most of the discussion labelled theoretical is either concerned with the application of non-archaeological theory and method to archaeological problems or is limited to a small segment of the total archaeological endeavor.

Progress has been impeded by ambiguities introduced in the discussions themselves. Identical terms are given different meanings by different authors; different authors use different terms to mean the same thing. There is no evident agreement as to what archaeological laws are, if there are any, or how they should be developed if they are both possible and desirable. Programmatic statements may draw their rationale from one frame of reference while applications draw theirs from another.

Becoming scientific has been an explicit goal of many archaeologists (Watson, LeBlanc, and Redman 1971) and some real progress has been made; however, this transition is still incomplete. Scientific explanations employ both induction and deduction in important definable roles. Discovery and inven-

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tion are both part of the process. Although we have developed an awareness of these aspects of explanation during the past decade, we have yet to resolve most of the ambiguities that surround making assessments of the value of particular explanations or answers. It is important to recognize that two kinds of judgments are employed in a scientific framework. The truth of an answer to an equation is assessed by examining how the answer was obtained by establishing that all of the mathematical conventions involved have been properly employed. This kind of standard I will term a *ritualistic* judgment. To decide whether the equation was the appropriate one to relate the variables it includes is established by ascertaining if the use of the equation predicts the observed values in one or more cases involving its variables. To this kind of standard, I will apply the term *performance judgment*. The unquestioned success of the sciences is linked to their ultimate recourse to the performance standard and the use of this standard to select their ritualistic ones. Ritualistic standards, by themselves, are not adequate in a scientific frame; all scholarship, scientific or not, employs ritualistic standards.

By and large, archaeology has tried to become scientific by adopting the ritualistic judgments of science without the commensurate performance criteria. This has led to some curious contributions in which new methods and techniques are proposed and asserted to be good because they produce results identical or compatible with those of approaches rejected by the authors (e.g., Sackett 1966; Whallon 1972). The emphasis of ritualistic standards is evident in such comprehensive treatments as Analytical Archaeology (Clarke 1968) and Explanation in Archeology (Watson, LeBlanc, and Redman 1971). Procedural rigor is, of course, absolutely essential to the transition to a scientific archaeology, but it is only part of the process. Before analytical methods can be adopted as standards, it is important to show that their use leads to solutions that are acceptable in performance terms. In my view, this is where we fall down. How can we tell that a rigorously derived answer is also "correct" in some sense? This is a difficult task in the absence of clearcut disciplinary goals that are cast in concrete terms. Our explanations are not really expected to "do" anything or have performance consequences; we hide this by calling them interpretations. To resolve this will require some agreement on the purpose of archaeology. Whether "becoming scientific" is virtuous depends heavily upon the answer. The latent evolutionary goals of processual archaeologists, it seems to me, provide both this potential and a means of linking past and present in a manner conducive to making performance judgments.

Symptoms of this incomplete transition to science are apparent in many areas of archaeological endeavor. A common one is borrowing techniques from other, more scientific disciplines and then rummaging around in the archaeological record to find some data to which they can be applied (Service 1969). The current flurry of interest in the philosophy of science is another. Placed in perspective, the philosophy of science attempts to account for the structure of scientific inquiry. To have a philosophy of science implies that you have a science. The appeal to this discipline is quite consonant with the emphasis on the ritualistic aspects of science and the apparent view that archaeology need only assume scientific rigor to become a science. Unfortunately, there are different accounts of how science works or ought to work (c.f., Hempel 1965; Morgan 1973; Meehan 1968). While a thorough acquaintance with the philosophy of science is valuable, it is not by itself an adequate game plan for becoming a science.

## THREE ARCHAEOLOGICAL PARADIGMS

To identify the reasons why archaeology has failed to make more extensive use of evolutionary premises and complete the transition to a scientific approach requires a brief historical review. Three distinct and internally coherent approaches can be distinguished: culture history, cultural reconstructionism, and processual archaeology (Dunnell 1971a; see also Binford 1968; Deetz 1970).

### Culture History

The earliest paradigm, and the one that still guides a substantial segment of archaeological research, is culture history. Retrospectively, when archaeology emerged as a distinct intellectual tradition in the mid-nineteenth century, its major accomplishment was the documentation of a human past that was qualitatively different from contemporary and historically documented human conditions. Demonstration of the antiquity of a human presence through bones and artifacts created the time-

depth that made a qualitatively different past both possible and necessary. The character of the record, the Darwinian revolution, and the variability of living populations acted to make change a reasonable assumption. Having established a niche for archaeology, subsequent activity within this paradigm has largely been concerned with more detailed description of the archaeological record in an increasingly finer and more reliable time-space framework.

To a great degree, culture historical understanding relies on "common sense," i.e., it employs explanatory conventions that are implicit in our own cultural background. This is why culture historians generally display so little interest in theory. The role that explicit theoretical formulations play in the sciences are preempted by the "common sense" of western culture. As a result, conclusions seem self-evident once the requisite amount of data has been acquired. "Common sense," however, has little integrative power in the expanded temporal dimension of the archaeologist. Consequently, culture historians had to invent methods to deal with time and in this they followed Worsaae's dictum (Daniel 1950:47) on the utility of style in temporal discrimination. The reliance upon a common cultural background as a vehicle of understanding has many manifestations. One is evident in the ontological developmental organization of the archaeological record. Since we are the most "advanced" of contemporary cultures on a global scale, the archaeological record is often implicitly viewed as the development of culture from an initial non-cultural starting point to ourselves. The interest of culture historians in such global abstractions has varied over time, but when they have attempted it, it assumes this unilinear character.

In reality there is little of the culture history approach that can be characterized as evolutionary. In the early years of the paradigm, evolution was used as a justification for and a summary of the obvious tendency for temporal development of complexity and diversity in the archaeological record. Culture history did not use evolutionary processes to create the understanding, but employed a mixture of common sense and Worsaae's culture historical processes. One thing changes and blends into another, always more or less headed in the direction of complex, agricultural sedentary systems. Even today, there can be little doubt that all archaeologists tend to conceive of the past in these highly ethnocentric terms. Because the understanding is intrinsic to our own culture, this is a difficult obstacle to overcome. The widespread rejection of the scientific and even reconstructionist paradigms by culture historians is not so much a matter of specific objections as it is of a lack of interest because the newer paradigms are not perceived as relevant or necessary.

### Cultural Reconstructionism

A second paradigm, cultural reconstructionism, began to emerge in the late 19th century but gained little notice until the late 1930s and 1940s. Cultural reconstructionism is a reaction to culture history that has its roots in the association of archaeology and anthropology in North America and in the observation that culture history is not very anthropological.

Adopting sociocultural anthropology as a model for the conduct of archaeological research had important consequences that contrasted markedly with culture history. Instead of treating the archaeological record as a set of traits that could vary independently, an anthropological view forced archaeologists to see the record as the material residue of functioning systems in which one element had entailments in others. The site, which for culture historians was a locus of traits representative of an area and period, became the principal investigatory universe and variability within this unit became a major focus of analysis. Measured against sociocultural data, the archaeological record is impoverished and incomplete. Thus, it became imperative to reconstruct the "behavioral correlates" of the record so that it could be integrated with anthropology and accounted for in anthropological terms. The end product is essentially where the ethnologist begins, a transactional description. If the archaeologist goes beyond this, he is acting as an anthropologist. Archaeological theory has little role in this approach since the theory required for explanation is anthropological, not archaeological.

The main strategy for reconstruction is one of uniformitarian analogy with contemporary behavioral settings, a process usually termed ethnographic analogy. Reconstruction, whether archaeological or not, places a heavy emphasis on proper procedure and ritualistic judgments because there is no unambiguous way to apply performance standards to its particularistic products. This

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structural problem with ethnographic analogy has been critiqued many times (e.g., Slotkin 1952; Mac-White 1956; Longacre 1970; Dunnell 1971b, 1978; Sabloff, Beale and Kurland 1973). Nonetheless, its use persists.

Because of the historical coincidence of this paradigm with the rise of scientific methods in archaeology, the two are often treated as the same thing. The "New Archaeology" (Caldwell 1959), for example, subsumes all of the approaches that contrast with culture history. Many of the scientific techniques, most especially inductive statistics, have found broad applications within the cultural reconstructionist paradigm. As a result, "anthropological" has been equated with scientific. This confusion has blunted critiques of reconstructionism because of the faith placed in scientific approaches.

Whereas culture history can be viewed in the main as ethnocentric and producing understandings that are intrinsic to western culture, the reconstructionists provide a relativistic framework with understandings that are intrinsic to the cultures that form its subject matter. The approach has contributed important notions of spatial variability and a serious interest in function, both of which were lacking in culture history. And it is largely responsible for the insistence on methodological rigor. In assuming a particularist stance, this paradigm has not made use of evolutionary premises; particularistic reconstruction must deny evolution if it is to be applied to the past. Because of its particularistic character, its major contributions have been methodological. It has had little impact on a substantive understanding of the human past on a global scale. That understanding is still culture historical in nature.

# Processual or Scientific Archaeology

The processual paradigm is still more of a goal than a reality. In part this can be attributed to the short period of serious interest in the approach, but even more important are the limitations of the earlier paradigms on which it has had to draw and confusion with the reconstructionist position. Within this incipient paradigm, the purpose of archaeology is seen as generating laws that account for cultural change; the paradigm is frankly evolutionary in character (Leone 1972:26). This approach assumes that archaeological explanations must be extrinsic to both the culture of the investigator and that of the subject populations; in short, it assumes that an explicit archaeological theory will be developed.

Many scientific methods have been explored, but relatively few concepts have been developed. Certainly, no detailed archaeological framework has been invented to integrate our methodological advances. Typical of this situation is Binford's definition of culture as man's "extrasomatic adaptive system" (1965:205) and its subsequent use. Certainly this definition or a similar one is key to a scientific approach cast in evolutionary terms. In practice, the systemic aspects of the definition have been emphasized as a means of compensating for the incompleteness of the archaeological record in the reconstructionist framework. The adaptive aspects of the definition that potentially articulate with evolution in general and natural selection in particular have been largely ignored. When adaptation has been treated, the tendency has been to employ it in a synchronic ecological framework rather than an evolutionary one.

If the methodological sophistication that is really associated with the reconstructionists and the philosophical debate on how we should go about becoming a science are swept aside, we are left with little more than a statement of purpose. Two general notions that stem from our common sense approach have prevented further development: (1) a synchronic view of time (Plog 1974:43-45) carried over from both the culture historical and cultural reconstructionist paradigms that is incompatible with evolution and forces us to conceive of time as a sequence of homogeneous periods or systems rather than as continuous change; and (2) a belief that the appropriate subject matter is behavior rather than the hard phenomena of the archaeological record. This belief, inherited from the reconstructionists, forces us to manipulate inferences instead of phenomena and thereby deprives us of FULL USE of performance standards. As Leone (1972:25-26) implies, neither of these assumptions is necessary. This is not to say, however, that synchronic formulations of behavioral reconstructions are without ultimate value, only that they cannot be the foundation of an approach that professes to be both scientific and evolutionary.

## ELEMENTS OF A SCIENTIFIC EVOLUTIONARY APPROACH

Any new paradigm must draw upon previous formulations. In the case of archaeology, serious deficiencies have been identified in both earlier paradigms measured against the goals set by the processual or scientific approach. The effects of these deficiencies in the earlier paradigms on the basic units that we use to describe and explain the archaeological record must be identified before specific suggestions for the development of an evolutionary paradigm can be suggested.

## Archaeological Units

The terms we use to create archaeological data determine to a large degree the kind of subsequent operations that can be performed on these data (Binford 1968:23; Dunnell 1971a:59). Culture history employs two kinds of units. "Functional" units are intended to render sensible in ordinary terms the content of the past. These are drawn in an unstructured fashion from common experience. Thus we have axes, hoes, potsherds, and figurines. Because the process of unit definition is complex, wholly intuitive, and incidental to the main culture historical task, it is neither consistent nor easily reconstructed.

The units employed for chronological purposes are another matter. The process for their creation is certainly intuitive in most cases, but these units, usually called types, are the product of a distinctly archaeological analysis and are tested against a stylistic distributional model sometimes termed the "historical significance" criterion. Types are reformulated until they display the temporal-spatial contiguity required by this criterion (Krieger 1944; Ford 1954b). Because of the performance test employed, these types can be used to create chronologies using methods like seriation. Larger units defined by them retain the characteristic of temporal-spatial contiguity and produce phases and cultures that occur in spatially coherent areas over definite periods of time (e.g., Gifford 1960). In practice, because the process is intuitive and learned by imitative apprenticeship, any given application usually abounds with inconsistencies. Defining characteristics are dominantly stylistic but the test of historical significance does not exclude technological or functional attributes if they change over time in particular areas. Consequently, particular formulations often mix criteria (Jelinek 1976:26).

The reconstructionists pay more attention to functional units, largely by making the analogic process by which they are created more explicit and rigorous. Even with this improvement, functional units have not assumed an importance comparable to that of historical types. There are two reasons for this. First, functional units do not have distributional characteristics that allow them to structure the archaeological record in a time-space framework outside local areas. Second, the notion of function is not an archaeological concept comparable to "historical significance." It is an English word accompanied by all the behavioral connotations and denotations common to words from a natural language. The reconstructionists have simply made more explicit what the culture historians had been doing with function all along. The basic question still being asked is whether an object is an ax, or an adze, or an arrowhead. Deceptively, the "laws" (Fritz and Plog 1970) by which such naming takes place are not archaeological propositions but common cultural conventions of object naming enriched by an acquaintance with the ethnographic record. Thus, sense can be made of the archaeological record without recourse to explicit theory because once objects are named in English, they can be manipulated with common sense. Characteristically, for analogic constructions that employ uniformitarian principles, the products are not testable in performance terms (Sabloff, Beale, and Kurland 1973). Hence the concern with how the analogy is drawn (Ascher 1961; Binford 1967).

Types of a different sort were also developed on the basis of element configurations within particular collections of artifacts (e.g., Spaulding 1953). The rationale for the inductive statistical procedures employed did not come from the identification of a particular purpose they were intended to serve but lay instead in ritualistic judgments, namely that the procedures were explicit, rigorous, and repeatable. The resulting types are *real* because they can be shown to *exist* in the data. The procedures are attractive because of the methodological elegance, but the products, "statistical types," have not become a major force beyond the description of particular assemblages. The rationale for the approach is quite compatible with the reconstructionist paradigm because in a real way these procedures force the data to speak and the units are demonstrably intrinsic to the subject matter. The debate be-

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tween Ford and Spaulding (Spaulding 1953, 1954; Ford 1954a, 1954b) centered on this issue. Ford, as a culture historian par excellence, understood intuitively that Spaulding's methods did not produce types that could be *used* for anything, and thus he felt compelled to reject the method. On the other hand, the characteristically intuitive rationale of culture history made Ford unable to cope with the methodological rigor of Spaulding's elegant argument. In the end, most archaeologists working with types cite Spaulding but follow Ford.

Recent years have seen considerable experimentation and elaboration of techniques for unit formation (see Doran and Hodson 1975 for a critical review of many techniques), basically all in the inductive reconstructionist mode established by Spaulding, even though many of the techniques are radically different in technical detail. These discussions are focused on the virtues of particular computational and statistical alternatives and omit discussion of archaeological theory, meaning, or utility of the products beyond assemblage description. The source of the initial variables remains intuitive and is not adequately addressed in any of these discussions. No particular procedure has produced a set of units that can replace the culture historical types.

In the last analysis, the reconstructionists contributed little to unit formation (although many of the techniques are powerful tools in other contexts). They have exposed the implicit, sloppy character of culture historical units but they have failed to improve the formulation of culture historical units or replace them with different units of equally broad scope. The fundamental structure of the archaeological record as we know it is a product of the culture history paradigm and its dominantly stylistic units: "our perception and use of the archaeological record" (Binford 1968:23) has not changed. The question that must be faced by processualists is a simple one: Can style be explained within a scientific and evolutionary framework with laws of cultural change? The answer, at least at a level that will address the evolutionary character of the record, is unfortunately, no. To explain this negative assessment and to suggest a new direction requires that we examine characteristics of stylistic formulations in the context of evolutionary theory.

## Evolutionary Archaeology

Evolutionary archaeology should be understood as an explanatory framework that accounts for the structure and change evident in the archaeological record in terms of evolutionary processes (natural selection, flow, mutation, drift) either identical to or analogous with these processes as specified in neo-Darwinian evolutionary theory. This does not imply that cultural and genetic phenomena are identical. Obviously the processes themselves or the entities upon which they act must be redefined from the biological context unless one is prepared to assert that all cultural phenomena are genetically determined. Binford's "systemic" definition of culture provides a starting point, although the definition is better referred to as an "adaptive" one. The definition, however, may not be complete. For example, does the adaptive clause exclude a major segment of the phenomena that both archaeologists and anthropologists consider relevant and cultural? This question and similar questions cannot be addressed until both the implications of the definition and the implied evolutionary processes have been explored more thoroughly.

The first consequence we encounter in assuming an evolutionary point of view is that the specific origin or invention of new elements becomes a trivial inquiry. What is important is how and why a new element becomes fixed or accepted (Barnett 1953:291) and thus visable in the archaeological record. The overridingly important evolutionary mechanism in this process is natural selection. Invention is analogous to mutation in biological systems. On a global scale, it is probably a useful heuristic position to assume that invention is a random phenomenon, and, thus, that the total number of people is the major constraint on the raw material of culture change. Regional partitioning of this pool may be an effective account for more local rates of change. As the total human population increases geometrically, a similar logarithmic increase in the complexity of cultural elements is a natural consequence. It may well be that invention occurs at a nearly fixed rate (one new element every so many thousand or million man-years) as far back as the cultural record can be traced. If biological change or environmental circumstance exert any influence, our gross estimates of complexity and population size obscure these effects beyond a correlation of numbers of people and complexity. For our purposes here, however, the important consequence is that a given idea may appear spontaneously many dif-

ferent times in the same tradition or in different, widely separated traditions. What we will detect in the record is its acceptance or propagation in a cultural system. Both natural selection and stochastic processes may have a role in explaining cultural change in this context. Only in the case of natural selection will cultural systems have the adaptive character envisioned in the Binford definition of culture.

If it is possible to talk about cultural phenomena in evolutionary terms, we must address the matter of whether cultural laws in this framework will be distinct from biological ones. This question can be answered in the affirmative without appeal to the emotional distinction we maintain between ourselves and other creatures. S. J. Gould (1976) has summarized the importance of character transmission in understanding large scale evolutionary trends. In particular, he has concerned himself with the socalled "Cambrian Explosion." Briefly, although simple life forms had been around for a substantial period of time, almost all of the modern classes of living forms originated in the geologically brief period from the early Cambrian to the early Ordovician. Since then, "random" change has been characteristic. In seeking an explanation, Gould argues that the conditions which brought about the Cambrian explosion are not to be found in the Cambrian but in the preceding periods and that the explosion is simply the logarithmic phase of a normal growth curve that typifies the radiation of any organism with unlimited space and resources. Since the world was not lifeless before the Cambrian, this competition-free curve poses a problem. The answer to the paradox lies most likely in the observation that sexual reproduction appears as a new transmission mechanism and allows for much more rapid diversification, so much so that simple organisms persist only in those environments that are unoccupiable by the more complex forms. The ultimate limits on this explosion are set by the physical constraints of the planet.

Keeping in mind that our knowledge of the human record is more detailed and less objective, there is a striking parallel to the Cambrian explosion, one that would be expected if character transmission is of critical importance. If the production of artifacts is taken to mark the beginning of cultural transmission, the human record begins perhaps three million years ago. The "human explosion" measured either in number of people or cultural diversity does not begin until latest Pleistocene and early Holocene times. Cultural transmission has apparently had much the same impact as sexual reproduction in increasing diversity, shortening adaptive response time, and increasing the range of responses. If these two situations are at all analogous, there would appear to be ample room for cultural laws in an evolutionary model. Because cultural transmission appears to be a significant evolutionary factor, laws that cover its unique processes are clearly required. Cultural transmission does not replace and is not identical with sexual reproduction but it is a distinct, analogous process. Durham (1976) has reached a similar conclusion arguing from quite different premises. Failure to maintain this distinction would appear to be the source of Harris' critique of the Sahlins and Service evolutionary approach (Harris 1968:652).

Regardless of whether the analogy can be maintained after detailed examination, it would appear to be a valuable heuristic position until such a demonstration can be made. There are immediate practical consequences of this position. For example, it may be that we have been misled in seeking explanations for the development of civilization in the unique environmental conditions of the late Pleistocene and early Holocene and in the specific cultural forms extant during that period. This singularly important development in culture change may be simply the log phase of a natural growth curve initiated closer to the Plio-Pleistocene boundary than the Holocene. Observations of this order raise the question of whether an evolutionary model can assist us in accounting for particular forms or if it is limited to the grand structure of culture change. In an evolutionary framework, we would incline to explain the fixation of a particular form as a consequence of the increased Darwinian fitness that its presence confers on its transmitters. Traditional biological explanations argue that some elements are adaptive, that is, confer increased fitness, under a particular set of circumstances, and are thus fixed by natural selection while other elements are not adaptive and do not become fixed. In this sense, culture is truly "man's extrasomatic adaptive system." There is, however, an increasing awareness with other animal systems that not all elements can be assigned unambiguous positive or negative selective values (King and Jukes 1969; Lewontin 1974). Some, perhaps many, traits behave as if they are adaptively neutral (Gould and others 1977). This is not incompatible with an unreconstructed Darwinian view of natural selection. If Dunnell]

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the traits in question do not have large positive or negative selective values, and the environmental constraints that bring about selection are not fixed but vary randomly around gradually changing means, we should expect that a fair proportion of the total trait assemblage that makes up the description of an organism would behave on the whole in a rather random fashion even though no individual transmission could be said to be neutral. If anything, cultural transmission should act to increase the capacity for such neutral traits and increase the total diversity of cultural systems.

At first glance, the recognition of adaptively neutral elements forces the Binford definition of culture to exclude most of what we would like to think of as cultural. However, all traits have a cost in terms of energy, space, and matter and are thus an unavoidable part of the whole selective picture. In a cultural frame, many specific trait forms may lack adaptive value, but a reservoir of variability, some of which may ultimately acquire adaptive value with changing conditions, has a clear selective value. Analytically, this can be treated as a problem of scale. Specific, adaptively neutral forms may be functionally equivalent manifestations of larger entities that are accountable in terms of natural selection.

## Style and Function in an Evolutionary Context

Having argued that an evolutionary approach does have applicability to the archaeological record, we must recognize that we have two effectively different kinds of elements involved in any system undergoing evolution. Traits that have discrete selective values over measurable amounts of time should be accountable by natural selection and a set of external conditions. Traits identified as adaptively neutral will display a very different kind of behavior because their frequencies in a population are not directly accountable in terms of selection and external contingencies. Their behavior should be more adequately accommodated by stochastic processes.

It is at this point that the distinction between style and function becomes critical. The dichotomy is an old one and has even been accorded evolutionary connotations (Service 1964; Binford 1968). In the context of evolutionary processes just outlined, these terms can be redefined. *Style* denotes those *forms that do not have detectable selective values. Function* is manifest as those *forms that directly affect the Darwinian fitness of the populations in which they occur.* In an archaeological context, the term *form* should be limited to artificial attributes without any specification of scale (e.g., attributes of object, objects, etc.). The dichotomy is mutually exclusive and exhaustive in principle. Because each kind of element has distinct behavioral expectations, the two can potentially be distinguished in practical terms. A profitable direction may lie in identifying stylistic elements by their random behavior (Gould and others 1977).

This definition of style is quite close to its usage in archaeology, particularly as employed by culture historians. Their chronological efforts provide a demonstration of the practicality of its identification in the archaeological record. Stylistic similarity is homologous similarity; it is the result of direct cultural transmission once chance similarity in a context of limited possibilities is excluded. This confers upon stylistic units the marvelous abstract statistical properties that have delighted archaeologists since the nineteenth century. These same properties made stylistic units indispensible to culture history. Only with variables independent of external conditions is it possible to obtain the purely historical, non-repetitive classes that are used to tell time. It is not surprising that some of the most "scientific" applications should have come about in chronology. The elegant simplicity of style behavior and the ability to distinguish a correct answer from one that is simply elegant have made style the archaeological forte. Because of the independence of style from its environment and its homologous character it can also be employed as a tool to delineate spatial interaction. But the very characteristics that make style such a useful archaeological tool prohibit its explanation in terms of natural selection. The explanation of specific styles will have to come from non-evolutionary, stochastic processes coupled with such devices as Markov chains to accommodate its mode of transmission.

The implicit use of style to define archaeological units at all scales is nowhere more evident than in the "explanations" offered by culture historians for similarity. Diffusion, acculturation, persistence, tradition, horizon, trade, migration are mechanisms to account for homologous similarities. As processes, they designate only the source of a particular form and identify temporal-spatial contact. Of the culture historical processes, only independent invention lies outside this framework and it has been

used to explain such quasi-functional elements as pottery or agriculture. Even its application here is controversial, and strictly stylistic processes have been offered as explanations of grand scale phenomena (e.g., Meggers and Evans 1962; Ford 1969). All of the culture historical processes treat the source of particular forms; none addresses why those forms are fixed. An archaeological record structured by such stylistic concepts will be singularly difficult to explain in terms of evolutionary processes.

The definition of function, on the other hand, departs considerably from the traditional use of the word in archaeology where it is frequently a synonym of "use." The importance of distinguishing function from style has been realized (Jelinek 1976). In an evolutionary approach, the distinction is mandatory. Unfortunately, attempts to deal with function have almost exclusively been carried out with the reconstructionist framework. These attempts rely heavily upon analogy with contemporary functional forms like axes and hoes, a procedure that denies the evolution of functions. The contrastive behavior of functional elements should make them identifiable without recourse to behavioral correlates. Their necessary interaction with external conditions can provide the means of developing functional classifications at all scales comparable to the culture historical stylistic classifications. I have offered (1971b, 1978) a primitive scheme for the definition of functional classes at the scale of artifacts that is compatible with an evolutionary model. Refinements of this scheme or the development of others offer the potential of organizing the archaeological record in functional terms and provide entities that can be explained in terms of evolutionary processes.

### CONCLUSIONS

The failure of processual archaeology to make extensive use of evolutionary principles in explanations of the archaeological record can be attributed to the history of archaeological development. The basic structure of the archaeological record has been provided by culture history. There is abundant evidence that this structure is dominantly stylistic. Cultural reconstructionism has been responsible for the introduction of scientific rigor into the discipline, but the particularistic nature of its formulations has prevented it from developing a global understanding of the archaeological record that can replace the culture historical structure. Its contribution remains methodological rather than substantive or theoretical.

The success of the culture historical structure is in large part attributable to use of performance standards in the important area of chronology. A more detailed examination of the nature of style shows that the behavior of style is fundamentally stochastic. This observation explains its success in chronological matters and illuminates the nature of culture historical "explanatory" processes like diffusion. At the same time, this observation explains why evolutionary processes such as natural selection have not been effectively employed.

I have attempted to sketch some elements of a scientific evolutionary approach. This attempt suggests that evolutionary processes do have considerable potential in explaining cultural phenomena and that laws unique to cultural phenomena are possible and necessary. It is also apparent that not all phenomena traditionally considered cultural can be explained with such processes. The development of the latent archaeological distinction between style and function will be required if an evolutionary approach is to produce a global understanding of the archaeological record comparable to that of culture history. Explanations of stylistic phenomena will be found in stochastic processes and devices such as Markov chains; styles will continue to be useful tools for chronology and defining spatial interaction. Functional elements can be explained with evolutionary processes.

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