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What is the ‘process’ in cultural process and in processual archaeology?

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Abstract

The concept of ‘cultural process’ has been of interest to anthropologists since the late 19th century. Franz Boas indicated that investigating cultural processes was central to anthropology, but his failure to define the concept set a disciplinary precedent. Process has seldom been discussed in theoretical detail because the basic notion is commonsensical. A.L. Kroeber provided a definition in 1948 and distinguished between short-term dynamics of how cultures operate and long-term dynamics resulting in cultural change. Leslie White conflated the two families of processes. Archaeologists working before 1960 focused on processes resulting in the diachronic evolution of cultures; many of these involved cultural transmission. Initially, processes involving the synchronic operation of a culture were conflated with diachronic evolutionary processes by processual archaeologists. In the late 1960s and early 1970s, Lewis Binford, David Clarke, and Frank Hole and Robert Heizer all discussed cultural processes within the framework of systems theory. Simultaneously, growing concern over the formational processes that created the archaeological record shifted attention from the original conception of cultural processes. Models of the temporal duration, scale, and magnitude of cultural processes illustrate their complexity and suggest avenues for further conceptualization.

Key Words

cause • cultural process • description • process • sequence of events

[W]e must develop not only better theory for conceptualizing processes but also more adequate methods for studying them. (E.Z. Vogt, 1960: 28)

Like other fields, archeology is cursed with terms so vague and ambiguous that they tend to obscure more than they clarify. (K.V. Flannery, 1972: 400)
For more than a century, ‘cultural processes’ have been a guiding focus of anthropology (Bee, 1974). Whether the operation of one or more processes is studied within a particular culture, or a specific process or two are called upon to explain particular cultural phenomena, cultural processes are central to the discipline. What, then, might cultural processes be in a conceptual or theoretical sense? One would think that given their central role in anthropology, a detailed and nuanced literature addressing this question would exist. An approximation of such a literature is scattered among journal articles, book chapters, and monographs, each containing no more than a sentence or two devoted to the concept. Comprehensive treatments are virtually nonexistent; discussions of theoretical models and conceptions of cultural process(es) are also scarce. Both Vogt’s lament of more than 40 years ago and Flannery’s lament of more than 30 years ago in the epigraph apply to the term ‘cultural process’. Yet, the so-called processual archaeology of the 1960s and 1970s had as a research focus the study of cultural process(es), sometimes written in the singular, sometimes in the plural form (Binford, 1968b; Flannery, 1967; Thompson and Longacre, 1966). I have found only two discussions of the cultural process concept in the literature of processual archaeology, and they are short, given the apparent gravity of the concept.

The commonsensical understanding of (cultural) process held by anthropologists and archaeologists concerns the dynamic of some (cultural) thing developing into some (other cultural) thing that may be different from the original. A series of stages or events can be used to illustrate a process but is descriptive rather than explanatory if the cause or causal mechanism producing the series is unspecified. Common sense understanding resulted in conflation of two families of cultural processes, a shift in the meaning of cultural processes to the actions forming the archaeological record, and a muddling of the dynamic of becoming and the static state of being. This is not to say that the concept of process has been useless, as evidenced, for example, by the plethora of research accomplished under the banner of processual archaeology (see articles introduced by A.L. Johnson [2004] and references therein).

Some argue that terminological clarity is either unnecessary (Salmon, 1982) or difficult given the evolution of concepts that attends theory development (Hegmon, 2003). Philosopher of archaeology Merilee Salmon (1982: 142) thus advocated a dialectic between a concept’s definition and how well it assists with building useful explanatory theory, that is, theory that both constrains (by limiting the field of inquiry to particular phenomena, questions, or both) and enables (by specifying explanatory principles, how particular phenomena are thought to relate, and the like) how we understand and make sense of the world. Failure to make clear what a term means in a particular context may, however, lead to confusion, disagreement, and lack of efficiency in the research enterprise; understanding is likely to be commonsensical and thus individualistic. Further, a term’s meaning can transmogrify imperceptibly over time until researchers think they are talking about one thing when in fact they are talking about something else. Thus I believe that we must be concerned about conceptual and terminological ambiguity and seek to remove it (or at least identify it) whenever possible, but I also believe that definitions can and should shift as understanding changes and theories are rewritten.

In this article I do several things. First, I make four points with respect to the term culture/cultural process (both forms occur in the literature). In no particular order, these
points are: (1) labels for particular processes often conflate the dynamic of becoming with the result or state of being, and also conflate process as cause with process as description; (2) processes concerning the synchronic operation of a culture are sometimes conflated with those concerning the diachronic evolution of a culture; (3) a list of processes gleaned from the literature published in the 1940s and 1950s includes nearly all of those included in a list gleaned from the literature published in the 1970s and 1980s; and (4) in archaeology, the concept of cultural process was subsumed within formation processes in the 1970s, exacerbating terminological ambiguity.

To make these points, I explore the history of the term ‘cultural process’ to determine what it is thought to mean. My historical sketch is not exhaustive; such would take a book-length treatment. Instead, I summarize what is necessary to make the points I have just listed. I first review how the concept has been used in cultural anthropology, where my focus is on the pre-1960 literature. This provides a context for discussing the concept of culture process as it was used in archaeology; processual archaeology first emerged in North America where archaeologists are trained in departments of anthropology. Because I am particularly interested in the meaning(s) of the term with respect to processual archaeology, I outline the history of the term in archaeology from the 1930s through the 1980s.

The historical review demonstrates that many who used the term often conflated two families of processes. I term these the diachronic (historical) evolutionary family and the synchronic operational family. The former are generally processes of long duration, result in cultural change, and implicitly indicate that culture is transmitted; processes include acculturation, enculturation, socialization, and diffusion. Synchronic operational processes are of relatively short duration and repetitive or cyclical; the state of a culture might fluctuate as that culture operates over time, but the culture eventually returns to the state in which it began. One example is a first fruits ceremony held annually, and another would be a repetitive land-use pattern of seasonal transhumance. Conflation of the two families was likely caused by common-sense understanding of the general concept; explicit definitional and theoretical understanding would likely have precluded such conflation. Common-sense understanding also seems to underpin the 1970s conflation of culture process with formation process by archaeologists.

As a step toward replacing common sense with explicit models of cultural processes, I present a formal definition of the concept prior to presenting the historical overview. This should also help with perception of strengths and weaknesses in anthropological and archaeological use of the term. Toward the end of the discussion, I consider the implications of differences in the duration and results of the two families of processes in detail, and also the scale and magnitude of processes. My intention is not to provide the final word on the concept. Rather, I present this discussion as a catalyst for additional conceptualization of cultural process and how that term is used in the future. Archaeologist Irving Rouse provided an excellent place to start the discussion:

By pattern is meant a configuration discernable in the archaeological [or anthropological] record and by process, the actions that have produced the pattern. A pattern is an empirical observation and a process, an explanation of that observation; it tells us how the pattern came into existence. (1977: 1)
WHAT IS A CULTURAL PROCESS TO AN ANTHROPOLOGIST?
Boas (1896: 905) stated that ‘the object of [anthropological] investigation is to find the processes by which certain stages of culture have developed’ (emphasis in original). Boas had in mind historical processes that accounted for why culture traits were found where they were and in the forms that they were (Bee, 1974; Rohner and Rohner, 1969). During the first half of the 20th century the major approach to anthropological research was ‘historical ethnology’ (Radin, 1933) or ‘historical particularism’ (Harris, 1968). This approach examined the historical development of each individual culture by inferring the age and distribution route of cultural traits (Lyman and O’Brien, 2003). Names given to cultural processes indicate that they took place over time (were relatively diachronic) and the analytical unit used (cultural traits or elements) implied that a culture consisted of independent, discrete parts. The processes included evolution and diffusion (Boas, 1924), invention and innovation (Barnett, 1942, 1953; Ogburn, 1930; Steward, 1929), and convergence (Lowie, 1912). What exactly a cultural process was conceptually went unremarked. Boas himself never was clear about what one was (Rohner and Rohner, 1969: xvii), and this set a precedent. It was not until historical ethnology was nearly dead that discussions of what processes are and definitions of them began to appear, yet these were brief and did not seek a general theoretical understanding that could assist future research (Barnett, 1940; Herskovits, 1945, 1948; Redfield, 1934, 1941, 1953).

In the earliest explicit definition of which I am aware, Kroeber (1948: 344) defined ‘processes of culture [as] factors which operate either toward the stabilization and preservation of cultures and their parts, or toward growth and change’. This statement refers to both synchronic operational processes and diachronic evolutionary ones, respectively. Kroeber listed the usual historical processes of diffusion, invention, and the like (e.g. Murdock, 1955, 1956), and he also observed that cultural processes ‘which in the abstract seem so neat and distinctive, are found to manifest themselves in associations’ and that ‘conceptually distinct processes tend to come intertwined, and to interact, in the actual operations and history of culture’ (Kroeber, 1948: 344–5). It will, Kroeber thought, be difficult to tease apart the complexities of distinct processes.

Moore (1954: 354) considered only diachronic evolution when he wrote that ‘processes of a culture include not only changes in particular categories of the culture but also changes in the relationships between categories and between individuals performing the roles suited to the activity associated with each category. Thus cultural processes involve changes in the parts of a culture and changes in the interrelationships of the parts’. He, like Murdock (1955), used ‘cultural dynamics’ as a synonym for cultural processes (Moore, 1954: 355). Bidney (1953: 126) stated that the ‘cultural process, as applied to man, differs from other natural processes in that the former is not autonomous and does not guide itself, but requires constant and deliberate selection and effort on the part of its actual and potential adherents’. The culture process is dependent on ‘human intelligence and voluntary effort’; it is the ‘creative inventions and insights’ of humans that are the ‘sources of all cultural processes’ (Bidney, 1953: 137, 138).

The notion that society itself is a process and is continuously becoming was part of the ‘Chicago school’ of sociology in the 1920s and 1930s (Lerner, 1934), and reflected the general process of cultural transmission. This process had specific manifestations
such as enculturation, socialization, diffusion, borrowing, education, learning, and the like, and was thought to be the ultimate cause of cultural change and, particularly, stability (M.W. Willey, 1931). It is apparent in a statement by Mead (1943: 633) that ‘education is the cultural process, the way in which each newborn infant, born with a potentiality for learning greater than that of any other mammal, is transformed into a full member of a specific human society, sharing with the other members a specific human culture’. Herskovits (1943: 737) noted that researchers (including anthropologists studying primitive societies) had focused on education as a stabilizing force but they should also study mechanisms that encouraged cultural change.

The International Symposium on Anthropology held in 1952 resulted in a large volume of papers (Kroeber, 1953a) and a volume of discussions (Tax et al., 1953). Of the latter’s 20 sections, four include ‘Problems of Process’ as part of their titles. Nadel consulted a dictionary to determine what a process is (Tax et al., 1953: 156). Linton was ‘struck by the very slight attention paid to what is thought of in the United States as cultural process, that is, the whole field of diffusion, integration, invention, etc.’ (Tax et al., 1953: 219). Greenburg noted the concept ‘seems to be of rather strategic importance’ but was basically restricted to language change and ‘historical diachronic’ dynamics, and that many language processes had analogous processes in culture (Tax et al., 1953: 287–9). In his concluding essay Kroeber (1953b: 367) equated processes to ‘causal factors’. A few years later, evolutionary biologist Julian Huxley defined cultural process in evolutionary terms: ‘Culture in the anthropological sense is neither an entity nor a principle; it can only be treated as a type of process. [A culture] constitutes a self-reproducing and self-varying process whereby the pattern of human activities is transmitted and transformed in the course of time’ (1958: 437). This echoes the ‘Chicago school’ of sociology of 20 years earlier.

Spindler and Spindler (1959: 37) equated cultural processes with ‘culture change’. They noted that prior to the 1940s, the focus was on cultural traits as particles of culture; groups of people were culturally differentiated and interacted via diffusion. After the 1940s, in Spindler and Spindler’s view (see also Bee, 1974), a culture was an adaptation such that cultural interaction could involve impact and subsequent (adaptive) adjustment. The conceptual change arose because of White (1949, 1959) and Steward (1955), who focused on the adaptational and functional aspects of cultures rather than their historical transmission. The structural-functionalism of Malinowski and Radcliffe-Brown also contributed to the shift (Barnard, 2000; Harris, 1968), as did a similar shift in sociology (Matthews, 1989).

White (1948: 586) was influenced by Boas (Carneiro, 1981) and defined the culture process as ‘a stream of [culture] elements that are continually interacting with one another, forming new combinations and syntheses, eliminating some elements from the stream, and incorporating new ones’. Such a statement was lacking in historical ethnology. White (1947: 693) indicated that because culture was ‘dependent on the use of symbols . . . its elements are readily transmitted [and thus] culture becomes a continuum; it flows down through the ages from one generation to another and laterally from one people to another’. White (1948: 586) noted that the culture process ‘has its own principles and its own laws of change and development’. In an expanded discussion, White (1950: 76) said:
[The culture process is] a stream of interacting cultural elements – of instruments, beliefs, customs, etc. In this interactive process, each element impinges upon others and in turn is acted upon by them. The process is a competitive one: instruments, customs, and beliefs may become obsolete and eliminated from the stream. New elements are incorporated from time to time. New combinations and syntheses – inventions and discoveries – of cultural elements are continually being formed.

For White, the culture process not only is transmission (dynamic becoming), it involves adaptation (as both dynamic becoming and a state of being) and also interaction (a state of being).

White (1959: 16, 17) later reiterated that culture was 'a stream flowing down through time [comprising a] process' and added that the ‘interrelationship of [culture traits] and their integration into a single, coherent whole comprise the functions, or processes, of the cultural system'. The operation of a culture involved 'life-sustaining processes: subsistence, protection from the elements, defense from enemies, combating disease, etc.' (White, 1959: 19). He used the term process to denote both the diachronic evolution and the synchronic operation of a culture. Others did likewise (e.g. Hsu, 1959).

Carneiro, a student of White’s (Carneiro, 1981), defined process as a general phenomenon constituting ‘the interaction through time of the elements of a system as the system changes from one state to another’ (Carneiro, 1960: 145). Change is ‘determinate [and] is an expression of underlying natural laws’ (1960: 145). Elements are the structural units of a system, and they are ‘a conceptually separable class of phenomena’ including such things as the ‘division of labor, cannibalism, hunting magic, plow agriculture, and cross-cousin marriage’ (1960: 146). A system is ‘a set of structurally and functionally related elements articulated into a working whole’ (1960: 146). The ‘essence of process is change of some kind’, and ‘we may think of process as a very rapid succession of synchronic states of a system, each one only slightly modified over the preceding one’ (1960: 147).

Carneiro (1960: 148) argued that ‘We can arbitrarily, but quite justifiably, delimit a particular segment of the culture process and proceed to investigate it by itself. [One could] analyze the culture process logically into a number of constituent subprocesses’. Cultural anthropologists had, he noted, ‘found it convenient to analyze [the culture process] into such constituent [sub]processes as evolution, invention, diffusion, acculturation, integration, segmentation, and many more’ (Carneiro, 1960: 148). These are the standard historical processes; all are within the diachronic evolution family.

Steward (1949: 3) argued that to be a science, anthropology had to seek patterns in cultural data and to ‘ascertain processes that are duplicated independently in cultural sequences, and to recognize cause and effect in both temporal and functional relationships’. In his view, recitation of history was not an explanation of process, nor was identifying which process(es) occurred in a particular case a scientific explanation because such did not fully account for why that process worked in that particular case. He could not define specific processes (Steward, 1949: 24) and concluded by quoting Strong (1943: 41): When sufficient ‘comparative data are in hand the generalizations that will emerge may well revolutionize our concepts of culture history and culture process over the millennia’. More research was needed to define particular processes and to discover as yet unknown ones. Strong (1943: 30) noted that ‘culture process throughout the world seems to many of us to proceed according to as yet dimly perceived patterns which
only hard-won knowledge can clarify’. He was arguing, as did others at the time (e.g. Steward, 1949) and also later (e.g. Rouse, 1977; Terrell, 1986), that research should involve documentation of patterns in the archaeological record as prerequisite to discerning cultural processes.

White and Steward, along with Malinowski and Radcliffe-Brown (Barnard, 2000; Harris, 1968), were concerned with cultural processes other than the standard historical ones of diffusion, invention, and the like, and they influenced numerous individuals who followed them (Bee, 1974). Discussion of the historical processes did not, however, disappear after the 1950s. For example, some followed White and Steward and treated adaptation as a process of becoming (e.g. Kaplan and Manners, 1972) or as a state of being (e.g. Cohen, 1968).

When theoretically oriented discussions of cultural processes appeared in the 1960s, there was no guarantee they would clarify matters. Beals et al. (1967: 6) provide one of the only explicit definitions of process in the general anthropology literature of which I am aware: ‘A process is a series of [causally, functionally, mechanically] interlinked events which commences under certain defined conditions and which concludes under certain defined conditions’. This definition leaves one wondering if the ‘defined conditions’ are specified by the people whose actions comprise the events or by the anthropologist. Beals et al. (1967: 258–9) also imply that ‘processual analysis’ in cultural anthropology involves, first, observing the same process multiple times, keeping track of all variables that seem to be interlinked, and those that seem to be independent and free to vary. Second, arranging observations in a temporal series such that ‘acts and circumstances and variations that occur when the process is repeated’, both within a cultural system and in multiple cultural systems, facilitates comparative analyses and the building of abstract models of processes (Beals et al., 1967: 258–9). Whether the model comprised only a sequence of events, or the sequence plus their interlinkages, or the sequence plus the interlinkages plus any causal variables is unclear.

Steward (1968: 321) clarified things a bit when he commented that the presentations at the 1966 Man the Hunter conference indicated a discipline-wide failure to perfect ‘a methodology for determining cause-and-effect relationships in the evolution of different kinds of culture’. He noted that the flaw of the comparative method resided in the presumption that similar cross-cultural patterns denoted similar processes (and admitted to here contradicting his 1949 discussion). ‘Processes may be considered causes in one sense, [but] for present purposes [he defined them] as changes set in motion when more ultimate cultural and environmental factors are utilized by human societies’ (Steward, 1968: 322). Instead of discussing processes per se, Steward (1968) stressed the distinction between processes and ‘causal factors’. The latter included cultural and natural variables such as available technology and environmental potentials. Causal factors constituted the historical contingencies that constrained and channeled the operation of processes, and thus they helped account for why one process rather than another operated in a particular case. But what a process was other than a sequence of interlinked events remained unclear.

Bee (1974: 3) noted that ‘much of the theory and methodology of [cultural] change studies has not rigorously and consistently dealt with the problem of processes of change’. He found that processes varied from approach to approach within anthropology. Bee (1974: 3–4) defined process as ‘the interaction of causal forces so as to produce
a given condition. By “change process”, I mean the interaction of causal factors so as to produce a transformation of one condition into another’. In the first sentence he was using process to denote the synchronic operation of a culture and in the second sentence process denotes the diachronic evolution of a culture. Bee, like others, used the terms process and mechanism as synonyms.

Bohannan (1995: 81) echoed Boas when the former said ‘Discovering the processes is the goal of every science’. Bohannan’s concern was with both how cultures operate and how they change. He used more modern terms for some processes – transformation, turbulence, equilibrium – but also included older terms such as diffusion and innovation. He mentioned ‘cultural process theory’ (1995: 57), but never defined the term. Sometimes he contrasted ‘culture process’ and ‘culture change’ (and implied that the former involved the synchronic operation of a culture; 1995: 83), and other times he indicated that cultural evolution itself was a process (1995: 131). Bohannan used ‘process’ to denote both the synchronic operation and the diachronic evolution of a culture. Use of the same term between 1940 and 1990 to denote two distinct families of dynamics no doubt contributed to the conflation of the two in archaeology. I turn next to the history of the term in that subfield.

PRE-PROCESSUAL ARCHAEOLOGY

The programmatic literature produced by processual archaeologists during the 1960s and 1970s gives the impression that earlier archaeologists were doing descriptive history and were not interested in cultural processes (e.g. Binford, 1968a, 1968b; Flannery, 1967; Judge, 1982; Watson et al., 1971). Even pre-processual archaeologists occasionally stated that this was indeed the case: ‘Americanist studies over the last thirty years have been largely preoccupied with historical rather than processual objectives’ (Willey, 1953: 362). Willey (1953: 369) also noted that ‘the processes by which, or through which, cultural continuity and change are maintained or accomplished have not received the study and reflective thought commensurate with the way these concepts have been invoked by American archeologists’. But pre-processual archaeologists – those usually referred to as culture historians who worked prior to the 1960s – were indeed concerned with cultural processes. The family of processes they focused on, however, was the standard historical one involving cultural transmission. What Willey (1953) and others in the 1950s and 1960s had in mind was the other family of cultural processes – the one involving the synchronic functional operation of cultures.

Steward and Setzler (1938: 6–7) noted that archaeology ‘can shed light not only on the chronological and spatial arrangements and associations of [cultural traits], but on conditions underlying their origin, development, diffusion, acceptance, and interaction with one another. These are problems of cultural process, problems that archaeology and anthropology should have in common’. Although the terms differed from author to author between about 1920 and 1960, the cultural processes Steward and Setzler listed were the standard historical ones.

McGregor (1941: 49) stated that the archaeologist is ‘interested in three sorts of relationships: a local series of genetically, or developmentally, related events; the influence which this series had on other regions; and the influence outside areas had on its development’. Here, ‘influence’ can be loosely glossed as ‘pathways or modes of cultural transmission’. McGregor’s graph (Figure 1) illustrates well the basic transmission modes
of evolution: lineal, known in modern evolution as phyletic or anagenetic (1a); fusional, or reticulate, with two variants (1b, 1c); diversifying, or cladogenetic (1d); and replacement, or extirpation coincident with immigration (1e). A decade later McGregor (1950) noted that a cultural tradition depended on persistence created by continuous transmission – the American standard definition of a cultural tradition (Thompson, 1956; Willey, 1945).

Meggers (1955: 117), another student of White’s, implied that what would today be called cultural transmission was a generic cultural process that could take the form of diffusion or migration. It is a stretch to perceive in Meggers’s (1955) discussion the implication that invention and innovation are cultural processes, but I doubt that she would disagree. In her view, archaeology deserved pride of place among anthropological subfields because it was ‘shorn of the complicating and confusing psychological reactions of numbers of unique human personalities [and thus] cultural processes emerge in a stark and clear light’ (Meggers, 1955: 129). Like many of her contemporaries, Meggers apparently assumed that everyone understood that the family of processes involved cultural transmission. The family of processes of interest was, however, changing.

Taylor (1948: 108) stated that ‘cultural processes are the dynamic factors involving cultural traits; they . . . comprise the relationships between cultural traits’. Cultural traits for Taylor were mental, ideological, conceptual. He explicitly identified the cultural processes of ‘diffusion, culture contact, and acculturation’ and implied that there were others (1948: 108). He insisted that archaeologists determine prehistoric ‘cultural contexts’, defined as the ‘associations and relations of [cultural traits], of the balance between them, [and] of their relative quantitative and qualitative positions within the [cultural] whole’ (1948: 110). Study of artifact types that represented cultural traits

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**Figure 1. McGregor’s models of historical processes:** a, ‘genetic’ or lineal series; b and c, fusional series; d, divergence, or splitting; e, replacement of one series by another. Formal variation is continuous on the horizontal axis; capital letters signify form such that a change from one letter to another denotes a relatively major change whereas addition of a prime symbol denotes a minor change. After McGregor (1941).
within a cultural context would, Taylor (1948: 36) argued, reveal ‘the nature of culture, of cultural constants, of processes, or regularities, and of chronological development’. This sort of archaeological research was, in Taylor’s view, equivalent to cultural anthropology and what he called historiography. It involved the study of the ‘statics and dynamics of culture, its formal, functional, and developmental aspects’ (Taylor, 1948; see also Taylor, 1972).

Taylor’s insistence on the importance of cultural context means that he was interested in studying the synchronic operation of a culture. The ‘chronological development’ of those contexts was, apparently, to be discerned by ‘comparative study of the nature and workings of culture in its formal, functional, and/or developmental aspects’ (Taylor, 1948: 41). Taylor (1948) did not indicate the role of cultural processes in such studies. Despite the fact that Taylor’s *A Study of Archeology* is sometimes said to anticipate the processual archaeology of the 1960s and 1970s, Taylor (1948) said little else about cultural processes, and he did not (Taylor, 1972) complain that processual archaeologists had ignored his discussion of cultural processes. He could not do the latter as there was little concerning cultural processes for the processualists to ignore.

Caldwell (1959: 304) claimed that ‘the new American archeology’ contrasted with the earlier culture history approach, which had focused on ‘writing a history of material culture’; the new approach was ‘tending to be more concerned with culture process’. Although he implied that culture processes included diffusion, innovation, and migration, his discussion suggests that by ‘culture process’ Caldwell meant in part the interrelations between natural environment and culture – the functional adaptational processes. He, like others at the time (e.g. Griffin, 1956; Thompson, 1956), noted variation in the ‘rates and magnitudes of changes in cultural forms’, and that the rate could be zero or equivalent to stasis (Caldwell, 1959: 304). Caldwell concluded with the hypothesis that ‘behind the infinite variability of cultural facts and behind the infinite and largely unknown detail of historical situations we shall discover the workings of a finite number of general cultural processes’ (1959: 306). Mimicking the disciplinary standard (e.g. Hawkes, 1954; MacWhite, 1956; Meggers, 1955; Rowe, 1959), Caldwell did not distinguish the two families of processes or the processes within each.

Willey and Phillips (1958: 4–5) were interested in ‘processual interpretation’ of cultural chronologies. ‘Processual interpretation’ was a rewording of what Phillips (1955: 248) had termed ‘functional interpretation’. Willey (1953) had earlier equated the two. Willey and Phillips (1958: 5) indicated that by ‘processual interpretation’ they meant ‘any explanatory principle that might be invoked’. They emphasized that processual interpretation was ‘explanatory’ and that their favored agents of change were human groups because of the latter’s ‘social reality’ (1958: 6). Willey and Phillips (1958) distinguished the family of processes responsible for the synchronic operation of a culture from the family of processes responsible for the diachronic evolution of a culture.

Adams (1956, 1960) mentioned ‘processes’, ‘processes of growth’, ‘historical processes’, ‘agencies of change’, and ‘social forces’, but did not indicate what these might be. Adams was following Steward (1949) and Willey (1950: 223), the latter of whom was referring to ‘cultural growth and development’ when he posed the question ‘To what extent can we reconstruct the determinative factors which are responsible for these vertical [that is, temporal] patternings?’ Willey (1950) was no more explicit than Adams
when he listed various processes. He did, however, attempt to indicate how they interrelated when, in the last paragraph of his discussion, he stated

the interaction of technology and environment gives terrific impetus to the culture; and this impetus, mounting snowball fashion, carries the society along in its momentum. Sooner or later historical forces concur to smash or disarrange these dynamic patterns. The result, cultural death, deflection, or a new integration, depends to a great extent on the rigidity and velocity with which the original cultural growth has been molded and propelled toward its fate. (Willey, 1950: 242)

Pre-processual archaeologists called upon various cultural processes to help explain variation in the archaeological record that corresponded with the passage of time. Not surprisingly, the processes they referred to were the standard ones of historical ethnology. By the 1950s, other sorts of processes were being mentioned, and these likely originated in the shift in anthropology generally from historical ethnology to the evolutionism of White and Steward, along with doses of structuralism and functionalism from Malinowski and Radcliffe-Brown. The shift began to crystallize in archaeology in the 1960s with the emergence of processual archaeology. It has been said that processual archaeology ‘placed [emphasis] upon the explanation of change or stability with a view to the understanding of general cultural processes’ (Sterud, 1978: 295). But the key concept – cultural process – was rarely discussed in detail.

WHAT IS A CULTURAL PROCESS IN PROCESSUAL ARCHAEOLOGY?

Willey and Sabloff (1993: 221) believe that the ‘central concern [of processual archaeologists] was the elucidation of cultural processes’, new archaeologists of the 1960s ‘felt that the time had come for serious attack on questions of process’, and processual archaeologists sought to ‘reveal and explain cultural processes’. They equate a cultural process with a ‘causal factor’ (Willey and Sabloff, 1993: 170). In the ‘birth announcement’ of processual archaeology, Binford (1962: 217) indicated that a culture was an extrasomatic adaptive system, and that ‘process’ concerned ‘the operation and structural modification of systems’. He had both synchronic and diachronic processes in mind if by ‘the operation’ he meant how the culture system worked at any one point in time and if by ‘structural modification’ he meant change in how the system worked over time. Binford (1965: 204) characterized the culture history approach as assuming one particular culture process: ‘the dynamics of ideational transmission’. The process or dynamic was ‘learning [based on] cultural transmission between generations and diffusion between social units not linked by regular breeding behavior’ (Binford, 1965: 204). Additional ‘dynamics’ that contributed to the effects of cultural transmission were ‘barriers to social intercourse’, migration, ‘drift’ and innovation (1965: 204). Binford sought to replace this notion with a different conception of culture in order ‘to deal adequately with the explanation of cultural process’ (1965: 205); he followed White (1959: 8) and defined culture as ‘an extrasomatic adaptive system’ and stated that ‘the locus of cultural process is in the dynamic articulations of [cultural] subsystems’; this is process as synchronic operation. Understanding of cultural processes demanded comparative study of the ‘rates and patterns of change in different classes of cultural phenomena’ (Binford, 1965: 209); this is diachronic evolution and seems to echo Carneiro (1960).
A few years later Binford (1968a: 14) wrote that:

Different authors have referred to different phenomena in their discussions of culture process. The phrase has been used to refer to the dynamic relationships (causes and effects) operative among sociocultural systems, to those processes responsible for changes observed in the organization and/or content of the systems, or to the integration of new formal components into the system. The term cultural process has been used by others to refer to patterns or configurations in the temporal or spatial distributions of the archeological materials themselves (see Wauchope, 1966: 19–38). The first set of meanings — that of dynamic relationships operative among cultural systems — is the one used by this author and by the other authors in this volume.

The volume of which Binford spoke is *New Perspectives in Archeology* (Binford and Binford, 1968a). All contributors to that volume may indeed have subscribed to the definition Binford presented, but only one of them used the term ‘process’. Sackett (1968: 69) was concerned with ‘the processes that determined [the] form and mode of change’ of cultural units within the upper Paleolithic of France. Binford (1968a) accuses Wauchope (1966) of using ‘cultural process’ to refer to patterns of artifacts. Wauchope was, among other things, noting that the assumption underpinning archaeological studies of cultural process — stability in artifacts represents cultural stability, change in artifacts represents cultural change — was problematic. He was not saying that patterns in artifacts were processes or even that they were representative of processes, but rather that they might not represent cultural processes. I refer to this hereafter as Wauchope’s dilemma and note that it anticipates the concern with formation processes that emerges in the 1970s. Wauchope was also concerned that there was no satisfactory means to ‘weigh the importance of different categories of cultural stability [and change]’ such as whether, say, ‘changes in the amount of temper used in pottery paste [was equivalent to] changes in the design or style of ceramic decoration’ (Wauchope, 1966: 20). The magnitude of change among artifacts might not be directly related to the magnitude of a cultural process (assuming that it was related at all). But Wauchope (1966) was concerned with only the family of diachronic evolutionary processes; Binford was interested in both families, as were others (e.g. Longacre, 1968; Struver, 1968). What was the best way to access these processes and to conceive of them?

Binford (1962: 223) pointed out that models of how cultural systems worked and evolved had to be tested ‘against ethnographic data’ because it was only in the ethnographic context that one could see the actual operation of cultural processes. He (Binford, 1977: 7) later argued that archaeologists ‘evaluate ideas [that they] may hold about the conditions that brought about change and modification in the organization of dynamics occurring in past living systems. We seek understanding of the processes responsible for change and diversification in the organizational properties of living systems’. The favor bestowed on systems theory by many processualists (see later in this article) originated in part with the fact that the theory forced one to think of a culture as a set of multiple variables with particular structural and functional interrelationships (Carneiro, 1960; Flannery, 1967; Watson et al., 1971: 85), somewhat like White, Steward, Malinowski, and Radcliffe-Brown urged, and how some of their predecessors had conceived of a culture (e.g. Linton, 1936).
Flannery (1968: 74) identified two ‘regulatory mechanisms’ that operated in a cultural system: ‘seasonality’ concerns when, during a year, plant and animal resources are available or ripe for exploitation, and ‘scheduling’ concerns how humans resolve conflicts in seasonality such as when two resources are available simultaneously but in different areas, perhaps prompting men to exploit one and women the other resource. Within the overall resource procurement system, seasonality and scheduling constituted ‘deviation counter-acting’ mechanisms that promoted stability of the system (Flannery, 1968: 79). Flannery (1972: 404) later wrote of ‘mechanisms by which a “tribe” becomes a chiefdom, and a chiefdom a state’; this is a thinly veiled reference to the generic process of cultural evolution.

In the second sentence of the text of what might arguably be the first programmatic textbook for processual archaeology, Watson et al. (1971: 3) include ‘cultural processes’, but the term is not defined there. Nineteen pages later, it is defined in a footnote: ‘“Cultural process” or “culture process” usually means the synchronic or diachronic functioning and interrelationships of the systems and sub-systems that comprise a particular culture or human society; that is, the way a culture works at any one point in time, or the way it changes through time’ (Watson et al., 1971: 22). In the second edition of their book they place this same definition in the text, but it is a parenthetical inclusion, and it appears considerably later in the book (Watson et al., 1984: 44). This is strange treatment for a key concept, but it is not unique with respect to cultural process.

There are many examples of using but not defining the definitive concept of processual archaeology (e.g. Arnold, 1985; Bender and Wright, 1988; Flannery, 1968, 1972, 1999; Glasow, 1978; A.L. Johnson 2004; Preucel, 1991; Redman, 1973; Renfrew, 1969, 1973, 1982, 1994; Rosenswig, 2000; Rowlands, 1982; Sterud, 1978). In his introduction to an edited volume that resulted from a seminar explicitly meant to explore the virtues of adopting systems theory, Hill (1977: 8) noted that many key concepts and terms used in the seminar were not discussed, ‘definitionally or otherwise. It was simply understood that definitions would constitute irrelevant academics – these concepts are not in need of definition’. Perhaps this sort of thinking contributed to the majority of processual archaeologists not defining cultural process. Whatever the case, the authors cited in this paragraph imply that processes are internal to the subject culture, concern adaptation as a state of being or how things operated synchronically (a state of being), and/or concern adaptation as a diachronic dynamic of becoming that focuses on cause–effect relationships. Although using the same term to signify both a static state of being and the dynamic of becoming reduces jargon, it seems to have resulted in ambiguity with respect to whether an author was discussing a dynamic cause or describing a static result. It also resulted in a general failure to explore precisely what a particular process is or does, what happens mechanically, structurally, and so forth when that process is in operation, and if and how the entity under scrutiny differs between times when the process is in operation and when it is not. I believe such concerns never arose in part because by the 1970s the commonsensical meaning of the concept had shifted.

**SHIFTING MEANINGS OF CULTURAL PROCESS**

I suspect that what made the concept of cultural process difficult to discuss in the 1970s and 1980s was that it was a ‘vogue word’ – a word that was used to show that the user had acquired the term and all the supposed intellectual accessories that went with it.
(Service, 1969). M. Johnson (1999: 188) correctly suggested that conceptual ambiguity was exacerbated because the term process could be ‘used by an author in one sense and read in quite another’. This ambiguity allowed an unremarked shift in the meaning of the term over time.

Binford (1968b; see also Binford and Binford, 1968b) not only recognized the difference between the category of processes comprising the synchronic operation family and the diachronic evolution family, but he also noted that the archaeological record had been created by human behaviors, among other processes, and that the creation processes comprised a different category (Figure 2). He argued that an archaeologist must distinguish between explaining the archaeological record – a modern static phenomenon – and an extinct cultural system – a past dynamic phenomenon. A processual archaeologist seeks to understand ‘processual relationships among various classes of material items in the dynamics of cultural systems’, but such understanding can only come after one has explained observations made on the archaeological record [which] necessarily involves coping with problems of process. We attempt to explain similarities and differences in archaeological remains in terms of the functioning of material items in a cultural system and the processual features of the operation or evolution of the cultural systems responsible for the varied artifact forms, associations, and distributions observable in the ground. (Binford, 1968b: 273)

In the last quoted sentence, the wording before the second ‘and’ refers to behavioral processes that create the archaeological record; the words after that refer to the dynamic cultural processes (both synchronic operational and diachronic evolutionary) at work when the culture existed.

The distinction is made by an archaeologist interested in contributing to anthropological theory (Binford, 1962). It, along with Schiffer’s (1976) more detailed discussion,

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Figure 2. A taxonomy of processes discussed by archaeologists. The dashed line symbolizes the fact that those interested in formation processes sometimes conflate cultural formation processes with the category of cultural, social, and behavioral processes.
ultimately led to refocusing the processual approach not on what might be thought of as the ultimate goal of identifying category 2 processes – those involving the operation and evolution of dynamic cultural systems – but on the more archaeologically proximate goal of category 1 processes – what became known as processes that result in the formation of the archaeological record (Schiffer, 1987). (I use 1 and 2 merely to signify order of analysis.) By the middle 1980s, for example, the text of an edited book entitled Structure and Process in Southeastern Archaeology, comprising 14 chapters authored by 16 archaeologists (Dickens and Ward, 1985), hardly mentions category 2 (cultural) processes and instead focuses nearly exclusively on category 1 (formation) processes. Schiffer (1988) highlighted the distinctiveness of the two categories when he distinguished between ‘reconstruction theory’ (concerning category 1 processes) and ‘social theory’ (concerning category 2 processes). In her introduction to the recent volume Processual Archaeology, A.L. Johnson (2004) suggests that processes involve how a cultural system operates and also how the archaeological record is formed.

Additional evidence that formation processes usurped the priority of cultural processes is found in recent perspectives on Wauchope’s dilemma. Keegan (1991) suggests that at least some processes of interest are the behavioral processes that created the archaeological record, and others are the cultural processes or dynamics of an existing culture. Following Terrell (1986), Keegan (1991: 186–7) indicates that ‘cultural processes are the unfolding patterns of variability through time in conformity with nomothetic principles’. Terrell (1986) seems to have skirted Wauchope’s dilemma by suggesting that repetitive archaeological patterns were the results of predictable types of patterned human behavior. Echoing Kroeber (1948), Cunningham (2003: 391) indicates that ‘causal processes interact and combine in the creation of material patterns’. This results in three things. First, a particular pattern ‘can be created by entirely different sets of causal processes’ (2003: 392); this is equifinality (Lyman, 2004). Second, analytical reconfiguration of processes allows one to ‘explain behavior that may differ substantially from any modern situation’ (Cunningham, 2003: 394). And third, different processes and combinations thereof create different patterns in the material record (2003: 395). Identifying which processes and combinations thereof create which patterns is not only the goal of formation process studies (Schiffer, 1987) and middle range research (Cunningham, 2003), but it is, seemingly, now of importance equal to that of identifying the cultural, social, and behavioral processes that processual archaeologists originally sought.

DISCUSSIONS OF CULTURAL PROCESS BY PROCESSUAL ARCHAEOLOGISTS

Eisenberg (1971) argued that Deetz’s (1965) analysis exemplifies processual archaeology because it adopts the view of a culture as a system and seeks to understand the role of kinds of artifacts (in Deetz’s case, ceramic decorations) in a cultural system. It was in fact a systems-theory perspective that produced the two most detailed discussions of cultural processes by archaeologists of which I am aware. One was by David Clarke; the other was by Frank Hole and Robert Heizer.

Clarke (1968: 22) wrote that the ‘primary processes are those of inevitable variation, multilinear development, invention, diffusion and cultural selection. Combined in many permutations and circumstances these processes give rise to such complex
processes as acculturation, and cultural growth, decay and disintegration’. He explicitly
defined a process as ‘a vector which describes a series of states of an entity or system
undergoing continuous change in space or time’ (Clarke, 1968: 42, 668). Clarke (1968:
43) believed that a ‘general system model . . . should be representative of cultural
processes at several levels within a sociocultural unit’. He sought ‘a model for archaeo-
logical processes – archaeological entities changing as special kinds of dynamic systems,
susceptible to analysis in terms of general systems theory’ (1968: 72). He indicated that
‘We should not expect the processes that operate upon cultures or culture groups to be
the same as those that operate upon artifact attributes, although since the former entities
are compounds of the latter elements we might expect the processes appropriate to
higher entities to integrate the simpler processes as well’ (1968: 409). The first part of
the immediately preceding sentence echoes Wauchope’s dilemma, and the last part
concerns the magnitude and scale of processes.

Clarke (1968) lists various processes and provides a detailed and relatively lengthy
statement on category 2 (cultural, behavioral, social) processes that he thought operated
on or within most sociocultural entities. He specified three ‘general processes’ –
ontogeny, migration, interaction – and then suggested that each was manifest in various
ways by development of variants, decrease of variety, increase of variety, and transform-
ation of variety of cultural elements (Clarke, 1968: 409–10). The problem, Clarke
thought, was to derive a ‘nested hierarchy of socio-archaeological processes’ – processes
that linked sociocultural change to change in artifacts of whatever scale (Clarke, 1968:
411); this is an effort to resolve Wauchope’s dilemma. Each process Clarke listed is a
general kind that includes more specific kinds of processes. Many of his processes fall
within the diachronic evolutionary family.

Changes in Hole and Heizer’s multi-edition introductory textbook capture the
growing importance of culture processes in archaeology. There is minimal mention of
culture processes in the first two editions (Hole and Heizer, 1965, 1969), but the 1969
edition contains a discussion of the importance of systems theory to understanding
cultural dynamics. The third edition (Hole and Heizer, 1973: 439) discusses cultural
processes explicitly.

The term ‘process’ or ‘processes’ crops up frequently in the writings of scientific
archeology, and it is also used in history, in manufacturing, and in analysis. As we
understand the term colloquially it refers to the sequential set of operations that lead
from A to B . . . [Given examples in history, manufacturing and research one] can
readily see that process means two quite different things. First, it may refer to a
sequence of events. Second, it may refer to the causes of the sequence of events. In
both meanings, process is conceptually linked with the states or conditions of the
things under observation at different times. As process is used in archeology, it refers
to an analysis of the factors that cause changes in state.

The authors provide the same discussion in an abridged version of their book (Hole and
Heizer, 1977: 358), where they also define ‘process’ in the glossary as ‘the operation of
factors that result in a change of culture’ (1977: 387). Note that Hole and Heizer
indicate that a process can be a simple description of a sequence of events, or it can
refer to cause(s) of that sequence. Given processual archaeology’s hopes to explain the
archaeological record rather than just describe it (Lyman and O’Brien, 2004), a reasonable inference is that processualists sought to identify causal processes that operated prehistorically.

One of the alleged benefits of archaeologists adopting systems theory was that ‘questions phrased in terms of [systems] concepts direct our attention away from institutions and events and toward processes, away from efforts to discover the first appearance of particular cultural practices and toward efforts to understand their gradual evolution, and away from constructions of these events that are relatively hard to define in terms of archaeological observations toward ones that are more sensitive to the data with which we deal’ (Plog, 1975: 215). Plog is unclear, but I suspect he hoped to identify dynamic cause(s) rather than describe static events in temporal terms. Thus perhaps Plog was concerned with how a cultural system operates. Salmon (1978: 175), after all, pointed out that ‘anthropologists were engaged in analyzing social and cultural systems long before the advent of modern systems theory’ (see for example Kluckhohn’s [1951] discussion of Linton [1936]). This is particularly evident if one is aware of the structural–functional approaches in anthropology early in the 20th century, and also of the typical definition of a system as the relationships (mechanical, structural, functional) between entities comprising the system (Hill, 1977; Maruyama, 1963; Plog, 1975; Salmon, 1978). Systems theory seems to be preadapted to studying the dynamic operation (static state of being) of a cultural system.

When Clarke wrote his magnum opus, he modeled his recommendations for archaeological research on systems theory. But he did so with the following explicit and emphatic caution:

It would be all too easy to take systems theory as our model for archaeological [that is, sociocultural] processes and the cultural entities that generate them, without isolating precisely the kind of system these entities represent. This would simply extend systems theory and its terminology as yet another vague analogy of no practical potential. (Clarke, 1968: 39)

Because in Clarke’s (1968: 39) view, anthropologists were ‘only just beginning to analyze social systems in [systems theory] terms’, he devoted the majority of the nearly 700 pages of Analytical Archaeology to building a model of culture, including artifacts, as a system. He used systems theory concepts and terms such as ‘feedback’ and ‘homeostasis’ in his modeling efforts, but his cultural processes were not categorized by him as the generic deviation counteracting ones of the first cybernetics meant to study stasis nor the deviation amplifying ones of the second cybernetics meant to study change (Maruyama, 1963). Rather, they were ‘technocomplex repatterning’, ‘culture group repatterning’, ‘acculturation’, ‘diffusion’, ‘invention’, and the like (Clarke, 1968: 410–12). Flannery (1968, 1972), on the other hand, categorized the cultural processes he identified (seasonality, scheduling, centralization, segregation) as either one or the other of these two general categories (deviation counteracting or amplifying), and he, like Clarke, identified and named specifically cultural processes.

A significant influence on processual archaeologists’ focus on cultural processes was Maruyama’s (1963) discussion of the second cybernetics, or ‘deviation-amplifying mutual causal processes’ (see Flannery, 1968, 1972; Hill, 1977; Plog, 1975 for an
introduction). In his 16-page article, Maruyama used the term ‘process’ 40 times, or 2.5 times per page. What Maruyama means by the term is never explicit. I suggest that he meant several things, including dynamic causes, relationships (mechanical, functional) between variables or entities, and influences of one variable or entity on another. Perhaps because it is unclear whether he meant static mechanical relations or causally dynamic ones, to this day some authors define a cultural process such as ‘centralization’ as ‘the degree of linkage between the various subsystems and the highest-order controls of a cultural system’ (Spencer, 1997: 215). This definition does not identify a dynamic cause though it does implicate some kind of mechanical or functional relationship between phenomena. The name of a process has been applied to both a dynamic cause and its result. This seems to be the way that Maruyama (1963) used the term process, and his use likely influenced archaeologists.

DISCUSSION

Cordell states that:

process refers to quite abstract and repeatable events rather than to particular historic contingencies. The phrase ‘historical process’ can only refer to general statements about the course of history . . . [H]istorical processes are not laws of human behavior or empirical generalizations about how the world works. There are no historical processes. (1994: 157)

Sebastian and McGuire (2001) respond that Cordell incorrectly equated processes with laws, that history itself is a process, and that a critical analytical hurdle concerns how one integrates historical particularities with general processes. The latter problem is, in fact, easily solved (Lyman and O’Brien, 2004; Sengör, 2001). Recognizing this, Sebastian and McGuire (2001: 15) pose two questions: ‘How can we use specific, historical processes to inform our explanations and account for change in the past? How can we use our increasingly sophisticated understanding of general processes as a source of hypotheses about the constraints under which particular societies operated?’ Answers to these questions will be easier to construct with a nuanced understanding of cultural process.

Prior to about 1990 ‘cultural process’ was a commonsensical expression for anything dynamic and operating in a culture over some time span. A few researchers were aware of the difference between synchronic operational and the diachronic evolutionary processes. Consider a chronological list of cultural processes mentioned in the literature (Table 1). To keep the list manageable, processes listed in only one publication (e.g. hierarchization, individualization, intensification, replacement, secularization, tribalization, unification) are not included. The 27 processes in Table 1 include numerous ones within the family of processes concerning cultural transmission. Most concern diachronic evolutionary change; only enculturation/socialization and persistence imply stability, and persistence is descriptive of stasis rather than explanatory (M.W. Willey, 1931). A cumulative list of processes given between 1941 and 1954 includes all but five of the listed processes; all 27 processes are included in a cumulative list dating from 1964 to 1987. This cross-listing of processes mentioned prior to 1960 with those mentioned after 1960 may indicate why few archaeologists discussed the concept – everyone thought they agreed on what it meant and what it comprised.
Table 1. Chronological list of cultural processes mentioned in selected literature

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\(^a\) and parallelism. \(^b\) collapse, decay, degeneration, devolution, disorganization. \(^c\) development, evolution, formation, growth. \(^d\) and aggregation. \(^e\) and cultural transmission and learning.
Notice that I said ‘everyone thought they agreed’ on what ‘cultural process’ meant. Many used the term without definition, only a few defined it in commonsensical terms, and rarely was it discussed in nuanced theoretical terms. The apparent results are three. First, the list of processes did not really change between about 1950 and 1980 (Table I). Thus processual archaeology had trouble building explanations that did not include the traditional historical processes involving cultural transmission. Second, when a dynamic cultural process is named, the name is usually coined from the result of the process (or vice versa). For example, the process of social stratification is applied to the development of social strata, begging the question of whether we have explained anything by saying ‘the process of social stratification’. And third, the meaning of cultural processes shifted to include formation processes in the 1970s (Figure 2). Interest in the latter spawned ethnoarchaeology, middle range theory, experimental archaeology, and the like. No one commented on the potential confusion of the two categories of processes, likely because of the ambiguity of the original concept and a commonsensical notion that human behavioral processes created observed archaeological patterns. Which process is responsible for which pattern – Wauchope’s dilemma – became the problem requiring solution.

More or less redundant cultural processes (e.g. borrowing and diffusion; invention and innovation; evolution, development and florescence) are lumped together in one category in Table 1. Such lumping was not always easy because specific processes are seldom defined, leaving their theoretical implications, their scale, their duration, and other potentially critical aspects of them obscure. A necessary step toward improving the situation, then, is to consider these properties of cultural processes.

**Culture Process Defined**

Psychobiologist Henry Plotkin (2003: 121) indicates that ‘a process is a sequence of events that occurs in time and leads to an outcome, a result or end-state of some form. It is a means of proceeding or doing, involving change’. Continuing, ‘processes are driven by specific causal mechanisms’ (2003: 161). One can study process with no knowledge of mechanism, such as Darwin (1859) did when he discussed evolution as a process of ‘descent with modification’ or inheritance with change, without knowledge of the genetic mechanisms of mutation, transmission, and so on. What might, then, be thought of as subprocesses of evolution include transmission or heritability, sorting (including selection), and the generation of variation; in the case of biological evolution, these subprocesses act via genetic mechanisms (Plotkin, 2003: 133).

We are interested in cultural processes. A culture is a set of interrelated parts (subsystems) that is greater than the simple sum of the parts; cultures have emergent properties – properties of the aggregate but not of the parts comprising the aggregate. Cultures grow or decay (have more, or fewer, emergent properties over time, respectively). The rate of culture change can be zero (stasis), slow, or fast. One variable at a time in a (sub)system can change value; or multiple variables can change at the same time (at the same or different rates, the latter comprising mosaic evolution). The structural and functional (causal) interrelations of two or more variables can change as one or more of their respective values change.

A cultural process is the dynamic, cause–effect interrelations (implying stasis) and interactions (implying nonstasis) of multiple variables at least one of which is cultural.
It is the causal, structural, or functional linkages between variables and the mechanisms operating to affect the linkages that result in interrelations, interactions and reactions of or changes in values of one or more variables when one or more other variables change value. Certain variables will comprise significant contingencies that influence which process(es) operates at some magnitude or intensity for some duration at some scale (how much of the cultural [sub]system is affected) in any particular case.

The magnitude of a cultural process can vary (Hsu, 1959). Magnitude can be modeled as intensity – the degree of a process’s effect – and extent – how much time and how many people are involved. The number of people and the time involved in the operation of a process are likely to be positively related (Figure 3). Change need not occur over the long term, though it may well occur over the short term only to return to some initial state, as with the synchronic operation of a culture. Intensity can be conceived of as the amount of change that occurs per unit of time; the more change (in technology, subsistence, social organization, whatever; any or several or all) per time unit, the greater the intensity of the process. If a process is synchronic and cyclical, then the amplitude of the cycle is indicative of intensity. Units to measure intensity will depend on the process under consideration.

Longacre (1966: 95) argued that cultural processes took place over time spans better witnessed archaeologically than ethnographically. Some cultural anthropologists would disagree (e.g. Redfield, 1934, 1941). Vogt suggested that an ethnographic study should

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**Figure 3. Variation in the scale of cultural processes (modified from Landres, 1992).** Note the direct correlation of number of people (scaled as discontinuous social entities denoted by dashed-line rectangles) and temporal duration. Scale is dependent on the process(es) of concern; scales shown here are for illustration.
minimally involve continuous observation over a span of 20 years; this would be sufficient to ‘define and conceptualize the types of directional processes that are at work in social and cultural systems’ (Vogt, 1960: 29).

Vogt defined a directional process as one that occurs ‘on macro time-scales with sequences that are cumulative and pervasive and involve alterations in the structures of social and cultural systems’ (1960: 22); such processes include cultural evolution, elaboration, florescence, involution, drift, and growth. He defined recurrent processes as ones that occur on micro time scales and that ‘recur with regularity as individual members are born into and socialized by a society, and later as they die and leave the society; or they recur regularly as the society adjusts each year to the natural passage of the seasons; or as the system regularly makes adjustments to contacts with other societies’ (Vogt, 1960: 21; see also Gluckman, 1968). These are similar to diachronic evolutionary processes and synchronic operational processes, respectively, but the important point is that different subsystems operate over different spans of time. Explicit definition of the kind of subsystem and specification of its attendant processes are required to determine if a month or two, or several decades of ethnographic field work are necessary to observe the total operation of a particular process from start to finish, whether of the recurrent/operational family or the directional/evolutionary family. In some cases, only observation may determine duration.

An anonymous reviewer of this article suggested that noting process duration and the distinction of synchronic and diachronic processes are conceptually unhelpful for two reasons. First, evolution is ongoing all the time so no process is truly cyclical or repetitive. Second, the distinction of kinds of synchronic and diachronic processes (Figure 2) could be equated with the distinction of ecology and function relative to evolution. I disagree because each reason rests on an implicit definition and theory of cultural process and an equally implicit theory of how we classify phenomena (Lyman and O’Brien, 2002). Different theories, different definitions, and different classifications will produce different results (Gould, 1987; Lyman and Harpole, 2002).

Synchronic operational processes require a return to a particular state of being; that state defines the beginning and the ending points of the temporal duration of a synchronic operational process. Diachronic evolutionary processes require explication of an initial state and an end state that are different from one another (and neither initiation or termination necessarily implying evolutionary stasis) in order to determine process duration. Once states are defined for either family of processes (classification), process duration (and intensity and magnitude) will vary depending on the historical contingencies of the particular case (Steward, 1968).

Vogt (1960: 18) observed that despite ‘our traditional American interest in culture process and history’, anthropology had shifted in the middle of the 20th century from examination of historical diachronic processes to study of structural, functional and synchronic processes evident in the ethnographic (and, I would add, archaeological) record(s) (see also Barnard, 2000; Bee, 1974; Harris, 1968). The new approach assumed ‘that social and cultural systems tend to maintain equilibrium unless (a) they are either “hit” by some force from outside, or (b) develop some strain within the system which disturbs the equilibrium. Then we concentrate on finding out how equilibrium is restored’ (Vogt, 1960: 19). The result is that we describe the stable-state structure and function of a cultural (sub)system at several points in time (say, t2, t4, and t6), and then
compare the descriptions and imply that processes of change happened between the temporal periods of stability or equilibrium (see also Bee, 1974: 3).

Vogt’s (1960: 20) model of a structural–functional approach and his model of a processual approach are shown in Figure 4 where I have added an indication of recurrent operational and directional evolutionary processes. The structural–functional model epitomizes a synchronic perspective whereas the processual model epitomizes a diachronic one. The former is not concerned with whether continuity or discontinuity exists between entities occupying distinct temporal positions. Rather, one or more steady states are assumed and their operation(s) is studied. Or, heritable continuity created by cultural transmission is assumed and processes of change between steady states are inferred. Vogt’s processual model (not to be confused with processual archaeology) assumes an explicitly diachronic perspective and analysts search for the process(es) resulting in continuity and some sort of connection between states. For Vogt, the two models comprise equally valid analytical approaches. But after the 1950s the tempo and processes of change were seldom studied directly; instead, differences between snapshots of the temporal continuum were assumed to represent change (or stasis) and to show the effects of the operation of (inferred) cultural processes. Plog (e.g. 1973, 1974, 1977) made this point repeatedly during the 1970s’ heyday of processual archaeology. Without citing Vogt (1960), Plog (1977: 24) contrasted ‘organizational change’ – caused by or equivalent to Vogt’s directional processes – and cyclical change – caused by or equivalent to Vogt’s recurrent processes.

A means to integrate analytically and theoretically Vogt’s two models is provided by Darwinian evolutionism, an approach to history that can be adapted to cultural

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**Figure 4. Vogt’s models of a structural–functional approach (A, above the time line) and of a processual approach (B, below the time line). Time can pass from right to left, or from left to right; combinations of rectangles signify different structures or formal variants. After Vogt (1960).**
phenomena (O’Brien and Lyman, 2000). An advantage to starting with that approach is that many evolutionary processes have already been identified, discussed, refined, and modeled (Shanahan, 2004). Adaptation of those processes to cultural phenomena may be relatively easy, and in fact was originally attempted more than 30 years ago when Warwick Bray (1973) equated mutation with innovation, anagenesis with tradition and series, adaptive radiation with cultural diversification, and the like. Various processes of cultural evolution were proposed throughout the 20th century (see Lyman, 2007 for discussion and references); perhaps it is time to revisit those processes and adjust them according to our increased understanding of how the generic evolutionary process works. In doing so, the means to integrate Vogt’s two models (Figure 4) will be apparent.

Considering both the synchronic operation and the diachronic evolution of a culture, we can model the operation of processes. Synchronic operational processes are repetitive and cyclical (Figure 5a). A culture is dynamic, change is incessant, but over the long term, things do not really change, they just operate. A good example is the academic school year – fall semester, winter break, spring semester, summer school, repeat. Diachronic evolutionary processes produce change over either the long term or the short term, depending on the magnitude and rate of change (Figure 5b). These processes do

![Diagram of cultural processes]

**Figure 5. General types of cultural processes.** The vertical axis represents the passage of time (from bottom to top); the horizontal axis represents the formal variation in a cultural system.
not produce repetitive results but rather are constantly producing something new and different. Chaotic change is relatively intense, it will tend to be unpredictable and it can alter the trajectory of evolutionary processes (Figure 5c). A volcanic eruption, an invasion, and a fatal epidemic are examples; think about their influence on the processes comprising an academic school year if one of them occurs unexpectedly. Add synchronic operational processes, diachronic evolutionary processes, and chaotic processes together and an appreciation of the complexity of reality emerges (Figure 5d).

CONCLUSION
Kroeber (1953b: 362–3) contrasted what he called the ‘historical’ approach to anthropology with what he called the ‘processual’ approach, noting that the latter was concerned with causes whereas the former was mostly concerned with gathering and classifying facts. Thus Kroeber may have been the ultimate source of inspiration for the term ‘processual archaeology’ as a label for a nomothetic approach rather than an idio-graphic one (e.g. Watson, 1973). Looking back at the 1960s and 1970s, Redman (1991) made two observations about processual archaeology. First, no more than two or three people could agree on what it was, and second, it was not entirely clear how to operationalize it. The history presented here confirms both observations. Perhaps poor conceptualization not only made it difficult to operationalize the concept but also contributed to why there were few new ideas about cultural processes.

Hegmon (2003) applied the label ‘processualism plus’ to archaeology of the early 21st century, and published that label in the leading journal of archaeology in the Americas – American Antiquity. The June 2004 issue of American Anthropologist – the leading journal of anthropology in the world – included four articles under a section heading entitled ‘Modeling Social Processes’. Clearly, cultural processes are still important to both anthropology and archaeology. Future conceptualization must specify the duration of the process of interest such that the family of synchronic operational processes is distinguished from the family of diachronic evolutionary processes. Such conceptualization will require explicit definitions of operation and evolution. Here, I have tried to take the first steps toward answering the question: ‘What is the “process” in cultural process?’ and have identified the importance of process duration, magnitude, and scale. Future thinking, theorizing, and modeling of cultural processes will be easier, I think, in light of my historical review of the concept in anthropology generally and archaeology in particular.

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Perceptive comments by Christine VanPool, Todd VanPool, and several anonymous, unsympathetic reviewers helped considerably.

References


Sengör, A.M.C. (2001) Is the Present the Key to the Past or the Past the Key to the Present? Geological Society of America (Special Paper 355).
Strong, W.D. (1943) Cross Sections of New World Prehistory. Smithsonian Miscellaneous Collections 104(2).


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