Chapter 7

A Unified Middle-Range Theory of Artifact Design

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In this chapter, a middle-range theory is built that links specific aspects of the form of material culture to specific factors that can determine form. The tactics presented in Chapter 6 for building such a middle-range theory are used. The general nature of material style defined there, including its hierarchical and technological aspects, serves as a guiding perspective for building the theory.

The theory maps a hierarchy of formal attributes to a hierarchy of behavioral and other processes and constraints in a partially determinant, partially indeterminant, and context-dependent manner. The hierarchy of formal attributes is defined by largely objective criteria, including the relative visibility of the attributes, their relative placement in a hierarchy of manufacturing decisions, and their relative position in a sequence of production steps. The processes and constraints that are considered include technological (procedural and material), sociocultural, social-psychological, personal psychological, depth-psychological, and physiological-level factors, which pertain to varying spatial scales. A more expansive conceptual framework for future theory building is outlined in Chapter 1 (Figure 1-1, Table 1-1) and Chapter 14.

The theory built here is primarily middle-range in scope (Binford 1977), in that it aims at "identifying" the formal attributes of an artifact by assigning to each a single or several potential etic meanings. The assigned meanings are general kinds of processes or constraints (e.g., messaging social affiliation, the limitations posed by raw material properties) that may determine the state taken by an attribute. The theory considers but does not focus on the dynamics of the ultimate factors that determine stylistic content, diversity, and change, such as natural and cultural selection, social-psychological motivation and decision making, cognitive-perceptual organization, or the workings of the unconscious. Most of these factors are reviewed in Part II of this book. The theory pertains to all media. It is context-free in a culture-historical sense, but emphasizes the essential role that contextual information must play in deriving interpretations.

Most of the ideas discussed here are not new and are attributable to earlier outstanding theoretical contributions that have been made by many archaeologists and ethnoarchaeologists. What is new is the organization and integration of their ideas into a unified framework in a complementary

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rather than competitive manner, and in a hierarchical arrangement rather than on an equal basis. Different ideas about style pertain to differing ranges of levels of artifact form. By contrasting and placing bounds of applicability on the various ideas, they are both clarified and made operational.

The unified theory presented here was built on the theoretical developments of Whallon (1968), Hardin (Friedrich 1970), Wilmsen (1973), Wobst (1977), Hill and Gunn (1977), Braun (1977, 1980), S. Plog (1978, 1980), Conkey (1978, 1980), Voss (1980), Braun and Plog (1982), Sackett (1982, 1985), and Wiessner (1983, 1985). Their developments were then qualified and integrated into a first approximation of a unified theory by my inductively reconsidering Wiessner's (1983) Kalahari San data and Voss's (1982) European Neolithic ceramic data. Also important in building the theory were my reflections on my own creative experiences and enculturation as a watercolorist and pastel artist over many years, and my less extensive training in oils, potting, weaving, batique, and metalwork. Voss's (1980) paper on unifying style theory was especially critical to framing this inductive phase of theory building. The theory was then tested and refined through a series of studies of data on prehistoric Ohio Hopewell textiles (Carr and Maslowski, Chapter 9), California basketry (Pryor and Carr, Chapter 8), and carved, wooden Iroquois masks (Carr and Rosenthal 1986; Rosenthal, Chapter 10). These studies are presented in subsequent chapters, in order to illustrate the theory.

The significance of the unified theory of design is that it allows stylistic studies to be made analytically more "concordant" (Carr 1985). Specifically, it helps the researcher to choose an initial set of formal variables that are most likely to be relevant to and useful in measuring one or a few behavioral or other processes or constraints that are of interest. This is critical to breaking what has been called the "methodological double bind" (Carr 1985:3, 24–25) at the beginning of analysis, when little may be known empirically about the processes and constraints that determine formal variation. A clear application of how the unified theory can be used to choose relevant variables is given in the stylistic analysis of Ohio Hopewell fabrics reported in Chapter 9. In this case, only some of a broad set of fabric attributes were deduced to be useful for reconstructing regional patterns of social alliance.

This chapter has seven major parts. First, the skeletal structure of the unified theory is overviewed. This structure includes five "hierarchies," which pertain to: (1) processes/constraints that can determine the formal states taken by the attributes of an artifact, (2) the relative visibility of attributes, (3) manufacturing decisions, (4) production steps, and (5) the geographic distribution of the alternative states taken by attributes. The next five sections are devoted to describing each of the five hierarchies and the interrelationships among them. The interrelationships constitute the bridging arguments of the theory. Finally, some analytical strategies for applying the theory are outlined.

AN OVERVIEW OF THE STRUCTURE OF THE UNIFIED THEORY OF ARTIFACT DESIGN

The theory built in this and subsequent sections of this chapter draws upon a rich literature of ideas and terms of many researchers of material style (see citations above). Many of these ideas and terms have had to be qualified and modified here in the process of melding them into a unified framework. Consequently, for clarity, ideas and terms of other researchers are referenced here only when original meanings pertain.

In order to empirically support and illustrate the particular mappings drawn here between form and process, some stylistic data of certain researchers are reinterpreted within the broader framework. These supportive data, as well as nuances of the theory, are presented in the footnotes of the chapter, or in subsequent chapters of this book (Pryor and Carr, Chapter 8; Carr and Maslowski, Chapter 9; Rosenthal, Chapter 10).

Table 7-1 outlines the skeletal structure of the unified theory. Throughout this table and this chapter, the term "attribute" is used in the most general way to refer to either the content or structure of an artifact: its forms, engineering, and other properties (e.g., cord twist tightness, color),

relationships among forms or properties, part–whole relationships, syntactic patterns, and Gestalt–perceptual qualities (e.g., visual texture). This contrasts with the tendency in archaeology to use the term "attribute" to describe content (e.g., motifs, elements) rather than structural relationships. Also, attributes are distinguished here from the various "states" that they may take.

Finally, the concept of the attribute is not used here to refer to the inferred, general rules of organization of the properties of an artifact, as is sometimes the case in grammatical approaches to style and to measuring social interaction (e.g., Roe 1980; Chippendale 1986). The term is restricted to material or empirical properties and relationships.

Table 7-1 shows that, in contrast to the views of Wiessner, Sackett, Hodder, and some others, the design attributes of an artifact need not be conceived of as equal in their characteristics and in their potential for expressing various kinds of processes or constraints. Rather, an artifact's attributes can be thought of as being arranged *hierarchically* according to certain fundamental characteristics or "dimensions" of their variation. These dimensions are: (1) the visibility of the attributes relative to each other; (2) the relative order of the attributes in a hierarchy of manufacturing decisions involved in planning the design and attributes of the artifact; and (3) the relative order of the attributes in a sequence of production steps involved in manufacturing the artifact and manifesting its attributes. Formally, attributes ordered along each of these three dimensions (e.g., highly visible versus obscure attributes, attributes decided upon first versus last) are structured hierarchically. For example, obscure attributes usually occur within, or comprise a part of, highly visible ones.

The three dimensions of attribute visibility, decision order, and production order largely parallel, or covary positively or negatively, with each other. For example, highly visible attributes tend to be those produced either early or late during the manufacture of an artifact, depending on the medium. Because the three hierarchical dimensions covary, they can be used in conjunction with each other to define the hierarchical arrangement of an artifact's attributes. Thus, in Table 7-1, the artifact attributes shown in column 1 are ordered into a hierarchy from 1 to last according to the three hierarchies of dimensions in columns 2, 3, and 4.

Completely independent of these hierarchies of artifact attributes and their characteristics, it is also possible to define a hierarchy of processes and constraints that determine an artifact's design. These are summarized in column 7 of Table 7-1, and listed in greater detail in Table 7-2. They range from processes and constraints that are solely technological, to those that pertain to a society or community and its social segments of various decreasing scales, to those that operate at finer scales. Finer scale processes include those at the levels of the family or other interacting artisans, personal behavior, personal psychology, personal physiology, panhuman depth psychology, and panhuman physiology. The processes and constraints also range from active to passive and conscious to unconscious. Table 7-3 lists some contextual conditions that determine whether the various processes or constraints occur, their intensity, and their form.

The hierarchy of processes and constraints that determine an artifact's attributes and design somewhat parallels and can be linked to the hierarchy of attributes that is defined independently by their relative visibility, decision order, and production order. Consequently, a range of potential, causal processes and constraints, that is, etic meaning(s), can be mapped to each attribute. The nature of an attribute is thus "identified." This linkage of processes to forms is achieved with a large number of middle-range theoretic bridging propositions. These are schematized in column 6 of Table 7-1 and are discussed and justified in detail, below. For example, we find that first-order attributes—attributes that are highly visible, first-order in the hierarchy of manufacturing decisions, and early or late in the production sequence—may be determined by factors that are technological, active or passive social, active personal, or utilitarian functional in nature.

Of the three hierarchies that are used to order an artifact's attributes in order to assign ranges of etic meanings to them, the visibility hierarchy is most useful (see pp. 219–220, 223–224, 247; Voss and Young, Chapter 3; Pryor and Carr, Chapter 8).

The etic meanings that can be discriminated when assigning them to attributes on the basis of

Table 7-1. Hierarchies of Design Attributes, Processes, and Ordering Criteria

	Criteria for Ordering and Identifying the Etic Meaning of Attributes					
Hierarchy of Attributes	Hierarchy of attribute absolute contextual visibility	Hierarchy of manufacturing decisions	Manufacturing production sequence	Hierarchy of geographic expanse of distribution of attribute states (see text for assumptions)	Bridging propositions for mapping form to processes/constraints[a]	Hierarchy of processes/constraints; etic meaning of attributes[a]
First-order attributes, $1 \rightarrow n_1$	Highly visible	First-order manufacturing decisions	Early or late production steps	Broad geographic distribution associated with ecological–culture area	First-order attributes: Technological processes Social, active processes, less commonly passive processes Interacting artisan level, active processes Personal, active processes Utilitarian function	*Attributes constrained by technological procedures or raw material limitations, alone* (e.g., color, size, shape, movement, perceived texture)
Middle-order attributes, $n_1 \rightarrow n_2$	Moderately visible	Middle-order manufacturing decisions	Intermediate production steps	Moderate geographic distribution over expanse of the social group	Middle-order attributes: Social, active processes, less commonly passive processes Interacting artisan level, active processes. Personal, active processes Utilitarian function	*Attributes reflecting society, community, or social segment level processes, active or passive*: Attributes reflecting multisociety interaction spheres, linguistic groups, their common world views, social orders; multisociety distinctions of prestige, rank, class, authority Attributes reflecting the society Attributes reflecting segments within a society (e.g., residence groups, kinship groups, sodalities, gender distinctions; society-specific prestige, rank, class, authority differences

Last-order attributes, $n_2 \rightarrow n_{last}$	Poorly visible	Last-order manufacturing decisions	Late or early production steps	Restricted geographic distribution, defining a style "cline"	Last-order attributes: Social, passive processes Interacting artisan level, active or passive processes Personal and psychological processes, active or passive Personal physiological processes, passive, unconscious Depth-psychological processes, active, unconscious Utilitarian function	*Attributes reflecting finer-scale processes*: Attributes reflecting family or interacting artisan level processes, active or passive Atttributes reflecting personal and personal-psychological level processes, active or passive Attributes reflecting personal physiological level constraints, passive Attributes reflecting depth-psychological level processes, active and unconscious Attributes reflecting panhuman, physiological level constraints, passive

[a]Attributes reflecting artifact utilitarian function crosscut those that reflect the technological, social, interacting artisan, and personal levels. Nonvarying, technologically or materially constrained attributes are not considered.

Table 7-2. Processes and Constraints beyond Utilitarian Function that Determine an Artifact's Design and Their Correlates in Attribute Visibility and Geographic Distribution

Processes and constraints[a]	Attribute absolute contextual visibility	Geographic distribution[b]
Technological processes and constraints		(Research universe = several societies)
Passive constraints posed by basic method of manufacture	Visible	Distribution of the medium
Passive raw material properties	Visible	Distribution of the medium
Society, community, social segment level of processes		(Research universe = several societies)
Expression of social identity:		
Active, conscious expression or communication of boundaries between groups in order to message differentiation, complementarity, rejection, competition, and/or interruption between the groups (Wobst 1977, Wiessner 1984)	Visible	Patchy-bounded
Active, conscious communication of boundaries between groups as part of the competitive strategies of the subgroups within them (Barth 1969; Hodder 1982)	Visible	Patchy-bounded
Active, conscious expression or communication of intragroup cooperation and/or group membership (Wiessner 1983)	Visible	Patchy-bounded or uniform-unbounded
Active, conscious negotiation of social status between groups: reinforcement and resistance (Braithwaite 1982; Hodder 1984)	Visible	Patchy-bounded or random; depends on community settlement pattern
Active, conscious negotiation of social status within groups: reinforcement (Wobst 1977) and resistance (Hodder 1982a)	Visible	Random
Active interaction: active, conscious, stylistic mimicry in order for one group to integrate with another, as during migration or acculturation (Pryor and Carr, Chapter 8; Rosenthal, Chapter 10)	Visible	Uniform-unbounded
Active, conscious communication of other pansociety or pangroup messages:		
Economic or political imperatives	Visible	Patchy-bounded
Ownership	Visible	Patchy-bounded
Social authorship (e.g., made in Japan)	Visible	Patchy-bounded
Regulations of prescription or proscription (e.g., stay off this land)	Visible	Patchy-bounded
Confrontation	Visible	Patchy-bounded
Coercion, domination	Visible	Patchy-bounded
World view, mythological, religious themes or personifications or metaphoric information about the organization of society and the cosmos through representational art or nonrepresentational symbols (Roe, Chapter 2; Rosenthal, Chapter 10)	Visible	Patchy-bounded or uniform-unbounded

Active, unconscious projection of metaphoric information about the social order and cosmology at the structural level (Roe, Chapter 2)	Obscure	Patchy-bounded or uniform-unbounded
Active, unconscious projection of depth-psychological, archetypal figures through pansocietal representations of mythic-religious personages: anima, animus, hero, wise old man, wise old woman, miraculous child, shadow (Rosenthal, Chapter 10)	Visible	Patchy-bounded or uniform-unbounded
Active interaction: intermarriage, adoption, or artifact exchange between groups, or joint participation in intimate rituals or other events, leading to the diffusion of design attributes.	Visible to obscure	Patchy-bounded, uniform-unbounded, or clinal
Passive interaction: less structured contacts between members of two groups, leading to casual learning and diffusion of design attributes (Pryor and Carr, Chapter 8)	Visible to obscure but often obscure	Clinal
Passive sharing of a history of interactions with others by a social group, which constrain the range of techniques of manufacture and/or content. "Historicity" (Braun, Chapter 5) leading to restricted ranges of "isochrestic options."	Visible to obscure but often obscure	Patchy-bounded, uniform-unbounded, or clinal
Finer-scale factors:		
Family artisan and interacting artisans level of processes		(Research universe = one society)
Active, multiperson system of creative inspirations (e.g., Lowman and Allan 1973:22; Roe 1979:200)	Visible to obscure	Clinal
Active component of enculturation: teacher–student negotiations, joint participation in craft schools	Visible to obscure	Clinal
Passive component of enculturation (Longacre 1964)	Visible to obscure but often obscure	Clinal
Passive interaction: less structured contacts between artisans, leading to casual learning and diffusion of design attributes (Pryor and Carr, Chapter 8)	Visible to obscure but often obscure	Clinal
Passive sharing of a history of interactions with others by a family (Pryor and Carr, Chapter 8)	Visible to obscure	Clinal
Personal behavioral and personal psychological level of processes		(Research universe = one society)
Expression of personal identity:		
Active expression or communication of individual artisan's states of being (e.g., emotional state, liminality, alienation, or integration)	Visible to obscure	Random
Individual artisan's active, conscious or unconscious preferences (can be part of the active component of enculturation: teacher–student negotiations (Pryor and Carr, Chapter 8)	Visible to obscure	Random
Individual artisan's active, conscious or unconscious creative inspirations (can be part of the enculturation process, teacher–student negotiations)	Visible to obscure	Random
Individual artisan's active, unconscious selective memory (Rosenthal, Chapter 10)	Visible to obscure	Random

(*continued*)

Table 7-2. (*Continued*)

Processes and constraints[a]	Attribute absolute contextual visibility	Geographic distribution[b]
Active, conscious communication of other personal messages:		
Ownership	Visible to obscure	Random
Authorship (e.g., artisan's mark)	Visible to obscure	Random
Regulations of prescription or proscription (e.g., stay off this property; no smoking near me)	Visible	Random
Passive, personal history of interactions, and influences through diffusion, that constrain one's range of known techniques of manufacture and/or content; "historicity" (Pryor and Carr, Chapter 8)	Visible to obscure	Random
Passive, idiosyncratic, habitual methods of manufacture	Obscure	Random
Personal physiological constraints		(Research universe = one society)
Passive motor skills (e.g., handedness) (Hill and Gunn 1977)	Obscure	Random
Panhuman, depth-psychological level of processes at the core of the person's psyche/self (Jung 1964)		(Research universe = several societies)
Active, unconscious projection of archetypal personifications (e.g., the Hero, Wise Old Man, Numinous) through society-specific, mythic-religious personifications)	Visible	Patchy-bounded
Active, unconscious projection of panhuman archetypal, themes about relationships (e.g., gender relations, family relations, dominant–subordinant relations, the oneness/individual dichotomy, relationships about healing, etc.)	Obscure	Patchy-bounded or uniform-unbounded
Panhuman physiological constraints		(Research universe = several societies)
Passive neurophysiological constraints on perceptions and visions (e.g., phosphene-induced shapes; Reichel-Dolmatoff 1987)	Visible to obscure	Uniform-unbounded

[a]The processes and constraints listed here are a subset of the process and constraints cited by Carr and Neitzel (Chapter 1, Table 1-1, columns 3 and 4, respectively). Factors at the technological level defined here can be envisioned as a subset of ecological-level factors that Carr and Neitzel define.

[b]A distribution is clinal when an attribute state follows a smooth distance–decay model of some form away from the center of the social unit of interest. The decay may terminate either within or beyond the unit's boundary. A distribution is uniform-unbounded when an attribute state occurs uniformly over several units of interest. A distribution is patchy-bounded when an attribute state is more or less uniform within a social unit, differs between units, and exhibits a threshold/boundary between units. A distribution is random when the states of an attribute occur randomly within the unit of interst. Units may be societies, communities, or smaller groups, depending on the process. They must be territorial or residence groups for the listed geographic distribution to pertain.

It is assumed here that the design attribute can take a large number of states so that a clinal distribution can freely take this form as opposed to being constrained into a patchy-bounded or uniform-unbounded distribution (see pp. 240–241).

the attributes' visibility, manufacturing decision order, and production order, alone, are broad. They fall into a few classes: (1) a set of technological processes and constraints; (2) several classes of social factors of several scales that can perhaps be distinguished; and (3) an amalgam of finer-scale factors at the levels of the family and interacting artisans, personal behavior, personal psychology, personal physiology, depth psychology, panhuman physiology. Determining the more particular causes of attributes requires a consideration of the geographic and contextual patterning of attributes.

Specifically, it is possible to define a fourth, hierarchically structured dimension of attributes (Table 7-1: column 5), which describes the geographic expanses of the distributions of their alternative states. This hierarchy parallels the visibility, manufacturing decision, and production step hierarchies under certain natural environmental and social organizational conditions. Among these conditions are the uniformity of raw materials over the research universe and the lack of artifact exchange. When those conditions hold, the factors that potentially determine an attribute can be inferred from the geographic areas over which the attribute's states are distributed, both absolutely and relative to each other, and the areas of the states of other attributes. This is so because different kinds of factors operate at different spatial and sociocultural scales. In addition to the spatial expanses of an attribute's states, information on the forms of their distributions and a wide array of contextual considerations can be used to refine the etic meanings assigned to an attribute.

Note that utilitarian functional constraints on design are not considered explicitly within the framework presented here. This is done, in part, because functional constraints, as a category, manifest in attributes of many levels of an artifact's design. Attributes that are strictly functional cannot be predicted on the basis of their visibility, manufacturing decision order, or production step. Moreover, functional constraints sometimes crosscut the technological, social, or other factors that may determine an artifact's design (Carr, Chapter 6:Figure 6-4), making it impossible to discriminate attributes that reflect only one of these.[1]

The framework presented in Table 7-1 is formally a middle-range theory. Middle-range theory allows what Binford (1977) calls the "identification" of a phenomenon—the logic whereby a phenomenon is assigned etic meaning on the basis of objective criteria. Here, design attributes are the phenomena to be identified; their causal factors are the etic meanings to be assigned; and the objective mapping criteria are an attribute's relative visibility, decision order, and production step. The act of linking form to causal factors on the basis of these criteria is the logical process of identification (Figure 7-1). The bridging propositions presented below that use these criteria to link form to cause are what Binford calls "identifying propositions" or "definitions."

The idea of conceiving of an artifact's design as a hierarchy of attributes that reflect different processes and constraints has much precedence in archaeology. Different researchers have used attribute visibility, attribute position in the production sequence, or attribute position in the decision hierarchy singularly to define attribute hierarchies, and not all researchers have recognized that attributes of different levels correlate with different processes.[2] In contrast, some ethnological statements

[1]McGuire and Schiffer (1983) provide a broad theory of artifact design that considers both functional and social factors within a decision-making framework. Their theory can perhaps be integrated with the framework presented here (see pp. 229–230).

[2]The concept of an artifact's design being a hierarchy of attributes is embedded in the type–variety concept of traditional archaeological classification (Gifford 1960). The idea was stated more explicitly by Whallon (1968), was first operationalized and documented well by Hardin (Friedrich 1970), and was subsequently refined by Redman (1977:Fig. 4.2). Different researchers have used different criteria for defining attribute hierarchies. Gifford (1960) implicitly used attribute visibility. Hardin (Friedrich 1970:333, Hardin 1979:92, 1983a:315) generally used attribute position in the production sequence (see Footnote 27, p. 230). Redman (1977:46), Plog (1978:161, 1980:41–42), Braun (1977:129), and Braun and Plog (1982:511) used attribute position in the decision hierarchy. Many other archaeologists have understood the hierarchical organization of decoration or the total design of an artifact (see Graves' [1982:306] review), but have not seen that attributes of different levels reflect different processes.

Table 7-3. Contextual Conditions that Determine the Occurrence, Intensity, and/or Form of the Processes/Constraints that Determine an Artifact's Design[a]

Technological factors
Curation or expediency stressed by the technology
Material, time, and labor costs set by the technology
Artifact's anticipated use-life

Ecological and regional–historical factors
Environmental structure and grain, which affects the distribution of societies, degree of contact between societies, access to raw materials, relative prestige (Roe, Chapter 2)
Environmental content, which affects the abundance of raw materials
Regional historicity: the extant pool of isochrestic design alternatives upon which selection can act (Braun, Chapter 5)

Social, community-level factors
Social factors affecting between-society diffusion: grammatical, symbolic, and semantic similarity of styles of different societies; ethnotaxonomy of their styles (Roe, Chapter 2)
Sociocultural factors affecting the degree of contact, cooperation, and competition between societies
Pansociety population density and its effect on daily interaction rates, audience sizes, and artifact viewing distances
Socially determined priorities of various messages, situation-dependent or independent, active or passive
The social situation, its nature, group composition, and their effects on message priorities
The social situation, group size, and their effects on interaction and artifact viewing distances
Socially determined weighting of media for their communication potential ("semantic weighting," Roe, Chapter 2), active or passive
Society-wide concepts of the self (Carrithers, Collins, and Lukes 1985)
Socially determined concepts of property and ownership, active or passive
Constrained social access to raw materials, active
Social factors that affect the costs of artifact production and value, active and passive
Social historicity: the extant pool of isochrestic design alternatives upon which selection can act (Braun, Chapter 5)

Finer-scale factors
Family artisan and interacting artisans' level
Factors that affect enculturation (Roe, Chapter 2; Pryor and Carr, Chapter 8):
- Active power relations between teacher and student
- Kin relations, generations, and genders among which teaching occurs
- How creativity is accepted and criticism presented
- Realms of protected deviation
- Curation and archiving of models
- Active or passive preservation processes that affect the continuity of enculturation
- Artisan mobility

Factors that affect casual learning and diffusion:
- Grammatical, symbolic, and semantic similarity of the styles of groups; artisan mobility; frequency of contact

Family historicity: the extant pool of isochrestic design alternatives upon which selection can act (Braun, Chapter 5)

Personal behavioral and personal psychological levels
Personal technological knowledge
Personal historicity: the extant pool of isochrestic design alternatives from which choices can be made
Personal message priorities
Personal preferences, goals, strategies
Personal beliefs, world views
Ego drives
Contents of the personal layer of the unconscious: subliminal information, repressed thoughts and inspirations, personal manifestations of the archetypes

Personal physiological level
Personal physiology affecting motor coordination

(*continued*)

Table 7-3. (*Continued*)

A Panhuman, depth-psychological level
Contents of the cultural and universal, collective layers of the unconscious: mythological themes and structures about the social order and cosmology; culture-specific manifestations of the archetypes; the archetypes
Panhuman physiological level
Neurophysiology and biochemistry affecting nature and content of altered states of consciousness
Active memory capacity and information processing capability

[a]The contextual conditions listed here are equivalent to the "conditions"' and "adaptive milieux" cited by Carr and Neitzel (Chapter 1: Table 1-1, column 4).

on the nature of style (Kroeber 1963; Barth 1969), and recent archaeological studies of style (Sackett 1982; Hodder 1982a; Wiessner 1983), have treated attributes as formally equivalent, nonhierarchical in organization, and without different predispositions for reflecting various processes and constraints.

It should be stressed that the framework presented in Table 7-1 pertains to *attributes* that comprise a *single* kind of artifact and the relationships among attributes. These constitute a system. The theory does not pertain to multiple artifact classes or their combined inventory of attributes, which need not constitute a system. It is the organization of attributes in the context of each other as a physical, formal, technological, syntactic, and semantic system (see pp. 216–219; also Carr, Chapter 6:160), and the constraints that attributes thus come to pose on each other during their production, use, and display in a set range of contexts, that leads in part to the predictability of their causal factors.

THE HIERARCHY OF PROCESSES AND CONSTRAINTS

In this and the following four sections, each of the hierarchies shown in Table 7-1 are described. The bridging arguments that link them are also presented. This section begins by showing how the

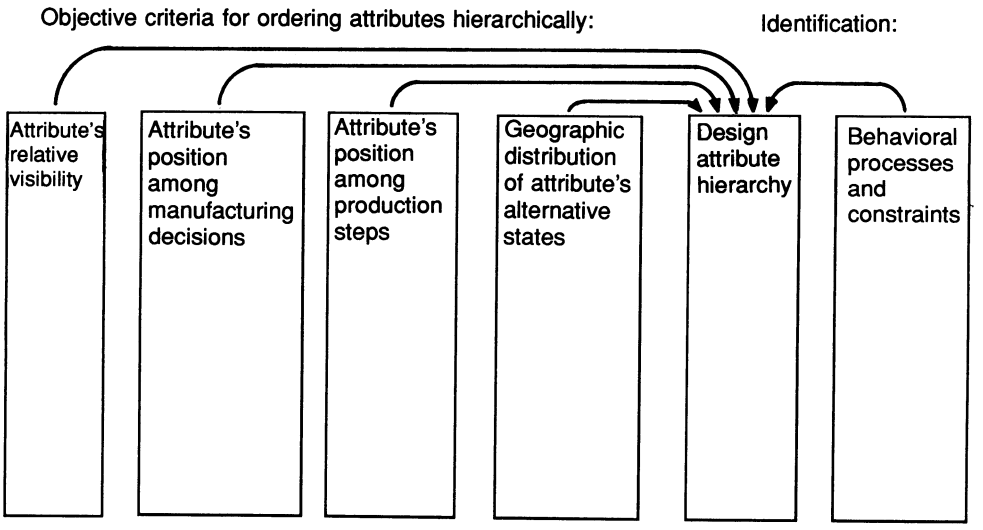


Figure 7-1. The framework presented in Table 7-1 is a middle-range theoretic framework in that it provides objective criteria for "identifying" (i.e., assigning etic meaning to) design attributes. The specific form of attribute visibility (column 1) that is relevant is the attribute's "absolute contextual visibility" compared to that of other attributes (see Table 7-5).

various processes and constraints that can determine an artifact's design can be envisioned as being arranged hierarchically. Then, definitions are given for and distinctions are made between four categories of processes that are not clearly distinguished in current archaeological literature. These are active, passive, conscious, and unconscious processes.

The Hierarchical Arrangement of Processes and Constraints

The most fundamental kinds of processes and constraints that can determine an artifact's design, and that are considered explicitly in the theory developed here, are characterized in general terms in Table 7-1 (column 7) and enumerated in detail in Table 7-2. These processes and constraints can be arranged hierarchically into three major levels: (1) technological; (2) social; and (3) finer-scale familial, personal, psychological, and physiological processes. Processes that operate at the social level, in turn, can be arranged from those pertinent to larger entities such as interaction spheres and a society as a whole to those pertinent to smaller social segments (cf. Conkey 1990:12 for a dynamic view of social units). Within each level, processes can then be arranged from active to passive and conscious to unconscious processes.

Carr and Neitzel (Chapter 1:Table 1-1, columns 3, 4) inventory a somewhat wider range of factors, especially ecological and psychological ones. These additional factors are not considered here and comprise areas for future theory-building efforts.[3]

The ordering of processes and constraints from technological to personal, as defined here, is truly hierarchical in nature. The lower the level of a process, the more processes within which it is embedded. (1) Technological processes are defined as those that are solely technological in nature. (2) Social through personal-level design processes are embedded within technological ones. Specifically, all design attributes that actively or passively reflect society, social groups, or the person are technological in the sense that the attributes occur within a manufacturing sequence (Sackett 1985). For example, the manner in which a biface is thinned may be socially constrained, but the fact that thinning a biface is a manufacturing process makes this attribute technological as well. (3) In a similar way, personal-level design processes are embedded within both technological and social ones. The attributes that an artisan chooses to express his or her individuality through combining them in a unique way will largely be those drawn from a socially constrained pool of attributes which are the product of the history of that social unit. The attributes that an artisan chooses will also be expressed through a manufacturing sequence.

This structuring of processes is complex. It is not mirrored by the terms that archaeologists have used intuitively to name the processes that determine an attribute or to refer to attributes—for example, "technological-," "social-," or "personal-" level processes, or attributes that are "technologically," "socially," or "personally" determined. In common usage, the term that is used to name the processes that determine an attribute, or to refer to an attribute, is always the *finest-grain* process (Figure 7-2). For example, a person's unique selection of a particular combination of attribute states from a wide set of socially and technologically constrained states is called a personal-level process. It is not called a personal *and* social *and* technological-level process. And the attribute is thought to reflect the person, not the person and society and technology.

This practice of naming processes and attributes by the finest-grained one that operates is retained in this chapter for simplicity. However, the more complex, hierarchical structuring of processes and attributes is important to remember.

Contrasting with the intuitive archaeological approach to naming processes and attributes is that of Sackett (1985). He calls all attributes technological, after this most encompassing determin-

[3]Carr and Neitzel (Chapter 14) provide some guidelines for such development. However, it should be recognized that factors of the technological level defined here can be envisioned as a subset of the ecological-level factors that Carr and Neitzel (Chapter 1) enumerate. This is true to the extent that natural, raw material properties, distributions, availabilities, and related characteristics of an ecosystem constrain technological possibilities.

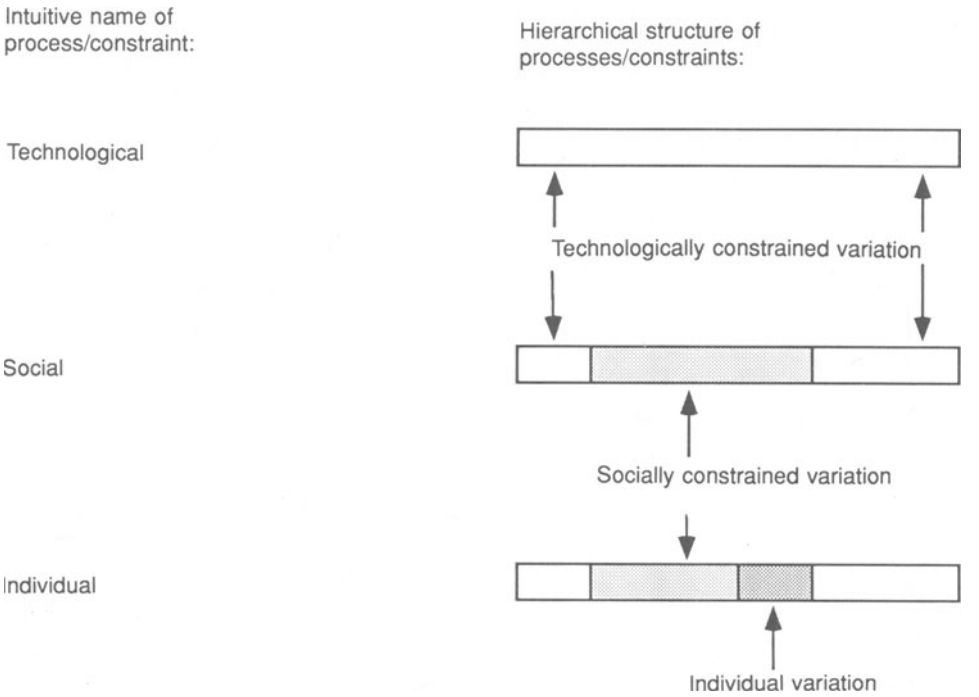


Figure 7-2. The processes and constraints that determine a design attribute's character are hierarchically nested. However, in common, intuitive terminology, the process/constraint by which the attribute is referred, and that is assigned to it as determining its character is the finest-grained one.

Table 7-4. Active and Passive, Conscious and Unconscious Processes

Dimension	Active (controlled)	Passive (uncontrolled)
More conscious (aware)	Expression of social identity	Technological, methological constraints
	Active interaction, stylistic mimicry	Technological, raw material constraints
	Expression of other social messages[a]	Shared culture history of interactions
	Expression of metaphoric information about the social order, cosmology	Enculturation
	Expression of personal identity	Passive interaction, casual learning between groups
	Expression of other personal messages[a]	Family and personal histories of interaction
	Personal preferences	Individual habitual methods of manufacture
	Enculturation	
	Depth-psychological, archetypal, mythological themes	
Less conscious, unconscious (less aware)	Expression of metaphoric information about the social order, cosmology	Shared culture history of interactions
	Projected messages of social or personal identity	Enculturation
	Depth-psychological, archetypal, mythological themes	Family and personal histories of interaction
	Personal preferences or inspirations	Individual habitual methods of manufacture
	Personal, selective memory	

[a]See Table 7-2 for a listing of messages.

ing process. This taxonomic practice is confusing and is not used here because it does not recognize the hierarchical narrowing of constraints (Figure 7-2). In this chapter, only attributes that are solely technologically determined are called technological.

Active, Passive, Conscious, and Unconscious Processes

Processes within each of the social, interacting artisan, and personal levels are ordered from active to passive ones and/or conscious to unconscious ones (Table 7-2). The active–passive continuum and conscious–unconscious continuum are two distinct dimensions of variation. They require explicit definition. This is necessary because in current archaeological literature (e.g., Braun and Plog 1982; Hodder 1982a; Sackett 1985; Wiessner 1985), the terms "active" and "passive" have been used in multiple ways by different authors, often implicitly, and without clear distinction from the conscious–unconscious dichotomy.

Active and passive processes are distinguished by the amount of *control* that the artisan has over them. For example, messaging status distinctions is an active, communication process within the control of the artisan. In contrast, the constraints posed by raw materials or by the pool of motifs that are available for selection as a product of culture history are passive and beyond the artisan's control.

Conscious and unconscious processes are distinguished by the level of *awareness* that the artisan has of them. For example, an artisan may be conscious of some messages of social and personal identity or metaphoric information about the social order that he or she actively invests in an artifact. The artisan may be less conscious or unconscious about other, social metaphoric and depth-psychological, archetypal themes that he or she encodes into the piece. Much of the mental activity of an artisan or perceiver during the production and viewing of an artifact occurs and remains at a semiconscious, preverbal level. Pryor (1985) calls this the "practical conscious."[4]

Table 7-4 shows the distribution of many processes within a cross-tabulation of the active–passive and conscious–unconscious dimensions. Note that some processes vary in their nature and fall in multiple categories. Especially significant is enculturation. In much archaeological literature, enculturation has been naively equated with only passive learning. It has been separated from broader contextual factors (e.g., power relations, family cycles, the etiquette of criticism) that make its character more variable (Carr and Neitzel, Introduction to Part III; Pryor and Carr, Chapter 8), as Table 7-4 shows. Also note in Table 7-4 that many passive processes can be either conscious or unconscious in nature.

Active processes vary in the expanse of the spheres over which control is attempted or achieved and the degree to which the artisan attempts control. Three kinds are definable: (1) Active processes that involve the least control include simply the *expression* of personal preferences and inspirations and social traditions for internal, personal reasons (Rosenthal, Chapter 10). (2) Processes that involve more control include the *communication* of personal and social messages to others for adaptive purposes that are not aimed at changing the existing social order (Wobst 1977; Sackett 1985). (3) Processes that involve the most control include social strategies for *negotiating, manipulating, and/or altering* the social order (Hodder 1982a:84–85; Wiessner 1983). These three kinds of active processes have not been clearly distinguished in the archaeological literature.

[4]Most polar distinctions that might be made between conscious and unconscious processes, especially among active processes (Table 7-4), are artificial. Both the production and perception of an artifact involve mental processes that bridge the unconscious to the conscious. During production and perception, unconscious content and meaning is brought into more conscious levels of the psyche and integrated with other conscious content and meaning at those levels. These levels include but are not restricted to the preverbal, semiconscious level that Pryor (1985) calls the "practical conscious."

THE VISIBILITY HIERARCHY

This section elaborates on Wobst's (1977) and Hardin's (Friedrich 1970) basic observation that the visibility of a design attribute correlates with the kinds of processes that determine it or are reflected by it. The section has four parts: First, the concept of visibility is defined in absolute and contextual terms. Second, the general nature of arrangement of the visibility hierarchy is discussed. Third, a large number of bridging arguments that link the visibility of an attribute to the processes that potentially may determine it are presented. Finally, the bridging arguments are used to integrate the information exchange and social interaction theories of style.

Visibility Defined

The visibility of an attribute depends on more primary physical and contextual variables. Those most essential are listed in Table 7-5.

Using these variables, four kinds of visibility of an attribute can be defined. These are its absolute physical (AP) visibility, its absolute contextual (AC) visibility, its relative physical (RP) visibility, and its relative perceived physical (RPP) visibility (Table 7-5). Distinguishing these kinds of attribute visibility is necessary if systematic relationships between form and process are to be found. However, archaeological literature in general does not make these distinctions. It moves freely, particularly between the physically and contextually defined kinds of attribute visibility (Voss, 1982; Hardin 1970; Braun 1987, Chapter 5).

Of the four kinds of visibility, the absolute physical visibility of an attribute is most essential to the arguments that link form to process below. The AP visibility of an attribute determines the contexts of viewing and social situations in which the attribute can and cannot easily be seen, communicate messages, be copied, and so on. In setting these limitations, the AP visibility of an attribute thus also determines the kinds of active processes that the attribute can and cannot reflect at the social, interacting artisan, and personal levels. AP visibility is thus useful in developing middle-range theory that applies across multiple contexts.

The absolute contextual visibility of an attribute summarizes the interaction of form and context into one measure of visual effectiveness. It is useful when analyzing material styles within one context. However, by combining both physical and contextual parameters, this measure of visibility does not allow the varying relationships between form, context, and process to be evaluated across multiple contexts and the building of middle-range theory.

The two measures of relative visibility are most useful in defining the hierarchical relationship among attributes of an artifact. However, they cannot be used by themselves in theorizing about the linkages between form and process because they do not measure the ease with which an attribute can be seen or comprehended at given distances in given social situations.

The General Nature of Arrangement of the Visibility Hierarchy

Attributes that are ordered according to their relative physical visibility usually follow a general pattern. Typically, they range from: (1) the overall size, form, color, texture, and/or movement of an item's design, as perceived in a Gestalt manner; through (2) its primary, secondary, and further partitions of composition and layout; to (3) the details that fill the partitions. An example of a hierarchy of attributes arranged by their RP visibility is shown in Table 7-10 (p. 217) for a piece of clothing. The attributes range in their RP visibility from the highly visible overall form of the item (dress vs. slacks), through highly to moderately visible features such as color and neckline form, to the more obscure details of adjunct decoration and stitching.

This general format of the visibility hierarchy often holds, but it is not universal. Case-specific variation in almost any of the primary physical variables that determine an attribute's AP visibility

Table 7-5. Defining the Visibility of an Attribute

Some physical variables that determine an attribute's visibility

1. The attribute's size
2. The degree to which the attribute contrasts with other attributes that form its background
3. The number of alternative states that the attribute takes and their range of contrast in a population of artifacts. This in turn depends on culture-historical factors, natural environmental limitations, and data coding schemes (see text)
4. The attribute's complexity. This determines its comprehensibility and ease of decoding
5. The attribute's frequency in the artifact of which it is a part
6. Whether the attribute is more visible in the endproduct or during artifact production

Some contextual variables that determine an attribute's visibility

7. The geographic density of the artifact of which it is a part
8. The social and physical contexts of artifact use. These, in turn, determine:
   (a) The distance from which the attribute is typically viewed
   (b) The openness or closure of the context of viewing
   (c) The number of viewers
   (d) The stillness or motion of the object or viewers (Lowman and Alland 1973:7)
   (e) Lighting conditions
9. The visibility of the attribute during artifact production versus artifact use and the different audiences present during both
10. The degree to which the attribute and artifact contrast with the natural and built environment's colors, forms, etc., which serve as a background (Lowman and Alexander 1973:19)
11. The use-life of the artifact
12. The time over which traditional prototypes are preserved and can serve as models for learning
13. Learned cognitive patterns of perception

Kinds of attribute visibility

1. The *absolute physical visibility* (AP visibility) of an attribute and its alternative states when viewed from some standard distance and from an objective physical-engineering standpoint, alone. This depends on the physical variables, 1–6.
2. The *absolute contextual visibility* (AC visibility) of an attribute and its alternative states when viewed from a distance that is determined by the context. This depends on both the physical and contextual variables, 1–12.
3. The *relative physical visibility* (RP visibility) of an attribute and its alternative states compared to other attributes and their alternative states from an objective physical engineering standpoint, alone. This depends on variables 1–6. The relative physical visibility of an attribute does not change with the viewing distance.
4. The *relative perceived physical visibility* (RPP visibility) of an attribute compared to other attributes. This depends on all of the physical variables, 1–6, plus learned patterns of cognitive perception (variable 13). It does not change with the viewing distance, but may change from culture to culture.

(Table 7-5, variables 2–6) can lead to a different ordering of attributes. For example, consider variable 3, the range of variation of an attribute's alternative states. This can considerably affect an attribute's AP visibility, its RP visibility and specific position within a visibility hierarchy of all attributes, and the behavioral meanings that the attribute can assume. An illustration of this circumstance can be found in the attribute, the type of fiber used to make a fabric. This attribute could have a high physical visibility relative to other attributes if silk, wool, and nonlustrous bast fibers were the alternative states taken by it in a population of fabrics. The fabrics made of different materials would differ notably in their Gestalt-perceived texture and color. Also, in this case, the attribute might have technological meaning. Silk might be necessary in the production of satin weaves, to bring out their luster. Wool might be necessary to make felt cloth (Emery 1966:108, 22). Bast fibers might be used more widely for other purposes. The attribute, fiber type, might also have social meaning. Silk might be used for expensive

clothing used in formal social situations. Bast fibers might be used for inexpensive clothing worn daily. In contrast, the attribute, fiber type, might have a poor physical visibility relative to other attributes if the population of fabrics were made with only nonlustrous bast fibers of similar kinds. Also, in this case, the attribute's variation might reflect only personal preferences or the shared history of schooling of closely interacting artisans (Pryor and Carr, Chapter 8).

Cross-cultural differences in perception (Table 7-5, variable 13), and in judgments of the RPP visibility of attributes, also lead to case-specific variation in the arrangement of attributes in the visibility hierarchy and deviation from the general pattern (Washburn 1983a, Chapter 4). For example, care in the production and weave of baskets, as manifest in their textural fineness and regularity, is more "visible" to the Pomo Indians of California than is the color of the weaving material (J. Pryor, personal communication). In contrast, for a lay Westerner, the color of the basket would probably register first. Similarly, lowland South Amerindians do not perceive the colors of a surface along simply the Western scales of hue and chroma (darkness), but also consider their reflectivity (Roe, Chapter 2). A slight difference in hue and chroma between two darkly colored surfaces, which would normally be perceived as poorly to moderately visible by a Westerner, would be perceived as more visible by a lowland South Amerindian if the surfaces differed in their reflectivity.

Another way in which cross-cultural differences in perception might lead to case-related differences in the arrangement of attributes in the visibility hierarchy is by affecting the number of alternative states of an attribute that are recognized. For example, the number of states of color recognized by a culture varies greatly among cultures (Berlin and Kay 1969). For an artifact class with a given range of color, societies recognizing more subdivisions within that range might perceive the attribute of color as more visible, relative to another attribute, whereas societies recognizing fewer color subdivisions might perceive the attribute of color as relatively less visible.

In sum, although there is a tendency for certain broad classes of attributes having greater or lesser RP visibility and for attribute visibility hierarchies to have the general form of arrangement described above, this pattern is not universal. The case-specific states of the primary variables that determine an attribute's AP and RP visibility (Table 7-5) must always be considered when defining a visibility hierarchy.

Attribute Definition and the Arrangement of the Visibility Hierarchy

The primary physical and contextual factors listed in Table 7-5 are not the only factors that determine the visibility of an artifact's attributes and their hierarchical arrangement. Also relevant is the manner in which the attributes have been defined analytically. Two aspects of attribute definition are important. First is the kind of scale along which the attributes' states are measured. Second is the level of generality with which the attributes' states are defined.

Scales of Measurement. Attributes of an object can be measured on nominal, ordinal, or continuous scales. Voss (1982) has equated nominal-scale attributes with physically visible ones and continuous attributes with physically obscure ones. He suggested analyzing these two kinds of data separately, in order to separately measure social communication and social interaction, respectively.

This strategy is methodologically attractive because most statistical methods operate on data of only one scale. However, the basic equation of nominal-scale attributes with visible ones and continuous attributes with obscure ones is not universally true. This is so because the visibility of an attribute depends on the distribution of and contrast between its alternative states. Specifically, if a continuous attribute has vivid modalities, it can operate like a visible, nominal-scale attribute (Spaulding 1982). For example, the length, width, and overall size of !Kung San projectile points are twice as small as those of G/wi and !Xo San points. The two modes of point sizes do not overlap in their range. Thus, in this case, length, width, and size are attributes with high relative physical visibility and distinguish San language groups, even though the attributes are continuous. Similarly, a nominal-scale, multistate categorical variable can operate like an obscure, continuous variable if all of its

alternative states are similar. An example would be the attribute, color, in a case where all artifacts are close shades of blue.

Thus, it is not possible to generalize about the physical visibility of nominal-scale and continuous attributes. The degree of continuity in the states of a nominal-scale attribute, and whether modalities occur in the states of a continuous attribute, must always be noted when evaluating their physical visibility. In turn, nominal-scale and continuous attributes can each vary from one data set to another in the range of processes and constraints that they reflect, depending on the distribution of and contrast between the states they take.

Attribute State Generality. The level of generality with which the states of an attribute are defined and coded must also be considered when evaluating its physical visibility. The generality of an attribute's states can affect their contrast relative to each other and, thus, the physical visibility of the attribute (Table 7-5). For example, again consider the attribute, the type of fiber used to make a fabric. The states defined for this attribute for a population of fabrics might make the simple distinction between plant and animal fibers. This distinction might be highly visible. Alternatively, more specific but less visible distinctions at the family, species, or variety levels might be used as the states of this attribute. Thus, an attribute can vary in its physical visibility depending on the generality with which its states are defined. This is so when the definition of an attribute is varied for a single data set as well as between data sets. In turn, the processes and constraints that the attribute reflects can differ with its definition.

Bridging Attribute Visibility to Determining Process

Attributes of different absolute contextual visibility reflect different behavioral and other processes and constraints in a complex way. In general, the greater the AC visibility of an attribute, the more processes and constraints that it potentially can reflect. Thus, in Table 7-1, columns 2 and 6, attributes with high AC visibility, for example, can reflect technological, active social, passive social, or active personal-level processes/constraints. In contrast, poorly visible attributes can reflect only passive social, active personal or passive personal-level processes/constraints.

A number of bridging arguments explain the assignments of etic meaning that are given to attributes in Table 7-1. These arguments are presented below, moving from visible to obscure attributes and from technological to social and finer-level processes. Then, both cross-cultural regularity and society-specific variation in these relationships are related to a fundamental parameter that has not previously been considered in theories of style. This is the priority given to messages of different kinds by a society and by individuals.

Technology. Attributes with the highest AP visibility may include the color, size, shape, movement, predominant directionality, and overall perceived texture of an object. These may reflect solely technological factors, either raw material or procedural (Table 7-2). For example, the color of textiles or stone tools in a region may be determined simply by the kinds of plants or stones that are available there. The upper size limit of stone projectiles in a region may reflect only the maximum size of cobbles that are available. The coarse flaking of a stone tool and its Gestalt-perceived surface texture and patterning may reflect simply the coarse grain of the raw material that is available. The shape of a bifacial stone tool, too, may reflect raw material grain to the extent that this poses limits on resharpening, such as the maximum length of thinning flakes that can feasibly be removed (Hoffman 1984). Whether static rectilinear or dynamic curvilinear designs are incised into a medium is encouraged or discouraged by its grain and the ease with which incisions can be made across the grain (Roe 1979:195).

Visible Attributes and Their Message Potential. Attributes with high to moderate AP visibility, but not obscure ones, can actively communicate any of a wide range of messages, from regional and

society-wide messages to those pertaining to smaller social segments or the individual (Table 7-2). This potential results from the diversity of viewing distances (e.g., far, close) and social situations (e.g., public ceremonial aggregations; smaller, private meetings) in which visible attributes are apparent and, thus, the diversity of audiences that can observe them (Braun, Chapter 5).

Messages of Social Units of Varying Scale. In the simplest distribution of social messages among attributes of an artifact, those messages that pertain to larger social units are encoded in attributes of higher AP visibility, whereas messages that pertain to smaller and smaller units are encoded in attributes of lower and lower AP visibility. For example, attributes that communicate about the society at large are often more visible than those that communicate about intrasocietal kinship, residence, or sodality groups. And these attributes are often more visible than those that are chosen to communicate family-level or personal messages. In my experience, this structuring of messages is found commonly in traditional societies, where society and social roles and identities tend to predominate over the individual and a personal sense of self.

Good examples of this pattern are documented by Wobst (1977: Tables 2, 3) in the folkdress of Albanian and Romanian language groups in Yugoslavia during the 1930s. Folkdress clearly communicated social identities. Those dress attributes with higher AP visibility reflected more inclusive social groups. For Albanians, coat color distinguished northern from central and southern regions; pants or jacket style discriminated subregions; large decorative features of the shirts, pants, and coats varied among valleys or villages in a clinal manner that paralleled interaction patterns; and small decorations indicated personal rank. For Romanians, shirt cut or color varied clinally among subregions; the color or combination of motifs on shirts varied clinally among villages; and the quality and quantity of least visible decorations reflected individual status, occupation, or family. Several other examples where messages that pertain to larger social units were encoded in attributes of higher visibility are well documented in ethnographic and archaeological literature.[5]

[5]A clear example of where messages that pertain to larger social units are encoded in attributes of higher visibility is found in the painted designs on New Guinea Maring war shields (Lowman and Alland 1973). War shields were painted in bold patterns and colors primarily to communicate the warrior's power and to draw the enemy's aim off target during battle. However, they also appear to have indicated group identity, for they were posted at the gates to a group's territory (Lowman and Alland 1973:20). The most visible attribute, general layout and overall perceptual effect of the entire shield, was shared by the Maring at large and contrasted with the layouts of shields of neighboring tribes. Maring shields bore geometric designs and were characterized by vertical bilateral asymmetry with horizontal asymmetry and occasional oblique asymmetry. Shields of other New Guinea tribes bore anthropomorphic designs and lacked asymmetries (Lowman and Alland 1973:30, 34, 44). Less visible, constituent motifs and the details of their layout differed between Maring local groups, but with much overlap as a result of the copying of designs and the capture of enemy shields. Of the perhaps dozen types of motif–layout combinations used in the Maring area, six or seven might have been used by a local group (Lowman and Alland 1973:24,30). Least visible were variations in motif shape and internal structure and an optional orchid fiber edging. These variations were made idiosyncratically according to the preference of the artisan team who manufactured a shield (Lowman and Alland 1973:22,24,34).

Other examples where the AP visibility of attributes correlates with the scale of the social units over which they are distributed can be cited. However, it is not as clear (Sackett 1985) as it is in Wobst's data and Lowman and Alland's data that the attributes actively communicated messages and, thus, that a communication process was responsible for the relationship between attribute visibility and social unit size. For instance, Wiessner (1983: 265–269) found that, for Kalahari San projectile points, their most visible features, including size and certain aspects of tip, body, and base shape, distinguished large, risk-pooling language groups. A somewhat more subtle difference in body shape distinguished smaller band clusters within one of the language groups (see pp. 203–204 for details). Similarly, Carr and Maslowski (Chapter 9: Table 9-6) show for Ohio Hopewell fabrics that moderately visible attributes, such as the overall textural coarseness and the directionality of texture of spaced weaves, distinguished social groups in different major river valleys. Somewhat more subtle differences in the weft element spacing and textural directionality of spaced and compact weaves distinguished more local groups within one of the valleys.

There are three factors that explain the common relationship between attribute visibility and the scale of the communicating social unit. (1) As the social unit becomes smaller, social encounters become closer and more face-to-face. These smaller viewing distances permit attributes of lesser AP visibility to be used to communicate the unit's messages. This factor, alone, sets only the *lower* limits of AP visibility that an attribute must have to effectively communicate. It limits, for example, intersociety or society-wide messages, which often are broadcast over only long distances, to attributes of high AP visibility. And it allows personal or small-group messages, which are often broadcast over shorter distances, to be expressed in attributes of lesser AP visibility. However, the factor of viewing distances does not place any *upper* limit on the AP visibility with which a message must be expressed for successful communication. It does not, for example, prohibit personal or kin group messages from being expressed in attributes of high AP visibility. Thus, in Table 7-1, columns 2 and 6, highly to moderately visible attributes are shown to be capable of communicating the messages of units of a broad range of sizes, from the individual to the regional interaction sphere.

There are other factors, however, that in combination do tend to constrain the upper limit of attribute AP visibility within which messages of smaller units are expressed. These factors thereby strengthen the correlation between attribute visibility and the scale of the communicating unit. These factors are: (2) the limited number of visible attributes that are available in an artifact for expressing messages, and (3) the relative values or priorities that a culture places on various messages for communication. Specifically, because an artifact has a limited number of visible attributes, not all potential messages can be expressed in them. Thus, those messages that are deemed most important culturally, and that it is desirable to express most effectively, will tend to be encoded in the available attributes that are most visible. Less important messages will be encoded in what attributes remain. To the extent that messages that pertain to larger social units are given priority culturally over messages that pertain to smaller units, the messages of larger units will be expressed in attributes of greater AP visibility, which are more effective for communication; the messages of smaller units will be left for expression in more obscure attributes. This argument and the concept of message priorities are elaborated on pages 201–205.

The common correlation between the AP visibility of an artifact's attributes and the size of the social units whose messages are expressed by those attributes is not universal, however. This is so because the context of use and viewing of an artifact is as critical as the AP visibility of its attributes in determining their potentials for actively communicating messages. Thus, the AC visibility of an attribute, not its AP visibility, is the final determinant of its communication potential (Table 7-1, column 2). If viewing and interaction distances are great, such as the intermountain valley distances over which Yugoslavian headdresses traditionally communicated ethnic affiliation (Wobst 1977:332), then the argument holds that attributes must have a high AP visibility to be adaptive in allowing the prediction of an oncomer's social affiliation or the perception of other social messages. The same model of interaction and reasoning applies well to colosseum-like events, such as football games. There, participants are seen from afar and must be differentiated with attributes of high AP visibility, such as the color of helmets and jerseys. In contrast, in other social situations, the distances of interaction may be small, as when persons of different ethnic groups or communities assemble and intermingle in a restricted space. Periodic alliance-creating ceremonies, such as the Tsembaga Maring kaiko (Rappaport 1968, 1979:39), the "Yanomamo" feast (Chagnon 1983), the Huron Feast of the Dead (Trigger 1969), and possibly Ohio Hopewell mortuary rites (Maslowski and Carr, Chapter 9) are examples. In such cases, the messages of larger-scale social units can be expressed with design attributes that are more subtle in their AP visibility, yet have sufficient AC visibility to be seen.

Finally, in the medium of language rather than material culture, A. Yengoyan (personal communication) notes that in interior Australia, neighboring regional bands define themselves at the most visible level of the lexicon rather than at the more subtle levels of grammar and phonology. Data on lexical, grammatical, and phonological "implicational hierarchies" (Hudson 1980:170, 185186) hint that this pattern occurs elsewhere as well.

The messages that social units of various sizes may communicate with attributes of high AC visibility are diverse (Table 7-2). Messages of social affiliation may allow people to predict the affiliation of oncomers prior to encounter so that social intercourse can be planned, eased, and made cooperative (Wobst 1977). Messages of social affiliation may also, however, openly express competition, confrontation, or domination. Messages of social mimicry or complementarity may be encoded in order to encourage cooperative interaction, allow settlement, or permit passage. Legal and territorial messages of prescription, proscription, ownership, and authorship, and the conscious mythic–religious symbolic messages which are found in public iconography may also be expressed by attributes of high AC visibility. This diversity of messages contrasts with the heavy focus in current archaeology on messages of social affiliation and their specific use to ease social intercourse. That focus is, in part, a happenstance of the example that Wobst (1977) chose to illustrate his information exchange theory of style.

Personal Messages. Attributes that express personal identity or other kinds of personal messages (Table 7-2) can range in their AP visibility from high to low. This broad range of possibilities arises from the face-to-face nature of individual interactions, which permits messages to be coded and perceived in attributes of essentially any AP visibility. Restriction of personal messages to lower visibility attributes, alone, will occur when social or family-level messages are given precedence over personal expression.

An example where personal messages are communicated in attributes of high AP visibility is head shaving among the Tallensi in order to symbolize bereavement. Different amounts of the head were shaved, depending on the closeness of the bereaved to the deceased. The heads of spouses and children were shaved completely. Only half the heads of grandchildren were shaved. These shavings were compulsory. The heads of classificatory children might be shaven completely, but this was not compulsory (Fortes 1949:161,179,238–239).

Yugoslavian folkdress and Maring war shields (see p. 189) are examples of artifact classes where personal messages were communicated or personal preferences were expressed in attributes of lower AP visibility. Social messages were given priority and conveyed in more visible attributes. Examples where personal messages were communicated or personal preferences were expressed through attributes that range widely in their AP visibility include some artifact classes of the !Kung Bushmen, San José Tarascans, and contemporary Western culture.[6]

The attribute visibility level and priority with which personal messages are expressed in a given medium or artifact class may apply to all social contexts within a culture or may vary with the social situation (see pp. 206–210). The priority can also vary from medium to medium as a function of the

[6]Individual !Kung identified their own arrow heads on the basis of not only attributes of moderate AP visibility, such as body shape and barb shape, but also minor details such as the direction of filing of the edge (Wiessner 1983). The presumption is that individual identity was communicated by both kinds of traits.

Individual San José Tarascan potters differed in their preference for painted decorative attributes that range from highly visible to moderately obscure (Table 7-7, pp. 199–201). Attributes of high AP visibility that varied in preference among potters include the basic layout of the vessel into two versus three design fields, whether the interior as well as exterior of the vessel is used as a design field, and the overall perceptual texture of design fields, which depends on the kind of design configuration selected as a fill. Less visible attributes that varied in preference among potters include the design configuration and design elements used to fill a design field. All of these ceramic variations resulted from the active expression of individual preference, if not the communication of individuality (Friedrich 1970:337; Hardin 1977:113–116). They contrast with variations that reflect only passive personal factors such as habitual methods of manufacture or motor skill (Table 7-7, pp. 199–201). Design element shape, line width, the manner of terminating brush strokes, the pressure of application of brush strokes, and paint thickness are examples of design variations determined by passive personal factors (Hardin 1977:119–125).

Finally, American and British youths of the late 1980s communicated their personal identities with highly visible, uniquely dyed punk hairdress (Hodder 1986:47), but also with obscure personal motifs and ornamentation on clothing.

contexts in which they are crafted and used. Roe (Chapter 2) calls those contexts and media in which it is fit for a person to openly express him or herself "realms of protected deviation." Finally, the priority given to the expression of the person varies among cultures with their differing emphasis on individuation (Carrithers, Collins, and Lukes 1985). The value placed on the individual and freedom of individual expression in punk Anglo-American hairdress (Hodder 1986:47) is clear.

Obscure Attributes. Attributes of poor AP visibility, which Hardin (Friedrich 1970) calls the "nuances" of style, can express only passive, social-level processes, or active or passive processes at the levels of interacting artisan networks or the person. Obscure attributes are sufficient for communicating messages and can be copied or taught only where contact is closer, more intimate, and more frequent among interacting artisans or other dyads. Obscure attributes are insufficient for communicating messages at larger distances within larger social units. Table 7-2 lists the diverse array of processes that obscure attributes can reflect.

Kinds of Obscure Attributes. Attributes of poor AP visibility are of three kinds. First are small, nonrelational attributes, such as small design elements or some maker's marks. Second are very simple relational attributes, such as counts, dimensions, and dimensional relations. Some examples for painted media include the number of design elements or configurations within a design zone, the widths of lines that separate design zones, and the relative dimensions of lines or zones. Finally, there are more complex relational attributes. These include correlations and "co-occurrence restrictions" (Hardin 1983a:313) among attributes within or between design levels, other design grammatical rules, and the structure and complexity of design grammars. Examples of complex relational attributes include metric, similarity, affine, and projective geometric transformations, the most well-discussed archaeologically of which are metric symmetry patterns (Washburn and Crowe 1987; Washburn, Chapter 4); shape grammar operators (Roe 1980; Knight 1986; Chippindale 1986); Chomskian grammatical structures (Muller 1979; Hassan 1986); and metaphorical structures such as dual triadic dualism and chromatism (Roe, Chapter 2).

All obscure attributes of the third kind, but not all of the first and second, comprise "isochrestic variation" in Sackett's (1982) terms. Complex relational attributes usually are socially traditional, passively learned practices. In contrast, small and simple relational, obscure attributes can reflect a wide variety of active and passive, personal, and personal physiological processes (Tables 7-2, 7-7).

The analytical categories of "composition" and "structure" that are used by some other researchers (Graves 1982:307; Kent 1983:120; Washburn 1983a; who follow Shapiro 1953:259) do not correspond with the distinction made here between "visible attributes" and "obscure attributes."[7] The two pairs of terms should not be confounded.

Physically Obscure Attributes and Interaction. Several kinds of interactive processes, at the levels of the social group and interacting artisans, are defined in Table 7-2. Although these processes are usually lumped under the general term "social interaction" in archaeological literature, their distinction is important in tracing form–process relationships. The reader should consult this table in preparation for the discussions on interaction in the following sections.

[7]Washburn (1983), Kent (1983:120), and Graves (1982:307), following Shapiro(1953:259), make a distinction between the "structure" and the "composition" of an artifact. Structure is defined as the way a total design field is subdivided for decoration and the type of symmetry this creates. "Composition" refers to content—the nature of the elements, motifs, or other units that fill the design field. These terms classify both physically visible and obscure traits together. The term "structure" does not equate with obscure attributes. Also, the dictionary definition and common use of the term "composition" is the arrangement and relations among constituent elements of a thing, not the content of the thing. For these reasons, the terms "composition" and "structure" are not used in the unified, middle-range theory of design.

Attributes of poor AP visibility are not perceived or comprehended with the catch of the eye; rather, they must be inspected. Consequently, they are not easily copied and do not diffuse quickly through a society or between societies. Thus, their distribution within a society can indicate family networks of artisans, more informal networks of passively interacting artisans, or joint participation in craft schools. Social segments such as kinship groups, residence groups, and formal sodalities may also be revealed (see p. 197). Finally, the similarity of obscure attributes between social groups is a good indicator of the degree of active group interaction (Friedrich 1970) through intermarriage, adoption, artifact exchange, or intimate ceremonies, or the degree of passive group interaction through less structured contacts. In contrast, attributes and artifacts of greater AP and AC visibility, which are easily copied and which can diffuse quickly and widely, are not reliably good indicators of within-group or between-group interaction.

There are numerous examples where the distribution of attributes of poor AP or AC visibility has been used to reveal artisan and family networks within societies. A number of different media have been analyzed.[8] Obscure attributes in various media have also been studied in order to distinguish larger social segments, communities, or societies, or to measure the degree of active and/or passive interaction between them.[9] Most stylistic studies of interaction within family or artisan networks and between larger social groups have used small, nonrelational attributes or simple relational attributes. Complex relational attributes such as design grammars have been used less often.[10]

The utility of the obscure in tracing artisan networks and in measuring interaction holds not only for attributes of artifacts, but also for whole classes of obscure artifacts[11] and for the subtle,

[8]Examples where artisan and family networks within societies have been revealed by the distribution of obscure attributes include Hardin's (Friedrich 1970) and Bunzel's (1929; Roe 1979:214) classic studies of the details of Tarascan and Zuni painted pottery, Roe's (1980) study of the grammar of painted Shipibo textiles, and Pryor and Carr's (Chapter 8) analyses of Pomo basketry. Similarly, obscure attribute distributions have been used to define horizontal role differentiation within a society, such as the sexual division and complementarity of crafting (Roe 1979:212–214), and vertical differentiation by rank, wealth, prestige, power, etc. (Pryor and Carr, Chapter 8).

[9]Studies that use obscure attributes to reveal larger social segments, communities, or societies, or that measure interaction between these, include Voss's (1982) analysis of incised and stamped ceramics of the European Neolithic (Western TRB period), Washburn's (1983b) and Graves' (1982) studies of the painted ceramics of the Greek Neolithic and the contemporary Philippino Kalinga, respectively, Carr and Maslowski's (Chapter 9) study of Ohio Hopewell mortuary fabrics, a variety of studies of cordage element twist direction reviewed by Carr and Maslowski, Newton's (1974, n.d.) studies of the element twist direction of Brazilian Timbira net hammocks and the knots of bow strings, Hodder's (1982a:48–56, 68–73) study of Baringo stool morphology, interior hearth positioning, and certain calabash decorations, and Roe's (1979:192–193) discrimination of Shipibo and Conibo art of several media by line widths. Voss's (1982), Washburn's (1983b), Graves' (1982), and Carr and Maslowski's (Chapter 9) analyses contrast the distributions of low-visibility attributes with those of high-visibility attributes. They show the utility of obscure attributes, alone, in monitoring interaction.

[10]An example of the use of complex relational attributes to reveal interaction at the local scale, within artisan networks, is Roe's (1980:59–62) study of Shipibo fabrics. Roe traced interaction patterns among Shipibo artisans within one compound using the design grammars of their painted fabrics. He found that similarity in the design grammar rules, numbers of rules, and the depth of the design grammars of the artisans correlated well with the levels of interaction among them. At the regional scale of interaction between social groups, Roe (1987:8) showed that the distribution of dual triadic dualistic structure among highland and lowland South American societies corresponds to the limits of the Chavin interaction sphere. This correlation was found using several different media. Similarly, symmetry patterns have been shown to often reflect interaction patterns among social units within ethnic groups (Washburn, Chapter 4; Washburn and Crowe 1987) or larger regional units (Graves 1982:Table 1; Washburn 1977, 1983b:151; Washburn and Petitto 1991; see pp. 196–197).

[11]Hodder (1982a:37–48, 84) has shown that the distribution of exchanged, physically and/or contextually obscure artifact classes, which he terms the "trivia of daily life," can indicate patterns of interaction between groups. In this way, obscure artifact classes operate like obscure material attributes.

phonological level of language.[12] The significance of obscure attributes as indicators of interaction among artisans was also recognized in the traditional "type-variety" school of ceramic typology (Gifford 1960).[13]

The alternative states of obscure attributes that represent traditional, passively learned ways of manufacturing an artifact, and that reflect interaction patterns, are among the formal variations that Sackett (1982) calls "isochrestic variation." However, obscure attributes may reflect many other processes (Table 7-2) and isochrestic attributes may be visible as well as obscure.

Physically Obscure Attributes and Active Interaction. Processes of active interaction among communities and societies are of several kinds (Table 7-6, column 2). These processes vary in the duration over which interaction occurs. Silent trade and some kinds of ceremonial trade may involve meetings of only a few moments among the members of different communities or societies. Intermarriage involves very extended to continuous interaction.

It is expectable that active interaction processes that differ in the duration of interaction will be reflected in poorly visible attributes of differing levels of obscurity. Processes that involve longer meetings or stays provide greater opportunity to observe the details of design of artifacts, to study and decode their structure, and even to watch their manufacture. The details of design can more readily be learned and copied. In briefer meetings, this opportunity does not exist. Thus, active interaction processes that involve extended meetings or stays can be expected to be reflected in the distribution and similarity of both very obscure and less obscure attributes among social groups. In contrast, brief meetings are more likely to be reflected in the distribution and similarity of only less obscure attributes (Table 7-6, columns 2, 3).

This pattern is expectable for only those artifacts that are not exchanged among groups and that are observable at the location of interaction. Exchanged artifacts can be studied at length after a meeting or stay and, therefore, would not indicate the duration of interaction. Minimally, the pattern would be relevant to items of dress, ornaments, and personal property taken to meetings. It might also pertain to artifacts that happen to be used or observable at the location of interaction (e.g., utensils for cooking and eating, subsistence tools, architecture). Although reasonable, these expectations have yet to be confirmed empirically.

The patterning in Table 7-6 is significant to the archaeological reconstruction of alliance patterns and their evolution in egalitarian societies. It allows one to begin to estimate the degree of psychological commitment and trust invested in interaction, the degree of structural formalization and institutionalization of alliance ties, and alliance strength. Carr and Maslowski (Chapter 9) discuss this theoretical framework in greater detail.

Physically Obscure Attributes and Drift. Analogous to the spread of design attributes over space through interaction is their drift through time. Physically obscure attributes have greater potential than visible ones for exhibiting drift in their states and the relative frequencies of states within a social group. For example, LeBlanc (1975) found drift in the width of decorative lines on pottery from the Cibola area of New Mexico over a period of less than 25 years. Binford (1963) also provides examples of stylistic drift for the details of projectile point morphology; as does Cleland (1972) for certain nondirectional variations in the designs of Jesuit finger rings.

[12]Differences between social groups in their phonological systems, which are verbally more obscure than grammatical or lexicon differences, have repeatedly been found to be good indicators of interaction between groups (Hudson 1980:172–173, 177–180).

[13]In the "type-variety" school of ceramic typology, the "variety" was defined by "minor" traits or "embellishments." It was taken to be the product of the individual or "relatively small groups within society," such as "potters in a village segment, a group of small villages, a community, or a group of communities (at a maximum)" (Gifford 1960:341,343).

Table 7-6. Processes of Active Interaction and the Visibility Levels of Obscure Attributes that Reflect Those Processes

Duration of interaction	Some examples of processes of active interaction among communities or societies	Visibility level of obscure attributes indicating interaction (nonexchanged artifacts only)
Long	Intermarriage among groups and extended visiting among kinsmen	Less obscure through very obscure
	Extended ritual, sociopolitical and/or economic aggregations among allies and/or geographically dispersed kinsmen (e.g., Maring kaiko, Huron Feast of the Dead, Yanomamo feast, aggregations of local bands of hunter–gatherers for subsistence tasks)	
	Utilitarian trade in neighboring villages, markets, fairs	
	Ceremonial trade among trade partners, brief interaction (e.g., kula partners)	
Short	Silent trade	Less obscure attributes only

An attribute of poor AP visibility is susceptible to drift in two ways. First, its obscurity makes it susceptible to stochastic learning discontinuities between generations within a family or artisan network. These variations, in turn, may be compounded by the stochastic termination of particular families or artisan networks over time. Second, because poorly visible traits are not usually suitable for communication or social manipulation or modeling, they are not subject to directional social selection (Braun, Chapter 5).

Contextually Obscure Attributes and Interaction. The context of use and viewing of an artifact, which determines the AC visibility of its attributes, is as essential as the attributes' AP visibility in limiting their diffusion to networks of close interaction and in encouraging their drift through time. Regarding interaction, when an artifact is produced and used in a socially closed context where it is seen frequently and closely by only more intimately related individuals (e.g., kin, friends, neighbors, interacting artisans), then attributes of both high and low AP visibility will have low AC visibility. Consequently, both kinds of attributes will measure that interaction accurately. The domestic space is one context in which this effect arises. Good examples of this situation are found in Pryor and Carr's (Chapter 8) analysis of Pomo utilitarian basket mush boilers, Braun's (1977) analysis of Woodland ceramic cooking pots, and Hodder's (1982a:54–56) data on the position of hearths within huts in the Baringo district of Kenya.[14]

[14]The mush boilers studied by Pryor and Carr (Chapter 8) were used by the Pomo within their homes—a fairly closed context of use. Attributes of both high AP visibility (basket shape, design cluster) and low AP visibility (weave) were distributed among language groups in line with patterns of interaction among the groups. Similarly, the cooking pots studied by Braun (1977) were used in domestic contexts. Stylistic attributes were found to shift through time in their spatial distribution in accordance with evolutionary patterns of social interaction that are expectable for tribal societies, even though the attributes were visible, discrete design elements and configurations which one would expect to reflect broader communication patterns. Finally, the attribute, position of hearths within huts, which Hodder (1982a:54–56) studied, has high AP visibility but low AC visibility. Hodder found that hearth position tends to be homogeneous within local populations and to vary between them, perhaps reflecting interaction patterns.

Contextually Obscure Attributes and Drift. Design attributes of artifacts that are used and produced in socially closed contexts are also susceptible to drift in their states and frequencies of states over time. The low AC visibility of the artifacts and their attributes encourages drift, regardless of whether they have high or low AP visibility.

The domestic space is one kind of closed context in which design attributes have low AC visibility and drift often occurs. A second kind of context that favors drift is an ecological regime of regional population increase within a band or tribal society, where local groups or communities fission and then distance themselves socially from each other (Binford 1963:93; Cleland 1972:209). The internal conflicts that often exist within the group that divides (e.g., Turnbull 1961), the group division process, and subsequent social distancing may have several related consequences. These are the low AC visibility of artifacts and attributes among groups, learning discontinuities between groups over space and time, and, thus, drift.

A third kind of context in which design attributes are susceptible to drift is found in societies that do not archive examples of past work for future artisans to learn from and to use as a basis for their own inspirations. Here, the low AC visibility of artifacts and their attributes among generations of artisans produces learning discontinuities that encourage drift. This situation typically arises in traditional societies that lack writing and photography, but is accentuated in societies where prototypes are purposefully destroyed periodically. Roe (Chapter 2) calls this destructive process "cultural amnesia." Examples of it include the destruction of the pots of Shipibo potters (Roe, Chapter 2) and the baskets of Pomo basket makers (Pryor and Carr, Chapter 8) upon the death of the craftsperson.

Physically Obscure Attributes and Production. An attribute can have high to moderate AP visibility during the production of an artifact but low AP visibility in the end product. Attributes of this nature include the structural or foundation elements of an artifact that are partially or largely masked through subsequent production steps. Some specific examples are hidden warp or weft elements in certain fabric weaves (Emery 1966), hidden ribbing in baskets, and support structures in some buildings.

Like attributes that are physically obscure in both production and the endproduct, those that are obscure in only the endproduct are often restricted in their diffusion to closely interacting artisans or social groups. Thus, they are good indicators of social interaction. However, being apparent during production, they may diffuse more quickly among the interacting parties, all else being equal; this makes them more quickly stabilizing measures of interaction. They may consequently also be less susceptible to stochastic learning discontinuities that lead to drift.

Attributes that have high AP visibility in an endproduct but whose manufacture depends technologically upon attributes that have low AP visibility during production and in the endproduct are also often constrained in their diffusion to closely interacting artisans or social groups. Although their morphology may be noticed from a distance by casually interacting parties, they cannot be copied without closer tutorial interaction. Consequently, they, too, are good indicators of social interaction and may exhibit drift. Some examples of attributes with these qualities include certain traits of Pomo baskets, such as some weave textures that depend on subtle weaving procedures, motifs that are tied to certain weaves, and quailtop feather decorations that are attached by unobvious means (Pryor and Carr, Chapter 8).

Physically Obscure, Complex Relational Attributes Comprised of Visible Attributes. An obscure, complex relational attribute may itself be comprised of attributes having high AP visibility. Whereas the relational attribute may reflect passive interaction among persons within an artisan network or active or passive interaction between social groups, the constituent high-visibility attributes may not. They may instead communicate messages among the interacting persons or groups, or may reflect active or passive interaction among yet larger social units.

For example, Hardin found for San José Tarascan ceramics that the obscure "grammatical" organization of design elements into configurations revealed the degree of interaction among

individual artisans. It discriminated the unique style of potters in the Alejos family from the styles of other individuals in other artisan networks (Friedrich 1970:339). In contrast, the more visible, constituent design configurations and design elements were socially recognized and spread throughout the community (Friedrich 1970:Figure 4). They apparently reflected passive interaction within this larger social unit. Similar cases at larger social–geographic scales are documented by Washburn (1983b) and Graves (1982).[15]

Interaction and Communication Reflected in the Same, Visible Attribute(s). In contradistinction to Friedrich's (1970:337–339) conclusion, attributes that indicate networks of artisans, social groups, or interaction within or among groups are not necessarily restricted to obscure attributes. Attributes of high to moderate AP visibility may reflect social interactions if the interactions are important economically, politically, socially, and/or ecologically, and, if they come to be actively recognized, materially symbolized, and communicated. In this case, communication aligns with social interaction, both processes are expressed in the same visible attribute(s). Thus, both the social interaction and information exchange theories apply.

One example of highly visible attributes that reflect social interaction is found in Wiessner's (1983:267–268; 272) data on the design of Kalahari San projectile points. Highly visible, size and shape attributes were found to distinguish language groups. These are the broadest social units of San interaction, within which environmental risks are pooled. A second example may be found in the development of White Mountain Redware of the American Southwest. This pottery is distinguished from previous black-on-white wares by its highly visible, red background color. Graves (1982:341) interprets the ware and its color as a symbol of a regional interaction network that was economically and/or politically critical to the existence of local groups.

Obscure Attributes and Qualifications on Defining Local Social Segments. At the local scale, spatial distributions of obscure attributes that reflect interaction strictly indicate only networks of interacting artisans or the redistribution of their members or products through intermarriage, adoption, or artifact exchange. These distributions do not necessarily define kinship groups (e.g., families, lineages, clans), residence groups (e.g., households, village segments, villages), or institutionalized sodalities (e.g., work groups, fraternities). Whether any of these kinds of local social segments are indicated by obscure attribute distributions depends on whether interacting artisan networks equate with any of them. In turn, this equation depends on the adaptive context and the social lines along which enduring economic, social, and/or political cooperation occurs (Lathrap 1983:38). It also depends on the social lines along which enculturation occurs, which depends on unique culture history (Pryor and Carr, Chapter 8).

The simple Deetz-Longacre hypothesis (Deetz 1965:2; Longacre 1964) attempts to infer kinship, marriage, or residence patterns from style distributions. More recent modifications of the idea have focused on artisan coresidence (Roe 1980). However, none of these versions are cross-culturally

[15]A second case where obscure, relational attributes and constituent, high visibility attributes reflect different processes is found in Washburn's (1983b:151–157; Figures 9.9, 9.11) data on Neolithic mainland Greek ceramics. Relatively obscure symmetry classes that describe the structuring of design elements (the flame, net) into configurations, were distributed locally. The classes occurred within topographically delimited provinces, within which frequent social interaction was probably circumscribed. In contrast, the moderately visible flame and net design elements were regionally widespread and were not found to be useful for delineating local, socially integrated groups. Their distribution apparently reflected passive or active interaction (e.g., artifact exchange) over the region.

Graves' (1982:310, Table 1) analysis of Philippino Kalinga painted ceramic decoration closely parallels Washburn's. He found that two competitive, territorial, endogamous kin groups were much better distinguished by obscure symmetry classes used to arrange design configurations from each other than by the moderately visible design configurations, themselves.

tenable because they assume that interacting artisan networks equate with some one kind of social unit.

Passive Processes at the Social and Interacting Artisan Levels. Several processes can define the range of manufacturing options that a social group or network uses: a history of interactions shared by a culture, social group, or family; passive interaction among social groups or artisans of a network; and the passive aspects of enculturation. These processes can operate on and be reflected in attributes having any level of AP visibility, from high to low. For example, among the Pomo Indians, the process of shared culture history within sublanguage groups appears to have been responsible for some geographic patterning in both visible basket attributes (form, design layout) and a less visible attribute (weave) (Pryor and Carr, Chapter 8).

In cultural contexts where style is used actively to express social or individual messages or to manipulate or model social relations, these active processes may dominate the production and form of more visible attributes. Consequently, passive social and interacting-artisan level processes may be reflected in only attributes of lesser AP visibility. This ordering of processes among attributes is more likely to arise among artifacts made of more malleable media, which are more conducive to being used for active social or individual expression. The medium of ceramics is an example of this, in contrast to more technologically-bound media like lithics (Sackett 1982) or basketry (Pryor and Carr, Chapter 8).

Passive, Personal-Level Processes. Passive, personal-level processes include idiosyncratic, habitual methods of manufacture and physiologically based motor skills. Habitual methods of manufacture include both patterns of hand movement and the limitations on manual execution set by personally unique selections of tools (Hardin 1977:118–120).

Habitual methods of manufacture and motor skills typically manifest in design traits that have low AP visibility. Habitual methods of manufacture tend to be restricted to attributes of low AP visibility because more visible ones are susceptible to constraint by passive social norms and enculturation, or are used as vehicles of active social or personal expression. Motor skills tend to be reflected in attributes of low AP visibility for another reason. They, by definition, pertain to the details of eye-hand coordination and manual dexterity.

Many examples of attributes that reflect personal manufacturing habits or motor skills have been cited in archaeological literature for a variety of media.[16]

Ideation and Archetypes. Three levels of processes pertain to the broad areas of mythology, religion, cosmology and world view, social structure, and depth-psychological archetypes. These processes must be carefully discriminated for their different material correlates: First is the active, *conscious* communication of pansociety or regional mythic–religious themes or personifications, or metaphoric information about the organization of society or the cosmos. These subjects can be portrayed through either representational art or nonrepresentational symbols. Examples in representational art include the mythic supernatural beings and scenes carved on the facades of temples of some early civilizations, ritual masks that depict supernatural beings, such as the Iroquoian False Faces (Rosenthal, Chapter 10), and the animal-shaped earthworks of prehistoric Eastern Woodland Indians. Examples in nonrepresentational symbols include motifs that are structured with easily

[16]Some examples of attributes of basketry, fabrics, and netting that reflect personal manufacturing habits or motor skills include the form of starting and other knots (Pryor and Carr, Chapter 8; Newton n.d.). For lithic artifacts, the orientation of flake scars on bifaces (Gunn 1975) has been noted. For painted ceramics, pertinent attributes include the orientation and shape of design elements and their variation (Hill 1977, 1978; Hardin 1977:121–122); the absolute and relative sizes of and distances between design elements; the absolute and relative angles, widths, and spacing of fill lines (Hill 1977, 1978:247,252; Redman 1977:49–50); the number of brush strokes used to produce a design element; the pressure with which the brush is applied; and the manner of terminating brush strokes (Hardin 1977:121–124).

perceived binary oppositions or other readily perceived relationships. The Zinacantecan's quadripartite, two-colored *olin* (Washburn, Chapter 4), Native American four-colored medicine wheels, and the prehistoric North American Woodland Indian copper/shell contrast are cases in point. As symbols meant to communicate to others in daily life or in ritual, sometimes to an audience at a distance, representational and nonrepresentational images of these kinds and their informative attributes have high to moderate AP visibility.

The second kind of process is the active, *unconscious* projection of metaphoric information about the organization of society or the cosmos, or depth-psychological, archetypal themes about relationships. Information is encoded in complex, relational attributes that are not easily comprehended, such as some triadic dual compositions, dual triadic dual compositions, chromatism (Roe, Chapter 2), or more complex associations. The attributes thus have low AP visibility. These subtle cognitive oppositions, complements, and gradations are also found in myths, fairy tales, and dreams. They are best analyzed by the methods of structural anthropology (Roe, Chapter 2) and depth psychology (Jung 1964).

A good example of the projection of a depth-psychological, archetypal theme is found in the Old Temple at Chavin de Huantar. This depicts, through dual triadic dual composition, the simultaneous segregation and complementary dependence of the sexes, their roles, and their animistic symbols in constituting society (Roe, Chapter 2).

The third kind of process is the active, *unconscious* projection of depth-psychological, archetypal personifications, such as the Hero, the Wise Old Man, or the Numinous. Because the archetypes are experienced and take form only indirectly, through cultural and personal contexts (Jung 1964), these figures will be formally equivalent to pansociety, mythic–religious personages that are communicated consciously and executed in a physically visible way. The difference between this process and the first is at the level of interpretation rather than form.

Not All Kinds of Processes Are Represented in an Artifact. Any single class of artifacts and the hierarchy of attributes that comprise them usually will reflect only some of the processes and social units listed in Table 7-2. For example, an artifact class might communicate regional, intersociety messages, reflect the passive, shared history of interactions of a community, and express an artisan's personal preferences for design, but not reflect processes that pertain to intracommunity social segments of various scales. It is possible to read too many causal factors into an artifact class based simply on the range of visibility of its attributes. This problem can be curtailed by considering the geographic distributions of the attributes' alternative states and the contexts of production, use, and display of the artifact class.

The Common Arrangement of Attribute Visibility Hierarchies that Reflect Multiple Processes. When a diversity of processes and constraints from the social to personal physiological levels (Table 7-2) determine the attributes of an artifact class, these causal factors commonly map to form in the following way. As the AC visibility of the attributes decreases, their causal processes shift in nature from (1) those reflecting larger social units through those reflecting smaller social units to those reflecting the person; (2) active to passive in the level of artisan control; and (3) conscious to unconscious in the degree of artisan awareness. Attributes that communicate messages often are more visible than those that reflect active or passive interaction. Tables 7-1 and 7-2 are arranged in this pattern. Many reasons for this correlation between attribute AC visibility and the nature of the causal process, as well as for exceptions to it, have been given on pages 188–199 and are elaborated for communication processes in particular on pages 201–205.

Most archaeological studies of artifact design have documented attributes of only one or two levels of visibility and do not reveal this total pattern. A few studies are more helpful. Hardin's (1977, 1983b; Friedrich 1970) descriptions of Tarascan redware utilitarian ceramics in composite allow the relationship between attribute visibility and causal process to be ascertained for attributes of a wide range of visibility (Table 7-7). As the AP visibility of attributes decreases, their causal processes shift

Table 7-7. Hierarchy of the Absolute Physical Visibility of Select Design Attributes of Tarascan Redware Utilitarian Ceramic Jars

Attribute	Absolute physical visibility level	Social unit, and inferred or known process, reflected by the attribute	Bibliographic reference
Overall shape (pitcher)	1. High	Western Tarascan (San José Patamban, Eleven Pueblos) in contrast with Eastern Tarascan; communication of regional identity, shared culture history, and/or diffusion	Hardin (1983:10)
Color and reflectivity (red background, clear glaze)	2. High	Western Tarascan (San José Patamban, Eleven Pueblos) in contrast with Eastern Tarascan; communication of regional identity, shared culture history, and/or diffusion	Hardin (1983:10)
Layout into 2 or 3 design fields	3. High	Active, expression of personal preference and/or communication of individuality	Hardin (1977: 113–114)
Optional use of vessel interior as a design field	4. High to moderate	Active, expression of personal preference and/or communication of individuality	Hardin (1977:113)
Overall perceptual texture of design fields, depending on configurations used as fills	5. High to moderate	Active, expression of personal preference and/or communication of individuality	Hardin (1977:114)
Kind of design configuration	6. Moderate	Active expression of personal preference and/or communication of individuality	Hardin (1977:114)
		Active expression or passive reflection of interacting artisans: village-wide diffused configurations; configurations distinguishing Alejos family from other artisan networks	Friedrich (1970: 336–337, Figure 4)
Organization of design fields	7. Moderate to obscure	Passive reflection of interacting artisans: Alejos family versus other artisan networks	Friedrich (1970:338)
Organization of design elements into configurations	8. Obscure	Passive reflection of interacting artisans: Alejos family versus other artisan networks	Friedrich (1970: 337–339)
Syntactic placement of isolated design elements	9. Obscure	Passive reflection of interacting artisans: Alejos family versus other artisan networks	Friedrich (1970: 337, 339)
Design element shape	10. Obscure	Passive, personal, habitual methods of manufacture	Hardin (1977: 121–124)
Paint thickness	11. Obscure	Passive, personal, habitual methods of manufacture	Hardin (1977:119)
Manner of terminating brush strokes; pressure of application of brush strokes; number of brush strokes used to make design configurations	12. Obscure	Personal motor skills	Hardin (1977: 121–123)

from (1) the active communication or passive reflection of regional differences; through (2) active, personal communication or expression; through (3) the active expression or passive reflection of interactions among individual artisans; through (4) the passive reflection of interactions among individual artisans, to (5) passive, personal conscious or unconscious habits of manufacture; and (6) passive, personal, unconscious, motor skills. Other studies that reveal similar arrangements of processes are Carr and Maslowski (Chapter 9) and Pryor and Carr (Chapter 8), and in lesser detail, studies by Redman (1977), Voss (1982), Graves (1982), Kent (1983), and Washburn (1983b).[17]

Message Priorities and Context in Bridging Attribute Visibility to Determining Process

In the above section, a broad spectrum of processes—both active and passive and technological through personal—are considered for their relationships to the visibility of attributes. This section focuses more specifically on the active process of communicating messages and on the concept of message priorities, which was introduced above. A number of factors that determine the priority of various kinds of messages and the visibility with which they are expressed in an artifact are discussed. Factors that are largely uniform cross-culturally are considered first, then factors that are cultural or context-specific.

Cross-Cultural Regularities

In traditional societies, active, conscious and unconscious messages and projections that pertain to social units of decreasing scale often manifest themselves respectively in attributes of decreasing AP visibility, if the messages are expressed materially. These units include panregional interaction

[17]Carr and Maslowski (Chapter 9:Tables 9-6, 9-7) and Pryor and Carr (Chapter 8:Tables 8-4, 8-5) document in detail the multilevel attribute visibility hierarchies of Ohio Hopewell fabrics and Pomo basketry. The correlations that they find between attribute AC visibility and the nature of causal processes reiterate the common pattern that is described in the main text.

Voss's (1982) analysis of decorative attributes of Neolithic TRB period ceramics from the northern Netherlands and Germany also follows the general pattern. The attributes that Voss studied include visible, discrete decorative attributes and obscure, continuous ones. The visible attributes are all design elements. The obscure attributes are the number of design element repetitions within design fields, the dimensions of design fields, the dimensions of some elements, and line widths. Visible attributes were widely distributed over the study region. Their distribution presumably reflects the active symbolization and communication of regional social interaction, or the active or passive interaction and rapid diffusion of visible design elements among local groups. In contrast, obscure attributes were more localized. Their relative frequencies within sites varies with the distances between sites. This suggests that the attributes reflect active or passive interaction among local groups.

Other studies also reveal the regional versus localized distributions of visible versus obscure attributes. Kent (1983:121–124) found that Pueblo III period fabrics from the Anasazi, Sinagua-Salado, and Hohokam traditions in the American Southwest all share certain visible, Gestalt–perceptual qualities that contrast them from previous Basketmaker and Pueblo I fabrics. These include two-dimensional limitless patterns rather than one-dimensional band decorative patterns; segmentation of the design field by oblique lines which give a sense of motion, rather than by horizontal and vertical lines which impart a static quality; and the freestanding positioning of design elements, rather than their absorption into large blocks of color. In contrast to these highly visible, widely distributed attributes are moderately visible to obscure ones that distinguish the three traditions. These include the kind, scale, nuances of shape, and placement of decorative motifs. The visible attribute of color also distinguishes the three traditions.

The ceramic studies of Washburn (1983b) and Graves (1982), summarized above, also document a correlation between the AC visibility of attributes and the scale of the social unit that the attributes reflect. Finally, Redman (1977:51), from his experience with American Southwest ceramics, came to a corroborating conclusion. He suggested that greater degrees of active or passive interaction between social units manifest in more detailed aspects of design (perhaps reflecting more interaction among smaller social units at smaller scales).

networks, the language group, society, smaller social segments, the community, the family/artisan network, and/or the person. For example, society or community-pertinent messages are often given priority over personal messages and are manifested in attributes of greater AP visibility.

This regularity arises from five interrelated factors. The bottom half of Figure 7-10 (p. 240), summarizes these.

Physical-Perceptual Factors. First, as discussed previously, the scale of a social unit often determines artifact viewing distances (Braun, Chapter 5). Viewing distances, in turn, set the lower limits of AP visibility that an attribute must have to effectively communicate messages. Thus, messages of larger-scale social units, which imply longer viewing distances, tend to be communicated in more visible attributes. (This argument must be qualified where social groups assemble and interact in a setting that is more restricted than their size implies. In this case, the lower limit of AP visibility that an attribute must have to communicate effectively is decreased; see p. 190.)

A second reason for the cross-cultural correlation of social unit size and attribute AP visibility is that an artifact has a limited number of attributes with high to moderate AP visibility and with good potential for communicating messages. Consequently, only certain of the many possible messages about social units that might be encoded in the artifact can be expressed in its more visible attributes. Those units and messages that are expressed in the more visible attributes are those that are most important in the normal context of artifact use. Less important units and messages are then expressed in the remaining, less visible attributes. Thus, to the extent that the importance of a social unit correlates with its size, for the ecological–evolutionary reasons given next, messages of larger social units will tend to be expressed in more visible attributes, and messages of smaller social units will tend to be left for expression in less visible attributes. Thus, upper limits are placed on the AP visibility of attributes that communicate about smaller units.

Ecological–Evolutionary Factors. A third reason for the cross-cultural regularity described above involves several interrelated ecological-evolutionary factors. In evolving human ecosystems, more inclusive social units and their messages tend to be more "important" than less inclusive units and their messages. More inclusive social units are more "important" in the sense that they are as essential to a social system's function and survival as are units of any scale, yet they are structurally more "vulnerable" (Eisenstadt 1969:368; 1988:15–17) to external or internal systemic, disruptive stresses. As a consequence of their more problematic yet essential status, the messages of more inclusive social units are often given greater cultural value and are selected for expression in the more physically visible attributes of artifacts having ecological–adaptive functions. Less inclusive units and their messages thus are limited in their expression to the remaining, less visible attributes in such artifacts, or to artifact classes that do not have ecological–adaptive importance.

The greater vulnerability of more inclusive sociocultural units and their consequent "importance" to a social system's survival follows from Slobodkin and Rapoport's (1974) theory of ordered sequences of adaptation by biological systems and systems in general (see also Rappaport 1979:150–151). Specifically, for human ecosystems, if natural or social environmental risks of various kinds gradually become more intense, frequent, and/or unpredictable in a region, networks of social integration will be increasingly widened in a compensatory manner in order to level out, circumvent, or subdue those greater risks (Braun and Plog 1982). Thus, in an evolving social system, larger-scale units are closer to the "edge" of the social system's adaptive organization of variables and to external stresses. Also, larger-scale units often represent more recent adaptations to greater levels of risk. In their immaturity, they may be structurally simpler (Simon 1965) and less well buffered from both external and internal stresses than smaller-scale, older units. In sum, in both their external stress load and structural fragility, larger-scale social units can be more vulnerable and less stable than smaller-scale social units. Some examples of this circumstance are the instability of chiefdoms (Leach 1954; Sahlins 1968:86–93; Cohen 1978:4), states (Cowgill 1988; Eisenstadt, Abitbol, and Chazan 1988:15–17; Tainter 1988), and empires (Eisenstadt, Abitbol, and Chazan 1969:24–25, 115–210, 309–360, 365–368) compared to

their constituent communities or polities, or the instability of tribal networks compared to their constituent communities and kinship groups (Fried 1968; Chagnon 1983). Note that this argument pertains to evolving social and human ecological systems rather than matured, involuted systems, where different factors can cause instability (Flannery 1972:420–421; Rappaport 1979:160–165; Tainter 1988:54–61, 91–203).

To the extent that larger-scale social units are given greater cultural value because of their problematic yet essential status, their messages will be more valued and will be expressed stylistically in the more visible attributes of artifacts with ecological–adaptive functions. This process, whereby messages are mapped to form, can involve active artisan choice, active audience selection, and/or other cultural or natural selective processes (Braun, Chapter 5). Also, the process requires that evolutionary changes be gradual enough that there is adequate time for specific design attributes to become selected and associated with particular social units.

This partial theory for why the messages of social units of decreasing scale often occur in attributes of decreasing AP visibility makes a number of assumptions. It pertains to only some ecological, evolutionary, social, and decision-making contexts, and to only some kinds of artifact classes. These assumptions and the bounds of applicability of the theory are discussed, and illustrated with specific cases of exception, on pages 204–205.

Finally, note that the theory is structural rather than functional. It does not posit that more inclusive units, such as regional interaction spheres or chiefdom bureaucracies, are more important than smaller units, such as communities or families, to the functioning and survival of a social system. Instead, the theory focuses on the external stress load, structural weakness, and vulnerability of more inclusive social units, rather than on their functional value.

A Social–Psychological Factor. A fourth reason for the cross-cultural correlation of social unit size and attribute AP visibility is the tendency for social units and their messages to be given priority over the person and personal messages, and to be expressed in more visible design attributes. This tendency arises because personal aspects of the self are always constructed and expressed through one's interaction with others *within* social roles (Goffman 1959; Stone 1962; Lindesmith, Strauss, and Denzin 1975; Voss and Young, Chapter 3). Much empirical research shows that individuals are unable to form images of their personal identities in the absence of social identities constructed through interpersonal comparison and membership in social groups (see references in Wiessner 1984:191–192).

An Empirical Factor. More inclusive social units and their messages tend to be expressed in more visible attributes, and smaller scale units and their messages in less visible attributes, for yet a fifth reason: Larger and smaller units differ in the frequencies of active and passive processes that define and operate within them and that determine an artifact's design. Active processes tend to be more common in larger social units, passive processes in smaller social units (Table 7-2). Because active processes by definition are given priority over passive processes for stylistic expression, larger social units tend to be reflected more frequently in visible attributes and smaller social units tend to be reflected more frequently in less visible ones.

Examples of the Ecological-Evolutionary Theory. Wiessner's (1983) data on contemporary Kalahari San projectile points illustrate how more inclusive social units, which lie closer to the edge of a society's adaptive organization, are given priority in their stylistic expression. Wiessner (1983:267–268, 272) found that the points of different language groups differed in attributes of very high AP visibility (point size; tip, body, and base shape), which even the "casual observer" would notice. Language groups are the social units within which environmental risks are pooled and that define the critical edge of the adaptive organization of San societies. In contrast, band clusters, which are the next most inclusive social units, were not distinguished by visible aspects of their projectile point designs except among the !Xo. Among them, a somewhat less visible attribute, body shape, distinguished

band clusters. The smallest-scale social units—bands and individuals—were not consistently distinguished by any of the visible attributes that Wiessner recorded (1983:265). We do not know whether bands and individuals expressed themselves in other, less visible projectile attributes because these are not reported by Wiessner. However, other San bands of the precontact period were distinguished by pottery motifs with moderate AP visibility and probably low AC visibility (Ridings and Sampson 1990). Additional, diachronic examples also document how more inclusive social units, which are closer to the edge of a society's adaptive organization, are given stylistic precedence.[18]

Assumptions of and Exceptions to the Ecological-Evolutionary Theory. The cross-cultural relationship between social group inclusiveness and attribute AP visibility is theoretically expectable from an ecological–evolutionary standpoint and is empirically common; however, the relationship is not universal. Some reasons for exceptions can be found in the assumptions and bounds of applicability of the ecological–evolutionary theory presented above.

The assumptions of the theory include the following. (1) The ecological milieu in which the relationship between attribute visibility and social unit inclusiveness holds is assumed to be one of increasing risk due to population increases and/or deterioration of the natural or social environments. Only in such contexts are more inclusive social units closer to the edge of the society's adaptive organization, subjected to high external stress loads, and relatively immature and fragile structurally. Such units are therefore vulnerable while also functionally essential and, thus, important to express symbolically. (2) Risks are assumed to be regional rather than local. Only in such contexts will social units and their messages tend to be ordered in value in a similar way throughout the society. (3) Humans are assumed to be rational decision makers who place most cultural and symbolic value on factors that are essential to their own and their system's survival, as opposed to secondary human needs and desires. (4) Humans are assumed to be omniscient decision makers who perceive the long-term effects of their short-term actions. (5) Humans are assumed to be altruistic decision makers who perceive system survival as a matter of personal survival. (6) The duration of regional stress is assumed to be long enough for the "important" messages of more inclusive, social units to be selected for material expression over the "less important" messages of smaller-scale units (Wobst 1977; Wiessner 1983). (7) The theory pertains to only those artifact classes that have an ecological, adaptive function. (8) The theory pertains to only those attributes that reflect horizontally differentiated social units. It is the evolution and widening of horizontal networks of integration that the theory addresses. Attributes that reflect different vertical social strata, and the relative visibility of attributes that reflect those strata and various horizontal social units, are beyond the domain of the theory.

Differences from these conditions may contribute to social units of any scale and their messages being more or less important, creating exceptions to the cross-cultural relationship between social group inclusiveness and attribute AP visibility. (1) In contradistinction to the first assumption, in circumstances of decreasing ecological risk and greater prosperity, when social units at the adaptive edge of organization of a system are not stressed externally, any of a wide variety of social units (the

[18]A well-known diachronic example of the expansion of networks of social integration in response to increasing risks, and of the corresponding expression of new and larger units of integration in design attributes and artifacts of high AP visibility, is found in the evolution of tribes in the eastern United States. During the Woodland Period in Ohio and Kentucky, regional interaction networks were broadened and formalized in response to increasing population densities and associated subsistence, territorial, and social competition. The networks were symbolized in the highly visible mounds, earthworks, and exchanged artifacts of Adena societies. With further ecological stress, interaction networks were expanded over much of the midcontinent and were expressed in the even more flamboyant mounds, earthworks, and artifacts of various Hopewellian societies (Maslowski and Carr, Chapter 9). These expressions were made in materials and attributes that are physically more visible than those that reflected local cultural traditions (Streuver 1965). Other examples of flamboyant archaeological horizon styles that symbolically expressed broader regional integration and the edge of adaptive organization of tribes or chiefdoms include the Southern Cult in the Southeastern United States, and perhaps the "Olmecoid" style in Mesoamerica (Flannery 1968) and Chavin in South America.

person, family, social segment, community, society) and their messages may come to be valued more and given stylistic expression. The reasons for the valuing of those units and messages may be adaptive, politically strategic, playful, and so on. (2) In contrast to the second assumption, short-term local stresses of an economic, social, political, or ideological nature may augment the cultural value of smaller-scale social units and encourage their stylistic expression in attributes of higher AP visibility. (3, 4) In contrast to the third and fourth assumptions, traditional or new cultural values that emphasize smaller-scale social groups and the stylistic communication of their messages may compete with ecological–adaptive issues that encourage the valuation of larger-scale social units and their stylistic expression. This may occur regardless of the adaptive advantage or disadvantage of giving stylistic priority to the messages of smaller-scale units. (5) In contradistinction to the fifth assumption, long or short-term tensions between self-serving groups within a society, and their goals and strategies, may be given priority for stylistic expression over messages pertinent to more inclusive social units and ecological–adaptive issues (Hodder 1982a:187). (6) In contrast to the sixth assumption, the duration of regional stress upon the social system may be too short for a selected stylistic response that emphasizes more inclusive units. (7) In contrast to the seventh assumption, the artifact class under study might not be of a kind, or be used and displayed in a context, that is effective for communicating the ecological–adaptive messages of larger social groups. For example, one would not expect messages pertinent to regional integration to occur on utilitarian artifacts used only in the domestic context. (8) In contrast to the eighth assumption, high social strata or positions within social units of any scale may be more valued and given more visible stylistic expression than larger-scale social units in some artifacts with ecological–adaptive functions. This exception is exemplified in "symbols of status" that represent prestige, rank, wealth, and/or power groups in attributes of greatest AP visibility (see Neitzel, Chapter 12; Morris, Chapter 13).

Example Exceptions to the Ecological-Evolutionary Theory. An example where large social units at the very adaptive organizational edge of a system are not given top priority for stylistic expression and where the messages of smaller units are emphasized is found in Yugoslavian dress during the 1930s (Wobst 1977:334–335). In Yugoslavia, at that time as today, there was a diversity of language and ethnic groups. The relationships between groups were often tense in regard to territory and religion. Nevertheless, groups had to interact because they were intermingled in patches over the country and because of strong local economic specialization and dependence on markets (Wobst 1977:330–331). In this case, it would have been ecologically adaptive if the wider regional system of economic interaction and interdependence had been most valued and given precedence in dress style over language and ethnic affiliation. Stylistic communication of economic cooperation would have made social intercourse easier among strangers traveling to markets. However, language and ethnic group affiliation, instead, were valued most and expressed in the most visible aspects of dress. The regional economic system was not symbolized in dress style at all. Thus, message priorities and their stylistic expression did not strictly follow those predicted by the theory of ordered sequences of adaptation. The predicted order did not hold because the fifth assumption of the ecological–evolutionary theory, concerning altruism, was not met in this case. (For less visible levels of the Yugoslavian clothing style hierarchy, message priorities and their stylistic communication did follow the predicted order; see p. 189.) Other examples of exceptions to the ecological–evolutionary theory are also known.[19]

[19]In other settings with different ecological or social challenges or opportunities, other kinds of less inclusive social units or vertically distinguished social strata (and their messages) might be valued and given priority for stylistic expression over more inclusive units and their messages. For example, among the prehistoric Ohio Hopewell, social differences in prestige were apparently communicated in more physically visible attributes of their mortuary fabrics, whereas ethnic affiliation was apparently communicated in less visible ones (Maslowski and Carr, Chapter 9). Another example is the loud expression of the individual in clothing and hairdress in postmodern Britain and the United States (see Footnote 6, p. 191). Many of the eight conditions that do not meet the assumptions of the theory of ordered sequences of adaptation could be reasons for these exceptions.

Message Priorities, Culture, and the Social Situation

The preceding section considered some factors that tend to be cross-culturally uniform in determining the priority of various kinds of messages and the visibility with which messages are expressed in a design hierarchy. In this section, the effects of cultural variation and social situational variation are discussed.

When an artisan makes an artifact, the messages to which he or she gives greater or lesser priority, and that are encoded in more or less visible attributes, reflect a process of compromise, balancing, and choice among alternative messages. Alternative messages are prioritized not by one set of ordering criteria, or weights, but by three. First are culturally dictated values that are uniform over the society and situationally independent in the relative priority that they give to various kinds of messages and themes. Second are culturally dictated values that vary systematically among different kinds of public social situations in the relative priority that they give to various kinds of messages. Third are artisan-determined values, preferences, motives, and strategies that vary within and among public and private social situations in the relative priority that they give to various cultural and personal messages. These three sets of criteria vary in importance among cultures or social situations within a culture. They are integrated in different ways in different cultures or social situations as the artisan designs and produces an artifact and chooses among alternative forms and their effects.

Culturally Dictated, Uniform Themes. Criteria of the first kind that determine the priority of messages and the visibility of the attributes in which they are expressed are dictated culturally rather than developed by the artisan. They also apply uniformly within a culture across all kind of social situations. They may vary between cultures. These criteria are the relative values given to various symbolic stylistic themes such as pansocietal or regional mythic–religious themes, and metaphoric information about the organization of society or the cosmos. Such themes are typically expressed across many media and genres, constituting part of the fabric or configuration of a culture (Roe, Chapter 2; Rosenthal, Chapter 10).

Some examples of such themes include the pervasive expression of mythic animistic characters and events in the surface decoration and form of South Amerindian material culture (Roe, Chapter 2); the representation of balance between the Upper, Middle, and Lower Worlds in many Southeastern Indian (Hudson 1976) and Hopewellian artifacts (Penny 1983, 1985); the San's value of "walking softly," which restricts flamboyance in artifact decoration (Wiessner 1984:201); and the material expressions of clean/dirty, male/female, life/death structural oppositions among the Nuba tribes (Hodder 1982a). In each of these cases, one or a few themes are emphasized at some obvious level throughout the oral, behavioral, and material culture of the society or region. When there are several themes, these are ordered in their importance, and expressed stylistically in artifacts and/or attributes of corresponding AP visibility, in a single way in all social situations. Long-term ecological–adaptive factors or short-term local stresses can be responsible for both the themes and the values given to them. The cultural values may or may not offer adaptive advantages.

Culturally Dictated, Situationally-Dependent Themes. Criteria of the second kind that determine the priority and visibility of messages are again values that are dictated culturally. However, their relative importance varies among public social situations of different classes and characteristics. Consequently, different messages have different but systematic priorities in different situations. MacDonald (1990:53) calls such situation-dependent messages "protocol."

Some examples of messages that are ordered in this manner include various public social identities and roles; socially recognized emotional or structural states of being such as bereaved, liminal/incorporated, or initiated/uninitiated; mythic–religious themes; and the content of socially important visions and dreams (Table 7-2; Rosenthal, Chapter 10). Some examples of the characteristics of different kinds of social situations among which the values of messages may vary are listed in

Table 7-8 (see also, Shapiro 1953:294; Wiessner 1984:227; Carr and Rosenthal 1985; Rosenthal, Chapter 10). Again, long-term ecological–adaptive factors or short-term local stresses can be responsible for both the themes and the values given to them (see previous page). The cultural values may or may not offer adaptive advantages.

In different kinds of public situations, different classes of messages will be given priority for expression in visible attributes according to the purpose of the occasion. The degree to which different kinds of messages are segregated by occasion will depend on the degree to which cultural institutions, roles, and goals are not embedded within each other.

An example where messages are systematically given different priority and visual expression in different kinds of situations by cultural dictate is found in the cloth handbags and skirts made and worn by Lue Thai women (Miller 1988). The Lue are relatively isolated rural rice farmers who live in ten villages. Lue women prepare their own thread and weave their own cloth, commonly in groups of two to four neighbors. For both the handbags and skirts of the Lue, background color is the most visible attribute. All handbags have the same background color, red, which indicates Lue ethnicity and differs from the background colors of handbags made by neighboring ethnic groups. In contrast, skirts vary systematically in their background colors according to the age of the wearer. The different messages that are given priority for expression in handbags versus skirts apparently reflect the social situations in which they are used. Handbags are used primarily outside the village in situations where it might be important to communicate ethnicity. Skirts are worn both inside and outside the village,

Table 7-8. Some Characteristics of Social Situations that Determine the Value of Messages and Their Priority for Material Expression

Characteristic	Relevant to culturally dictated messages in public situations?	Relevant to artisan-selected messages in public and private situations?
Ideological and social characteristics		
Sacred/profane	X	X
Liminal/incorporated	X	X
Recognized life/death spaces	X	X
Social and political characteristics		
Public/private		X
Civil/domestic		X
Urban/rural; center vs. periphery	X	X
Official/unofficial	X	X
Ceremonial/structured/informal	X	X
Elite/common/mixed	X	X
Strata-contrasting/strata-homogenizing	X	X
Acculturating/socially-isolating	X	X
Masculine/feminine	X	X
Gender contrasting/gender neutral/gender homogenizing	X	X
Economic characteristics		
Prosperous/poor		X
Emotional, moral, and spiritual characteristics		
Safe/risky/frightening		X
Functions		
Celebration, mourning, remembrance, honoring, play, justice	X	X

but are seen and would function in communication most frequently within the village, where women spend most of their time. Here, ethnicity is known and age would be more important to communicate.

Artisan-Selected, Situationally-Dependent Messages. Criteria of the third kind that determine the priority and visibility of messages are values, preferences, motives, and strategies that the artisan develops and that vary more freely within and among social situations. Consequently, different messages have different priorities both within and between different situations. Among the kinds of messages that are ordered in this manner are social and personal identities, the balance given to these, socially recognized emotional states of being, political or economic conditions or issues, and other social or personal messages that are not culturally dictated in the situation. The latter may include differentiation, affiliation, cooperation, competition, coercion, rejection, regulation, or ownership (Table 7-2). Some examples of characteristics of differing kinds of social situations among and within which the values of messages may vary are listed in Table 7-8 (see also, Shapiro 1953:294; Wiessner 1984:227; Carr and Rosenthal 1986; Rosenthal, Chapter 10).

Examples. One example where both culturally dictated and artisan-selected messages vary in their priority and attribute visibility with the social situation pertains to the contrast between sacred and profane contexts. Carr and Rosenthal (1986) and Rosenthal (Chapter 10) hypothesized and documented a systematic relationship between the sacred or profane nature of the social situation, the kinds of messages given priority in them, and the visibility of material attributes that communicate those messages. In sacred contexts, social messages are expected to be emphasized and expressed in more visible attributes. The messages may include social identity, religious beliefs that comprise social dogma as opposed to personal speculation (Malinowski 1948:237–254), mythological themes, and socially significant visions, dreams, predictions, or other psychological phenomena. Other messages such as political or economic conditions/issues, personal identities, or other personal messages are expected to be given lesser value and visibility. In contrast, in profane contexts, any of a wider range of political, economic, or personal messages might be given greater value and expressed in more visible attributes. Thus, for example, Iroquois False Face medicine masks in traditional sacred contexts were designed first by selecting physically visible features in relation to some religiously or mythologically, socially important prototype. Then, physically less-visible attributes were added or alterations were made to reflect the client's personal dream. Personal artistic license in designing visible attributes was taken more so in the profane sphere of Western market production than in the traditional, sacred sphere of mask production and use.

Another example where both culturally dictated and artisan-selected messages vary in their priority and attribute visibility with the social situation is the contrast between contexts in which group identity versus personal identity are emphasized. Most simply, this contrast relates to the respective distinction between "emblemic" versus "assertive" stylistic processes (Wiessner 1983), or "protocol" versus "panache" (MacDonald 1990) stylistic processes. In turn, emblemic/protocol processes may be of several kinds, which pertain to groups that range in scale from the society at large to smaller social segments (Table 7-1, column 7).

The balance that is given to the stylistic expression of society-wide identity, smaller social-group identities, or personal identity depends on a variety of adaptive, motivational, and strategic factors. Society-wide or smaller-group identities can be expected to be emphasized in situations of fear, intergroup competition, where possibilities for intergroup complementarity and symbiotic gains are obvious, or where intragroup cooperation in social, economic, or political adventures is needed (Barth 1969:84; Wiessner 1988:59). In contrast, personal or family identity can be expected to be emphasized in situations of interpersonal competition, affluence and opportunities for personal gain, and breakdown of the social order (Wiessner 1988:59), as in acculturation (Rosenthal, Chapter 10). (See also Barth [1969] and Royce [1982] for a broader range of factors that cause the development of ethnicity.)

Situations that lead to the communication of group versus personal identities can vary in a society daily or as trends over longer time periods. Wiessner (1984:220–225; 1988:50–61) documents this for the dress of the Eipo in New Guinea, Vietnamese housing, and San beaded headbands.[20]

The situation-dependent nature of expression of social and personal identities is well established in the symbolic–interactionist literature of social psychology (e.g., Goffman 1959; Stone 1962; Lindesmith et al. 1975:Chapter 14; references in Wiessner 1984 and Voss and Young, Chapter 2) and certain anthropological theory on social organization (Nadel 1957; Goodenough 1965). In social psychology, the self is defined as a person's own images of and theories about his or her social and personal dimensions. Social dimensions of the self are defined by and acted out according to the expectations of the social roles one assumes while interacting with others. Personal dimensions are expressed through one's interaction with others *within* social roles. Both aspects of the self are constructed primarily through the process of comparing one's behavior with others during interaction, that is, what is termed "mirroring" (Voss and Young, Chapter 2) or "social comparison" (Wiessner 1984).

The balance that is struck between the expression of social and personal aspects of the self depends on the social situation and the cultural context. Two social–psychological reasons are key. First, the social situation defines which aspects of social structure (i.e., which "structural poses" [Gearing 1958] and social roles [Nadel 1957:30]) are manifested. These, in turn, determine which aspects of the personal and social dimensions of the self are relevant for expression and comparison with others, the balance between these, and which will be expressed in more visible design attributes. Thus, for example, in daily-life interactions, the !Kung San compare the style of headbands worn by each other most commonly among kindred and affinal relations. Comparison is made especially among those with whom they interact most frequently, for it is these relations that structure everyday living arrangements and activities (Wiessner 1984:204–206).

The second way in which the social situation and cultural context determine the balance of expression of the social and personal selves is by defining the degree to which roles are ambiguous. Role ambiguity, in turn, governs how much and which aspects of the personal self it is socially appropriate to expose. Knowledgeable of the allowed latitude, a person manages and conveys impressions according to personal interests, be they ego or altruistically focused. Certain amounts and aspects of the personal self are revealed. The symbolic interactionist perspective in anthropology takes a similar view of the situationally dependent creation and negotiation of the self, behavior, and culture.

[20]Wiessner (1988:59–60) documents daily variation in the expression of personal versus social identities in the visible attributes of dress among the Eipo of New Guinea. As one moves from everyday life to intravillage feast-dances to finally intervalley feast-dances where the communication of group unity promotes exchange and discourages war, greater attention is given in dress to expressing social identity. Dress becomes more homogeneous within valley groups. Likewise, among the New Guinea Maring, male body ornamentation was elaborate, colorful, and "idiosyncratic" during ceremonial victory feasts, which were attended by allies and unmarried females who men sought to attract as mates. During formal warfare, when the communication of social solidarity was essential, male body ornamentation was more homogeneous, being restricted to black and white markings (Lowman and Alland 1973:15,20).

Situation-dependent changes in the balance of expression of social and personal identities can also be seen in longer time trends. For example, in northern Vietnam, as family economic initiative and income increased during the late 1970s and early 1980s, and as cooperation among households became less necessary, house decoration became more diverse and elaborate, emphasizing household individuality (Wiessner 1988:61). Also, among the Tsumkwe San, the recent aggregation of bands into larger government communities during much of the year has led to increased interpersonal competition, a need for greater personal differentiation, the breakdown of traditional social restraints on personal expression, and new economic opportunities for men and women. These factors have led to greater individuality in the styles of Tsumkwe San headbands. Headbands are a primary material means among the San for personal expression and interpersonal comparison (Wiessner 1984:220–225).

In the anthropology of social organization, Goodenough (1965:6) notes that the social and personal "identities" that a person selects depend on the social setting and the other persons that are present for interaction. He defines the "social persona" as that composite of the several identities that are thought appropriate in a given context (Goodenough 1965:7). Also, the rights and duties, or "statuses," that are attached to an identity depend on the identity with whom one is interacting (Goodenough 1965:4). Similarly, Nadel (1957:23–41) defines the social "role" as a bundle of social positions and their rights and duties, which are enacted sequentially in different contexts. Roles come into existence with various cues, or may "unfold" and transform through time as a context evolves.[21] Thus, social psychology and anthropology provide a firm theoretical foundation for expecting the stylistic expression of social and personal identities and their balance to shift with the social situation.

In summary, when an artisan makes an artifact, the relative importance that the artisan gives consciously or unconsciously to various messages, and the AP visibility of the attributes in which those messages are expressed, depend on three different sets of ordering criteria. The criteria include values and themes that are culturally dictated in a uniform or situation-dependent manner, as well as personal values, preferences, motives, and strategies that are situation-dependent. These three different kinds of ordering criteria, in turn, pertain to somewhat different classes of messages. The manner in which these different kinds of criteria are integrated so as to produce a single ordering of messages and a single mapping of messages to attributes varies with the culture and its general ecological–adaptive milieu. It also varies social-situationally with the cultural, ecological–adaptive, and motivational characteristics of the immediate contexts of artifact production, use, and display.

This way in which messages are ordered in importance and expressed materially is much more complex than that proposed by Wiessner (1984). She considers only the third kind of ordering criterion, which pertains to situationally varying messages that are selected by the artisan. She does not consider culturally dictated, constant messages or culturally dictated, situationally varying messages.

Finally, it is important to remember that despite the wide range of factors that may determine messages, message priorities, and the AP visibility of the attributes in which messages are expressed, there exists a cross-cultural regularity among them. Messages of social units of decreasing scale tend to be reflected in attributes of decreasing AP visibility in traditional societies, and for clear reasons (pp. 201–203).

The Concept of Message Priorities Extended to Multiple Media

Throughout the preceding section, the focus has been on the priority given to expressing various messages within single kinds of artifacts of one medium. Several factors were found to determine the order of importance of messages and the particular attributes in which they are expressed. These factors include the physical and contextual visibility of the attributes; the nature of the social situation(s) in which the artifact class is used; and the three ordering criteria of culturally dictated values that are uniform over a society, culturally dictated values that vary situationally, and artisan determined values, preferences, motives, and strategies. When artifacts of multiple classes of several media are considered, analogous factors determine the priority given to various messages and the particular classes through which they are expressed.

An example of a culturally dictated, uniform theme that was valued and applied broadly across many kinds of social situations and many visible media and artifact classes is the Baroque—which encompassed elaboration, complexity, contrasting effects, and sinuosity—in 17th century Europe. The Baroque was carried out with striking similarity and great priority in architecture, sculpture, painting, drawing, furniture and other household items, and gardening. Beyond these formal media, it

[21]This contextual, interactionist perspective differs from the more static social organizational models of Linton (1936:113–114), Merton (1957:368–370), and Service (1971:11), and common archaeological thought derived from Service. These models associate a constant array of rights, duties, and behaviors with a social "position."

was also expressed in the music, poetry, drama, and philosophy and science of the time (Shapiro 1953:295).

Several clear examples are given in this book and elsewhere of different media being used in different social situations and varying in the messages imbued in them according to situation-specific values. Morris (Chapter 13) contrasts the contexts of use, the expressive roles, and the messages of architecture, ceramics, textiles, and metals among the Inka. Neitzel (Chapter 12) does the same for architecture, a class of ceramics, and turquoise from the Chaco system of the American Southwest. Shapiro (1953:295) notes,

> We look in vain in England for a style of painting that corresponds to Elizabethan poetry and drama; just as in Russia in the nineteenth century there was no true parallel in painting to the great movement in literature. In these instances we recognize that the various arts have different roles in the culture and social life of the time and express in their content as well as style different interests and values.

Although the concept of message priorities and their relationship to material visibility and contexts of use can be extended in application from the multiple attributes of an artifact to multiple artifact classes, there is a fundamental difference between these two circumstances. In the case of a single artifact class, the number of highly visible attributes that are effective for bearing messages is limited, and messages (if there are several) must usually be ranked in their importance for expression in more or less visible attributes. In the case of multiple artifact classes, the number of classes that are highly visible need not be as restrictive, messages need not be ranked as rigidly, and simultaneous communication of many messages in multiple, highly visible classes is possible. The nature of the social situation, moreso than artifactual, physial-formal limitations on expressing messages, may lead to a prioritizing of messages for expression.

Constrained Indeterminacy in the Relationship between Attribute Visibility and Determining Process

Many factors structure the relationship between the AC visibility of an attribute and the processes or constraints that it reflects. Some of these factors can be summarized by relating them to three basic dimensions of the characteristics of the processes and constraints (Figure 7-3). The first dimension is the *scale* of the social unit within which the process operates. This may determine viewing distances and the relative ecological–evolutionary based cultural value of the social unit and its messages. Second is the active or passive degree of *control* that the artisan has over the process. Third is the conscious or unconscious level of *awareness* that the artisan has of the process. Thus, empirically one finds that processes that pertain to larger units, are active, and/or are conscious tend to be reflected in attributes with greater AC visibility. Processes that pertain to smaller units that are passive and/or that are unconscious tend to be reflected in less visible attributes (see pp. 189–190, 192, 199–205). Tables 7-1 and 7-2 model this pattern.

However, this pattern is only a cross-cultural tendency. There is no single ordering of processes and constraints that universally maps to attributes of decreasing AP or AC visibility. Nor is there any single algorithm or argument for combining the three dimensions of the characteristics of processes and constraints so as to define such an ordering.

This indeterminacy between attribute visibility and process arises from several circumstances. First is the wide and overlapping ranges of attribute AP visibility in which some processes can manifest themselves (Table 7-2). Second, indeterminacy results from a number of context-specific factors that cause variation in the relative importance of sociocultural units and their messages. These factors include cultural values and configurations that differ from society to society. They also include the cultural, ecological-adaptive, and motivational characteristics of the social situation of artifact production, use, and display within a society, which in turn determine culturally dictated, situation-

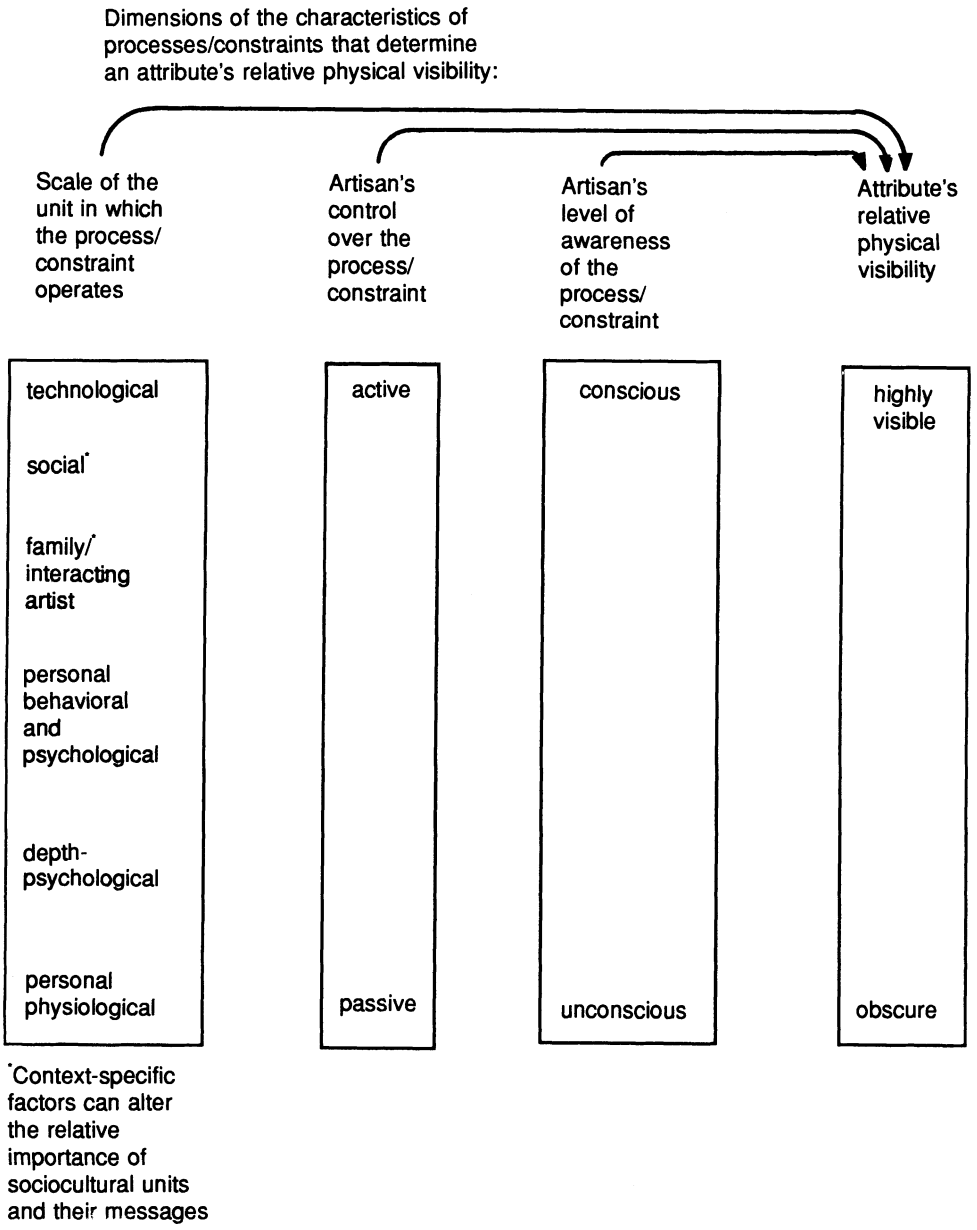


Figure 7-3. The processes and constraints that determine the relative physical visibility of the attribute have three dimensions of variation.

dependent values and personal values, preferences, motives, and strategies of the artisan. Third, indeterminacy results from the varying character of contexts of artifact use and display. This variation affects the distance and/or frequency of artifact viewing. Social events can be structured in varying ways that change artifact viewing distances. Socially closed contexts of use decrease the range of viewers to which an artifact might otherwise be visible and/or the frequency of viewing. Group fissioning and systematic destruction of prototypes have the same effect. Fourth, some contexts of artifact production or media are culturally defined as protected realms. There, the artisan can express his or her creativity in visible attributes normally restricted to traditional, socially dictated forms. Fifth, highly visible attributes whose production depends technologically on obscure attributes may not reflect the active processes or larger-scale social units that their high visibility would normally allow. Sixth, indeterminacy between attribute visibility and process can result from the alignment of communication and interaction processes and the expression of both in the same, visible attribute(s).

In sum, the relationship between attribute visibility and process is best characterized as "constrained indeterminacy" (Carr and Rosenthal 1986). It is neither the universal relationship once modeled by Wobst (1977), nor the culturally and historically particularistic phenomenon concluded by Hodder (Hodder 1982b:183).

Implications of the Bridging Propositions to Current Theoretical Debates on Style

The bridging propositions presented above have direct implications for two fundamental debates in archaeology. One debate concerns the relative truth of the information exchange versus the social interaction theories of style. The second pertains to the kinds of attributes that are appropriate for delimiting societies and social segments.

The Information Exchange and Social Interaction Theories Revisited

Historically, the information exchange and social interaction theories were characterized as competing frameworks that each pertain to an undefined, similar range of design attributes (Plog 1980; Braun and Plog 1982; Carr, Chapter 6). However, it is possible to reconcile and integrate the two theories by defining different boundary conditions and analytical roles for them (Voss 1980).

The two theories complement each other by pertaining to different ranges of attributes at different levels of an artifact's design hierarchy. Attributes at different hierarchical levels vary in their AP visibility, in the ranges of processes and social units that they thus can reflect and, consequently, in the theories that are relevant to them in addressing those processes. Specifically, the information exchange theory applies to design attributes of high to moderate AP visibility, and to attributes of lower AP visibility but high AC visibility. Only these attributes have consistent potential for communicating social and personal messages. Current social and personal conditions, issues, or needs that are important to communicate in the current context of production, use, and display of the artifact are more commonly reflected in these attributes. In contrast, the social interaction theory applies to attributes of poor AP and AC visibility, or to visible attributes that depend technologically on obscure ones. Only these attributes do not diffuse without close interaction, either because they or the attributes upon which they depend technologically are not easily perceived. Traditional aspects of artifact design that are learned when a craft is taught to an artisan (Roe 1980), rather than conditions in the current context of artifact production and use, are more commonly reflected in these attributes.

These boundary conditions on the two theories must be qualified, however, in two ways. First, there are processes and constraints beyond those addressed by the information exchange and social interaction theories that also affect the attributes to which these theories pertain. Not all attributes of high AP and/or AC visibility need communicate messages. For instance, some may reflect technology

alone, the passive sharing of culture history, or the active aspects of enculturation found in student–teacher negotiations (Table 7-2). Similarly, not all attributes of poor AP and AC visibility need reflect social interaction. For example, some may reflect passive personal preferences, manufacturing habits, or motor skills. These alternative causal factors can often be recognized by considering the geographic expanse and form of the attribute's spatial distribution and other spatial and nonspatial contextual information (see the Geographic Distribution Hierarchy, below).

A second way in which the boundary conditions on the two theories must be qualified is that the theories can overlap in the attributes to which they pertain. This is the case if the AP visibility rather than AC visibility of attributes is analyzed. Attributes of poor AP visibility can not only reflect social interaction, but also communicate messages in social situations where distances of interaction among persons and artifact viewing distances are small (see examples, p. 190). The two theories also overlap in the attributes that are relevant to them when interaction and communication processes come into alignment. This occurs when interactions are important economically, politically, socially, and/or ecologically and come to be actively recognized, symbolized, and communicated in attributes of high AP or AC visibility (see examples, p. 197).

Design Indicators of Social Groups

A basic task in archaeology is reconstructing the geographic and temporal bounds of societies and smaller, self-aware social groups. Archaeologists have endlessly debated the appropriateness of different kinds of attributes for this purpose in the contexts of both traditional artifact typology (c.f. Binford 1965; Dunnell 1971; Rouse 1960; Taylor 1948; Whallon and Brown 1982) and stylistic studies of interaction (e.g., Plog 1982 versus Washburn and Ahlstrom 1982).

The bridging arguments presented above make it clear why no single material criterion is useful cross-culturally for characterizing the kinds of attributes that delimit a society or other social groups. Specifically, a social group—be it a whole society, a community, or some other social segment—may be defined and delimited by any of several kinds of processes. Table 7-2 lists these processes. In turn, the AP visibility of design attributes that reflect each process and/or all of the processes that define a social group may vary widely. Table 7-9 shows this variation. Table 7-9 also shows one reason why the processes that define a social group vary in the AP visibility of the attributes that reflect those processes. The processes differ in their character: whether they (1) are active or passive; (2) are conscious or unconscious; or (3) pertain to between-group or within-group dynamics. Other reasons for variation in the AP visibility of attributes that reflect group-defining processes include the size of the group and most of the six circumstances leading to indeterminacy in the relationship between attribute visibility and causal process (pp. 211–213).

Especially relevant to current archaeological literature is whether the process that defines a social group stylistically operates within the group or between groups. Considering active processes, alone, artifact styles can vary among groups as a result of three kinds of processes. First is the active symbolization of group boundaries to express complementarity, competition, etc. (Barth 1969). Second is the active symbolization of group boundaries as part of the competitive strategies of subgroups within them (Hodder 1982a:75–86). Third is the active expression of within-group cooperation. Any one or more of these processes can be involved in the creation of ethnic identity (Royce 1982), and any one or more may have stylistic expressions that can help the archaeologist reconstruct social groups. However, which of these processes are expressed materially can vary from society to society, social segment to social segment, and by artifact class (Hodder 1982a:35). In turn, the material attributes that can reflect these processes differ in the ranges of their AP visibility. Expression of within-group cooperation can be achieved with attributes of moderate AP visibility when artifact viewing distances are small. In contrast, symboling of group boundaries often involves larger viewing distances and more highly visible attributes (Table 7-9).

Table 7-9. Kinds of Processes that May Define and Delimit a Society or Social Group, and the Absolute Physical Visibility Required of Design Attributes to Reflect Those Processes

DIMENSIONS 2 AND 3	DIMENSION 1	
	Between-group processes	Within-group processes
Active, conscious expression involved during attribute choice and artifact design	Process: symboling group affiliation to express social boundaries; communicating group proscriptions Visibility: attribute must be highly to moderately visible so that it can be seen from a distance	Processes: symboling group affiliation to express within-group cooperation and solidarity; communicating other pansociety messages Visibility: attribute need not be highly to moderately visible as it need not be seen from a distance, depending on the context
Active, unconscious expression involved during attribute choice and artifact design	Mutually exclusive dimensional states	Process: psychological projection of pansociety, metaphoric information about the organization of society or the cosmos, or depth-psychological, archetypal themes about relationships Visibility: obscure, in the form of complex, relational attributes Process: psychological projection of archetypal personages in the form of pansociety mythological figures Visibility: attribute need not be highly to moderately visible as it need not be seen from a distance, depending on the context
Passive, unconscious, or conscious use of attributes following traditional norms	Mutually exclusive dimensional states	Process: enculturation of traditional craft norms; shared culture or group history of interactions and influences; casual learning and diffusion through contact between groups Visibility: obscure to high

Thus, it is fruitless to look for any single, cross-culturally uniform, material criterion that defines the kinds of design attributes that delimit societies or social segments. Relevant attribute selections must be made on a case-by-case basis, in reference to the particular processes that probably operated or did operate in that context (see pp. 236–246).

THE DECISION HIERARCHY

A hierarchy of design attributes can be established on the basis of not only their AP and AC visibility, but also two other covarying attribute characteristics. First is the relative order of the attributes in a hierarchy of manufacturing decisions involved in planning the design and attributes

of the artifact. Second is the relative order of the attributes in a sequence of production steps involved in the artifact's manufacture. These characteristics serve to substantiate, elaborate on, and/or refine the ordering of attributes by their AP visibility. In this way, they strengthen the linking of attributes to their determining processes and constraints.

This section begins by defining the concept and nature of a decision hierarchy. Several factors that are essential to the nature of decision hierarchies and that determine attribute ordering are considered. These are technological and logical–formal constraints, syntactic and semantic constraints, and message priorities. Next, the relationship between the decision order of an artifact's attributes and the behavioral and other processes that they may reflect is described. Then, decision hierarchies of various structures are distinguished. The distinctions have implications for the selection of relevant design attributes for analysis. Finally, decision hierarchies are distinguished from design grammars. These two kinds of structures can be similar formally, but differ in their organizational basis, content, and goals.

The Decision Hierarchy Defined

A manufacturing decision hierarchy is a sequence of decisions or sets of decisions about an artifact's attributes that must be made, one after another, in the process of *planning* an artifact's design. Manufacturing decisions are distinct from the production steps taken to realize the artifact's attributes and design. Manufacturing decisions may be made (1) in a very formal manner entirely before the production of the artifact; (2) coeval with the production of attributes to which the decisions pertain, as a part of a spontaneous creative process; or (3) anytime between these two extremes (e.g., Roe 1979:207; Hardin 1979).

The order in which decisions are made reflects the logical relationships of dependence of later decisions upon earlier ones. Specifically, some decisions can be made only after other decisions have been made and serve as a "frame" for them. At the same time, those earlier decisions that do serve as a framework for the expression of later ones also "constrain" the range of alternative attributes that are possible, relevant, or appropriate in later decisions.

Framing constraints are of four kinds. Most basic are the *technological* constraints and the *logical–formal* constraints that earlier decisions place upon later ones. Only some technological procedures and materials are possible in the context of other technological givens. Thus, earlier decisions about materials and procedures constrain later ones. Similarly, only some alternative forms are logically possible in the context of other formal givens. Thus, early decisions about form constrain later ones.

For example, the quality of chert used to make a projectile *technologically* limits or permits the fineness with which its edges can be pressure-flaked. Early decisions about the kind of chert to be used technologically constrain later ones about pressure flaking. Similarly, whether a projectile has barbs *logically* and *formally* constrains whether the shape of barbs is relevant to consider. Early decisions about the general form of the projectile logically determine the relevance of later ones about the details of its form.

The third and fourth kinds of framing constraints are the *syntactic* and *semantic* constraints that earlier decisions about the messages, meanings, forms, and symbols to be encoded in an artifact place upon later such decisions. Only some messages, meanings, forms, and symbols are syntactically and semantically appropriate in the context of others already given.

Examples of syntactic constraints include surface grammatical rules for decorating pottery, such as the design grammars of Tarascan (Friedrich 1970:335), Lapita, and Ban Chieng (Hardin 1983a:311–312) painted pottery. In these cases, earlier decisions about design field layout constrain later decisions about the kind or organization of motifs that it is appropriate to paint in those fields. Examples of semantic constraints are commonly found in iconographic representations of cosmology. Cross-culturally, cosmologies often place value on separating, balancing, or integrating in this life the

categories of plants, animals, and other things that are associated mythologically with different cosmological realms, such as the earth, sky, or waters. In such cultures, earlier decisions to represent certain categories from certain realms on an artifact will constrain later decisions about what other categories from other realms are appropriate to also represent. The value that the Indians of the southeastern United States placed on separating and balancing things associated with the Upper and Lower Worlds in all aspects of life, including their art (Hudson 1976:136–148,173), illustrates this semantic constraint. Similar values may be expressed in the animal and material associations rendered in prehistoric Ohio Hopewell iconography (Penny 1983, 1985).

Of the four kinds of framing constraints, technological and logical–formal ones are more fundamental than syntactic and semantic ones. The messages, meanings, and symbols that may be encoded in an artifact are always played out in a material realm and embedded within technological (Sackett 1985) and logical-formal possibilities.

A simple example of a decision hierarchy, the framing relationships and constraints that structure it, and the resultant ordering of attributes can be found in the designing of an item of clothing (Table 7-10, Figure 7-4). Suppose a woman wishes to make an item of clothing. She has a series of decisions to make about the item's attributes. Some decisions must logically be made before others. Should she make a dress or a pair of slacks? She decides upon a dress. How formal should the dress be? She decides to make it formal. To manifest the formality of the dress, what should be its color, perceptual texture and material, and general shape, including its length, fit, and neckline height? She decides, among these characteristics, that the neckline will be high. Should the neckline be decorated with lace or stitched plain? She decides on lace. What type of lace should she use—bold or fine patterned? She decides on fine. Should the lace be attached with a muted, simple stitch or a bolder, angular stitch? She decides on muted, to allow the lace to speak for itself.

Earlier decisions in this hierarchy serve as a frame for later ones. Earlier decisions determine what attributes and attribute states are technologically possible, logically and formally relevant, or syntactically and culturally appropriate in later decisions. For example, the woman's decision to make a dress might depend on a technological, raw material limitation—the amount of cloth that she has available. Her decision about whether she should make a formal or informal dress is logically relevant only if she has first decided to make a dress, as opposed to slacks or some other kind of clothing. Her decisions about the color, texture, material, and general shape of the dress might depend syntactically on her choice to make a formal dress and cultural rules about the required characteristics of formal dresses. Her decision to add lace to the neckline might depend syntactically on her choice to make the neckline high and cultural rules about the decoration of high neckline, formal dresses. Her decision

Table 7-10. An Example of a Hierarchy of Design Attributes Arranged by Their Visibility and Decision Level

Design attribute	Attribute state	Relative physical visibility	Decision level
Overall form	Dress, slacks, etc.	High	1
Formality of the dress	Formal, informal Gestalt quality	High	2
Dress color	Various colors	High	3
Perceptual texture and material	Various textures and materials	High	3
General shape of the dress, including neckline height	High, low	Moderate	3
Lace on neckline	Present, absent	Moderate	4
Pattern of lace	Bold, fine	Poor	5
Stitching used to attach lace	Bold, muted	Poor	6

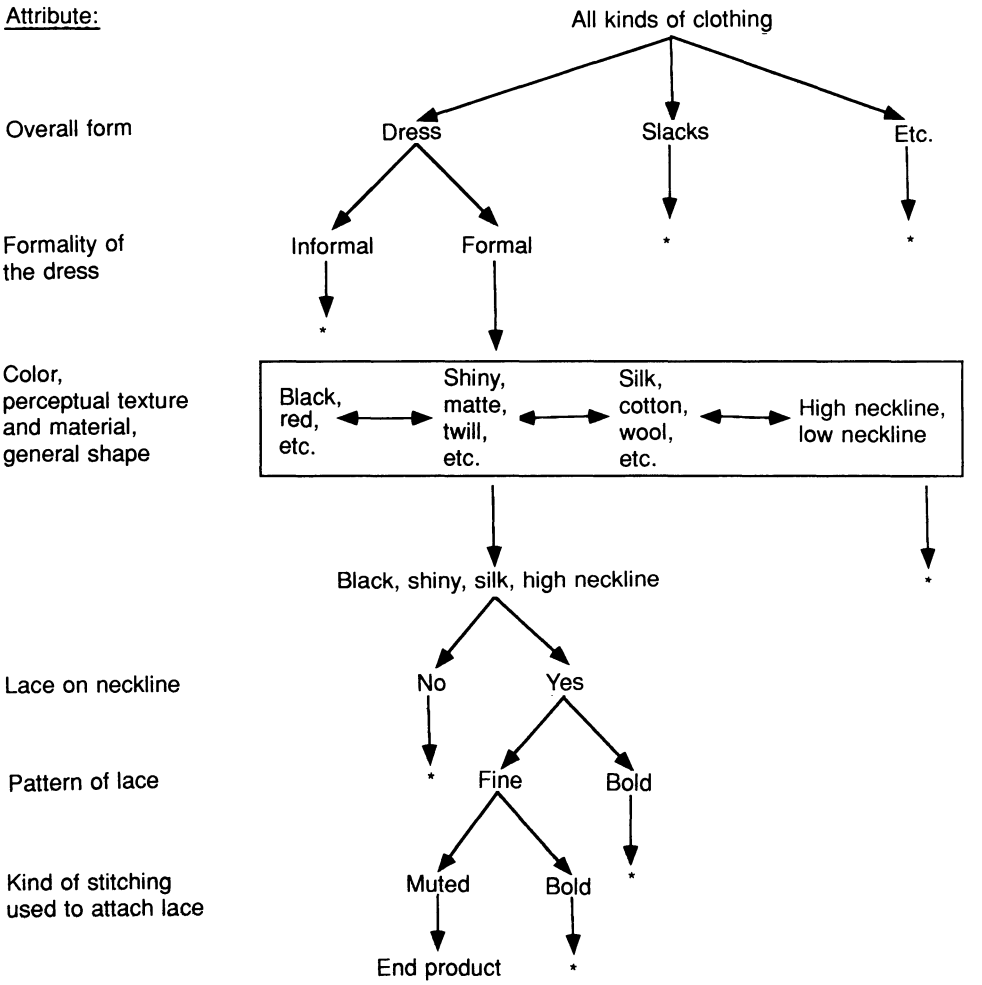


Figure 7-4. A decision tree for a dress. Asterisks (*) indicate additional, analogous decision pathways which lead to decisions about the same or similar attribute states but which are not shown here. Boxed attribute states are those about which decisions can be made "simultaneously," in this case in a "coordinated" manner.

about the pattern of lace to be used is logically and formally relevant only if she has already decided to decorate the neckline with lace. Finally, her decision about the fineness of stitch for attaching the lace might depend syntactically on the fineness of the pattern of lace that she previously chose and on cultural rules about coordinating kinds of lace and stitching. Thus, decisions are ordered and a decision hierarchy is structured by the framing relationships and constraints among the decisions.

All of these decisions and the framing relationships and constraints that structure them can be represented graphically by a decision tree (Figure 7-4). Other structures are also possible (see pp. 224–227).

The process of ordering manufacturing decisions into a hierarchy according to their framing

relationships and constraints, as just described, is applicable to all media.[22] Pryor and Carr (Chapter 8) and Carr and Maslowski (Chapter 9) illustrate this process for basketry, fabrics, and cordage.

The General Nature of Arrangement of the Decision Hierarchy

Attributes that are ordered according to their position in a decision hierarchy tend to follow a general pattern. Early decisions usually pertain to attributes that define the gross structure, composition, layout, or outline of an item. These attributes, being larger, tend to have greater AP visibility. Later decisions usually pertain to the finer details of design. These, being smaller, tend to be less visible. This pattern often occurs because, by definition, earlier decisions serve as the frame for and constrain later decisions.

Thus, the order of design attributes that is defined by their position in a manufacturing decision hierarchy tends to correlate with their order as defined by their AP and RP visibility. The clothing example in Table 7-10 illustrates this. The first decision, whether the item of clothing is to be a dress or slacks, pertains to its gross outline. This attribute is quite visible. Later decisions concern the finer and finer details of neckline height, lace decoration, and the stitching used to attach the lace. These attributes are decreasingly visible. Other examples of covariation between the AP or RP visibility of design attributes and their position in a decision hierarchy are provided for basketry, weaving, and cordage by Pryor and Carr (Chapter 8) and Carr and Maslowski (Chapter 9).

The correlation between the decision order of attributes and their AP or RP visibility is not perfect, however. For example, an attribute of a lower decision order may have a greater AP visibility than an attribute of higher decision order. Such circumstances can arise because the AP and RP visibility of an attribute are determined by more than its size (Table 7-5).

Simultaneous, Independent Decisions and Determinants of Their Order

When decisions about attributes are made sequentially, as has been assumed above, earlier decisions serve as a frame for and constrain later ones. Technological, formal, syntactic, and semantic constraints determine the order of decisions.

In many media, however, some decisions about some attributes are made in sets. Multiple decisions, rather than a single decision, are made at one decision level. These decisions may be made independent of each other, or to compensate or coordinate with each other, in any order, that is, "simultaneously" (see p. 225).

Simultaneous decisions within a set do not serve as a frame for each other or constrain each other. Factors other than the four kinds of framing constraints determine the order of decisions. When at least some of the decisions of a set pertain to attributes that actively communicate messages, the order of decisions is determined by the priority of the messages and the suitability of the attributes for expressing those messages. Decisions are made first about those attributes that are best suited in their nature and/or AP visibility to express messages of highest priority (Figure 7-5). Subsequent decisions

[22]Other examples of the process of ordering manufacturing decisions according to their framing relationships and constraints are as follows. In basketry, once one has decided the shape and weave/visual texture of a basket, one has technologically constrained the range of designs that can be woven into it (Pryor and Carr, Chapter 8:Figure 8-3). The same is true in the weaving of fabrics (Kent 1983:120; Carr and Maslowski, Chapter 9:Figure 9-3). In pastel drawing and watercolor painting, once one has placed a ground color or wash over an area, the hues of all objects subsequently drawn or painted over it are constrained technologically to a more limited range. In landscape painting, once one has drawn a horizon line, one has implicitly constrained, in accordance with the laws of linear perspective, the shapes and sizes that can be taken by objects that fill the sky and earth spaces. The laws of linear perspective are syntactic constraints that pertain to early Renaissance and later Western cultural heritage, rather than technological constraints.

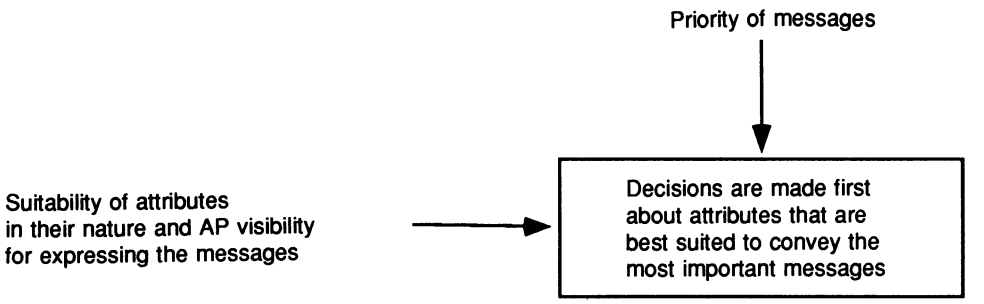


Figure 7-5. The determinants of decision order when decisions are made simultaneously in sets and independently of each other, and when attributes communicate messages.

are made about attributes that are useful or available for expressing lower priority messages, or that do not express messages.

The example of designing a dress (Table 7-10, Figure 7-4) can be used heuristically to illustrate these points. The decisions about dress color, perceptual texture, material, and general dress shape all occur at the same decision level. This set of decisions works out the implications of the previous decision to make a formal dress. All of the decisions in the set are made independently of each other. The decisions can be made in any order, or "simultaneously." They do not constrain each other technologically, formally, syntactically, or semantically, although they are all similarly constrained syntactically by the earlier decision to sew a formal dress.

However, the different attributes to which the decisions in the set pertain might actively communicate different messages. Dress shape might communicate the general formality of the situation in which the dress is to be worn and the woman's high social position, in general. Dress texture and material richness might communicate the woman's more specific economic status. Color might express the woman's personal preference and personality. In turn, these messages might differ in their importance for expression according to cultural values and perhaps the particular social context. If social position were more important to communicate than personality, then the first decisions to be made in the set would concern dress shape, texture, and material. Dress color would be decided secondarily. This decision order would become important if the decisions in the set were made in a simultaneous, dependent, coordinating, or compensating manner (although this is not so in this example). It this were the situation, the expression of less important messages in later-selected attributes might be compromised, formally, relative to the expression of more important messages in earlier-selected attributes (see also pp. 223–224).

In instances where decisions are made in sets and their order depends on communication processes that the archaeologist has yet to reconstruct, decision order is not a useful, independent criterion for ordering attributes into a hierarchy and for assigning processual meanings to attributes. It is important that researchers understand this limitation to the utility of decision hierarchies. It is also essential that researchers not force all manufacturing decisions into a sequential format.

Qualifications in the Definition and Arrangement of the Decision Hierarchy

There are several nuances to the concept of a decision hierarchy that require clarification for its appropriate application in style analyses. These include the distinction of decisions, on the one hand, from attributes, unconscious projections, and inspirations, on the other.

Decisions versus Attributes. In contradistinction to Plog (1980:41), decisions are not "equated" with attributes and a decision hierarchy is not equivalent to an attribute hierarchy as defined here. Decisions *pertain* to attributes; the construction of a decision hierarchy results in an ordering of attributes, from those to which earlier decisions pertain to those to which later ones pertain (e.g., Table 7-10). Moreover, the order of an attribute in a decision hierarchy is only one of its three *characteristics* that determines its position in an attribute hierarchy as defined here (Table 7-1). The other two characteristics are the attribute's visibility and production step order. These distinctions are important to maintain because all three characteristics of an attribute, not simply its order in a decision hierarchy, determine the range of processes that map to it.

Conscious and Unconscious Decisions. The term "decision" is used in current archaeological literature (Braun 1977:129; Redman 1977:46; Plog 1980:41–42; Braun and Plog 1982:511) to refer to a choice that an artisan comes to make when producing a piece of art or other artifacts. The term literally denotates a decisive act, based on a conscious, rational process (Limp and Carr 1985). However, the choice processes involved in the creation of an artifact are usually of a broader range of kinds. They include conscious choices, inspirations that remain unconscious projections through the creative process, and inspirations that rise to the semiconscious, preverbal level of the "practical conscious" (Pryor 1985a).[23] In this chapter, the term "decision" is used in an expansive manner to include all of these kinds of selection processes.

Decisions and Initial Inspirations. As decisions of a kind, the creative inspirations that may initially lead an artist to plan and produce a piece of art have a place analytically with other unconscious and conscious decisions in a design hierarchy. However, when structuring decisions into a hierarchy, the analyst should not confuse the sequence of the inspirations in the initial creative process with their order in the decision hierarchy.

Specifically, decisions in a decision hierarchy are ordered according to the technological, formal, syntactic, and semantic constraints that they impose on each other. In contrast, the initial creative inspirations that lead an artist to plan and produce a piece of art may belong to any level of the decision hierarchy of which the inspirations will become a part and which is yet to be realized. An artist may be inspired to make a piece of art by any of its attributes and the potentials that they hold for creative expression. Thus, the creative process is not necessarily begun with the most fundamental decisions of a decision hierarchy, which pertain to layout, outline, or other physically visible attributes.

In this sense, the terms "early" decisions and "later" decisions, which I have used heuristically above to introduce the concept of a decision hierarchy, are somewhat misleading. The order of decisions in a decision hierarchy is determined structurally and contextually rather than temporally. Thus, the terms, "first-order" decisions and "later-order" decisions, and "higher-order" decisions and "lower-order" decisions, are more appropriate when discussing a decision hierarchy. These are used henceforth.

Two examples of the distinction between the structural order of decisions in a decision hierarchy and the temporal order of inspirations and choices are the following. Suppose a painter is inspired to capture a certain twist in the branches of a tree, or a potter is inspired to create a certain vertically oriented decorative motif on a pot. Both of these are finer-scale design attributes. Once inspired,

[23]Some attributes of an artifact are chosen entirely consciously, based on a assessment of the logical possibilities for achieving some effect. For example, to greatly emphasize an orange in a still life, an artist might consciously assess the background colors that would be more or less effective for this, using the rules of the color wheel. However, choices are also arrived at through inspiration from the unconscious. The inspirations may remain entirely unconscious to the artisan through the creative and production processes, in which case they are psychologically termed "projections." Unconscious inspirations may also become conscious to various degrees as the artisan plays with these choices and their ramifications during further planning or production.

however, the artist must then plan the artifact's design in a more orderly manner. In particular, decisions must be made about grosser attributes, which will provide a frame for the finer one that initially inspired work. The artist must consider how various alternative gross attributes might or might not technologically or otherwise allow the finer, inspired attribute to become a part of the artifact's decision path and to be realized. Thus, the painter who is inspired to capture the twist of tree branches must consider whether he or she should paint one tree or a forest, the density and size of the trees, and the direction of lighting. These are all attributes of composition that are more visible, that pertain to first-order decisions in a decision hierarchy, and that may or may not allow the finer-scale, inspired attribute of branch twisting to be effectively achieved. Similarly, the potter who is inspired to create a vertical motif must consider the orientation of the pot's overall form, the orientation of the decorative field in which the motif will occur, and how these will or will not accentuate the motif's form. Again, these additional attributes all concern the composition of the piece, are visible, and pertain to first-order decisions that determine whether the finer-scale, inspired motif can be realized. Thus, initial inspirations are not necessarily the first-order decisions in a manufacturing decision hierarchy. Initial inspirations need not pertain to attributes that define the overall form or structure of an artifact and that have the greatest AP visibility.

A similar situation holds when an artist is in the midst of planning or producing a piece of art and is focusing on attributes of a restricted range of decision levels. Creative inspirations about attributes at any levels in this range may arise. However, once inspired, the artist must then step back and plan the design of this aspect of the artifact such that decisions about grosser attributes lead to the inspired attribute. The artist may also have to rework decisions made much earlier, which pertain to grosser attributes beyond the range of original focus.

Finally, note that both inspiration and planning can occur before or during production. Also, planning can be part of a playing process during production (Roe, Chapter 2), which facilitates further inspirations. The creative process is usually not a linear one.

These complexities in the creative process differ from the simplified view of it presented by Hardin (1979:92). Hardin envisioned the creative process as a sequence of production steps, with creative, "problem solving" and choice at each step. The possibility of forethought and inspiration prior to the manufacture of the artifact or some aspect of it are missing from Hardin's model. There are historical reasons for this.[24] In contrast to Hardin's view of creativity and more in line with the one presented here are the views of Bunzel (1929) on pottery decoration and Kent (1983:126) on weaving decoration. These analysts recognize the role of inspiration and forethought in creativity.

Attribute Generality and Decision Level. When describing the visibility hierarchy, it was shown that the AP visibility of an attribute depends in part on the generality with which its states have been defined. The same is true of the decision order of an attribute. If an attribute's states are defined very generally, it may have a higher decision order than if its states had been defined with more detail.

This effect is most evident when the decision about an attribute is broken analytically into two or more decisions of different generality. For example, consider the attribute, color. In planning a painting, an artist might first decide whether a certain area should be painted in a warm or cold color. Only later might the artist decide on which specific warm or cold color, such as red or blue, to use. Many decisions might intervene between the two decisions concerning color.

It is important to emphasize that, in such cases, a single attribute such as color does not hold two different levels within a decision hierarchy. To say this would imply analytic confusion over the

[24]Hardin's view of the creative process reflects the philosophy of the Abstract Expressionist movement of the 1960s during the time of her research. This movement encouraged the freeing of the creative process by envisioning it as a series of spontaneous acts during a series of manufacturing steps (Hunter 1966:60). The movement originated in reaction to traditional Western art, which emphasizes planning.

mapping between form and process. Instead, two different attributes of different generality are involved. In this example, they are color warmth and hue.

The different hierarchical levels that are held by similar decisions of differing generality can be significant to reconstructing processes from forms. The different attributes to which decisions of differing generality pertain can reflect different processes. For example, consider Newton's (n.d.) description of the knots that tribes of the Timbira and non-Timbira linguistic families of the Ge stock in northeast Brazil use to attach the top of a bow's drawstring. She describes the knots in two ways: as looped knots versus knotted knots in general, and more specifically as an array of variants of these. These two attributes are relevant to similar decisions, but decisions that differ in generality and that reflect different processes. The more general distinction between looped and knotted knots distinguishes the bows of two different linguistic families—the Timbira versus non-Timbira tribes—on generally differing sides of a major river (Newton n.d.:Figure 6). The more specific varieties indicate the varying degrees of interaction among different tribes within each linguistic group (Newton n.d.:Figures 4, 5). Thus, different processes are indicated by different attributes that pertain to decisions of different generality and that have different hierarchical positions. Carr and Maslowski (Chapter 9) provide a similar example.[25]

The Ge example is especially interesting. It shows how the criterion of decision order can complement the criterion of visibility in ordering attributes into a hierarchy that reveals the relationships of forms to their determining processes. In this example, both the general and specific attributes have a similar, obscure level of AP visibility. The criterion of visibility does not allow a hierarchical ordering of the attributes or suggest that they might reflect different processes. An attribute ordering that reveals the different processes is achieved with only the criterion of decision order. It is more effective in this case because, for obscure attributes, the hierarchical structure and content of manufacturing decisions directly reflect the subtleties of varying learned ways of doing and their diffusion. Attribute visibility does not.

Bridging Attribute Decision Level to Determining Processes

The correlations between form and process that were described for the visibility hierarchy also hold for the decision hierarchy. This is so because first-order decisions pertain to larger attributes that are usually more visible, whereas last-order decisions pertain to finer attributes that are usually less visible. Thus, for example, later-order decisions about the more obscure details of an artifact might concern the active expression of personal identity or passive, habitual manufacturing methods, but would not likely concern the active messaging of social identity. Here, the relationship of the processes that determine an attribute to its decision level is an indirect one, mediated by the attribute's visibility (Figure 7-6a).

However, there is also a direct way in which the decision levels of some attributes can relate to the attributes' determining processes (Figure 7-6b). The relationship holds for decisions about attributes that are highly to moderately visible, that communicate messages, and that are ordered sequentially. When this is the case, attributes that pertain to first-order decisions tend to express messages of higher priority, whereas attributes that pertain to later-order decisions tend to express messages of lower priority.

This pattern arises because attributes to which first-order decisions pertain are least constrained in their form and have the greatest range of possible forms for expressing a message. Form can thus be

[25]Carr and Maslowski (Chapter 9) found that the texture of Ohio Hopewell fabrics could be described in two ways: by whether the weave was compact or spaced in general, and more specifically by the average number of threads/cm. These two attributes pertain to similar decisions, but of two different levels of generality. However, the first attribute apparently reflects a regional, panethnic distinction among social strata, whereas the second attribute reflects more local distinctions among ethnic groups.

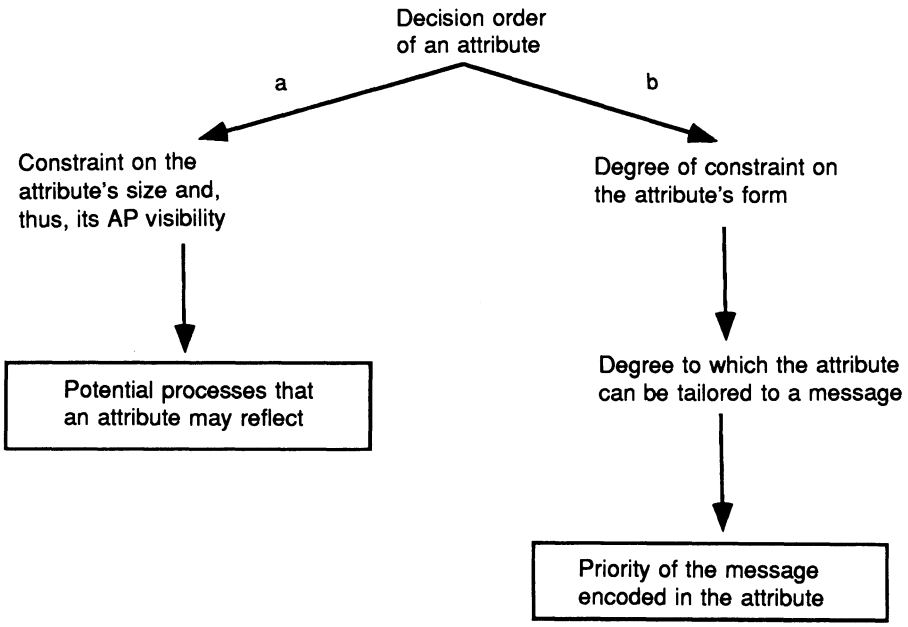


Figure 7-6. (a) The decision order of an attribute indirectly constrains the range of processes that the attribute can reflect by limiting its size and visibility. (b) The decision order of an attribute directly constrains the attribute's potential for expressing important messages by limiting its form. It is assumed that the attributes have high to moderate AP visibility, have potential for communicating messages, and are chosen sequentially.

tailored more closely to message content, which is desirable for important messages (Figure 7-6b). In contrast, attributes to which later-order decisions pertain are more constrained in their form and offer a narrower range of formal alternatives for expressing messages. Form cannot always be tailored as closely to message content, which may not be so critical for less important messages. Thus, important messages tend to be invested in attributes to which first-order decisions pertain and that offer greater potential for the suitable expression of those messages. Less important messages are compromised relative to important ones in their formal expression and are manifested in the more formally constrained attributes to which later-order decisions pertain.

In sum, the decision order of an attribute constrains the range of processes that it can reflect in a dual way, by limiting both its size and form. Whereas the first path of causation is largely described by the bridging arguments that pertain to the visibility hierarchy, the second is not. Thus, ordering attributes by decision criteria complements ordering them by their AP visibility. Both hierarchies are essential for identifying the etic meanings of attributes.

Structures of Decision Hierarchies

Decision "hierarchies" can vary in the structure of their pathways in four ways. The pathways can be (1) sequential or simultaneous; (2) paradigmatic, hierarchical, or a complex network; (3) independent, compensating, or coordinating; or (4) single or multiple independent paths. These dimensions of variation define a number of ideal types of decision hierarchies. Seven common types are shown in Figure 7-7.

The decisions involved in planning artifacts of most media combine two or more types of hierarchies. However, some media tend to be dominated by one type or another (see below and p. 228). Thus, it is necessary to distinguish between the dominant, global structure of a decision hierarchy and the structure of local pathways that are embedded within it.

The seven ideal types of hierarchies are defined as follows. The simplest kind is a sequential, full paradigmatic pathway (Figure 7-7a). In this kind, all attributes are considered, one after another, and all combinations of attribute states can be selected. In contrast, in a sequential, hierarchical, state-dependent pathway (Figure 7-7b), all attributes are considered, one after another, but the state taken by the first chosen attribute determines the states that are relevant for the second, and so on. Only some combinations of attribute states can be selected. In a sequential, hierarchical, attribute-dependent pathway (Figure 7-7c), the state taken by an earlier chosen attribute determines which attributes, as opposed to attribute states, are relevant in later decisions. Consequently, not all attributes are considered in any one decision pathway. Complex networks (Figure 7-7d) are similar to attribute-dependent hierarchical pathways but have diverging pathways that can merge in later decision levels. This structure gives the decision and production processes the character of equifinality. Also, complex networks are not totally sequential: decisions about one attribute can directly affect the decisions made about another several decision levels down, without acting through the decisions at the intervening levels. Simultaneous pathways (Figures 7-7e,f) are distinguished by multiple attributes that can or must be chosen simultaneously as a set at one decision level, rather than chosen sequentially. In a simultaneous independent pathway (Figure 7-7e), no attribute constrains any other and the states of each attribute can be selected independent of the states of others. In a simultaneous compensating pathway or a simultaneous coordinating pathway (Figure 7-7f), choice in the state taken by one attribute at a level affects and must be compensated by or coordinated with the states chosen for other attributes at that level in order to produce some overall result. The attributes are interrelated as a system. Finally, multiple independent pathways exist when the decisions involved in planning an object can be broken apart into two or more independent pathways of any of the above kinds.

Decision hierarchies with attribute-dependent pathways (Figure 7-7c,d) differ from decision hierarchies with state-dependent pathways (Figure 7-7a,b) in how decision order relates to attribute visibility. In a hierarchy with state-dependent pathways, alternative attribute states at one decision level have the same visibility by definition. For example, in the decision hierarchy for planning a dress, as shown previously in Figure 7-4, the two attribute states, having lace on the neckline and not having lace on the neckline, are equally visible. In contrast, in a hierarchy with attribute-dependent pathways, the states of alternative attributes at one decision level (i.e., of the same decision order) may vary in their visibility. For example, in Figure 7-4, the attribute immediately depending on whether a dress is made, overall dress formality, might take states that are considerably more visible than the states taken by some attribute immediately depending on whether slacks are made, such as the cut of the slacks.

Different media are dominated by different kinds of decision hierarchies. Ceramic vessel decoration often involves decisions that are organized primarily as sequential, hierarchical state-dependent or sequential, hierarchical attribute-dependent pathways (Friedrich 1970:333–335; Hardin 1983a: 313–317). Simultaneous coordinating pathways can also occur in the form of grammatical "rules of co-occurrence" among the decorations of different spatial divisions. Examples of this include some pottery of Uruk and Ban Chieng (Hardin 1983a:313). Paradigmatic pathways may also be embedded locally within the global hierarchical pathways that characterize ceramic decision making.

Flint knapping, stone sculpture, and wood carving, as subtractive processes, involve decisions that tend to be more rigidly organized. Sequential hierarchical, attribute-dependent pathways, with some networking, characterize these media (Crabtree 1966:12–15, 17–21; Bordes and Crabtree 1969:3–7; Collins 1975:16–18; Muto 1976:35–55).

Basket making involves decisions that form a complex network with an overall direction (Pryor and Carr, Chapter 8: Figure 8-3). The same holds for the decisions involved in the weaving of fabrics

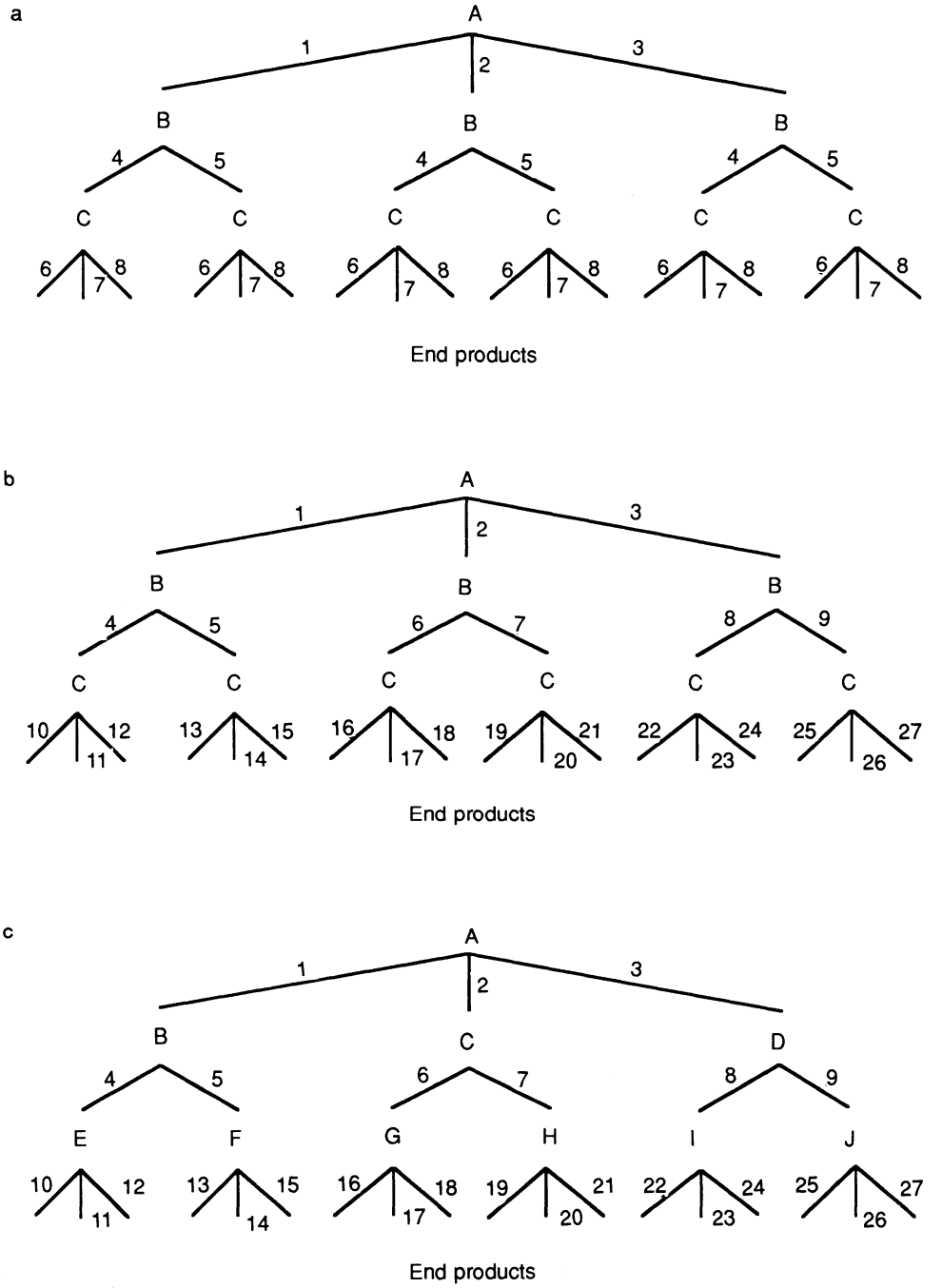
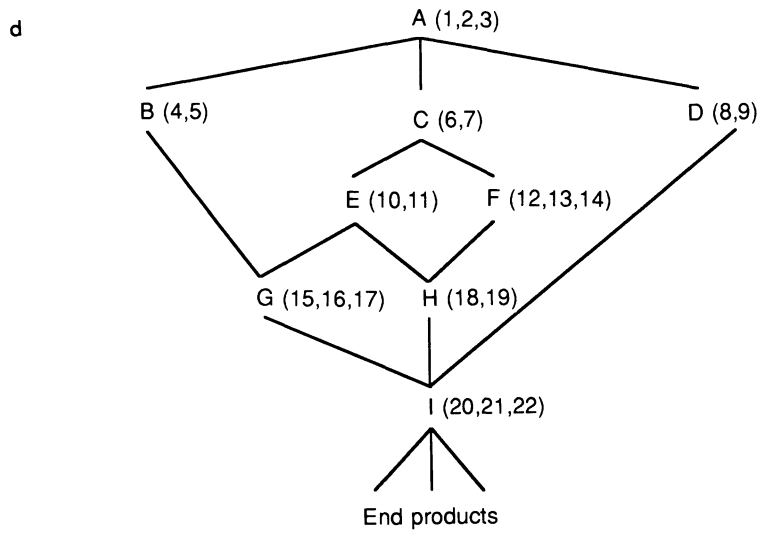
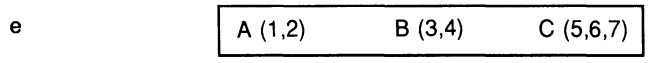
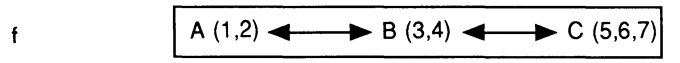


Figure 7-7. Decision hierarchies have various structures: (a) sequential–full paradigmatic; (b) hierarchical state-dependent; (c) hierarchical attribute-dependent; (d) a complex network; (e) simultaneous independent; (f) simultaneous compensating or coordinating; (g) multiple independent sequences or hierarchies. Capital letters represent attributes; numbers represent attribute states.







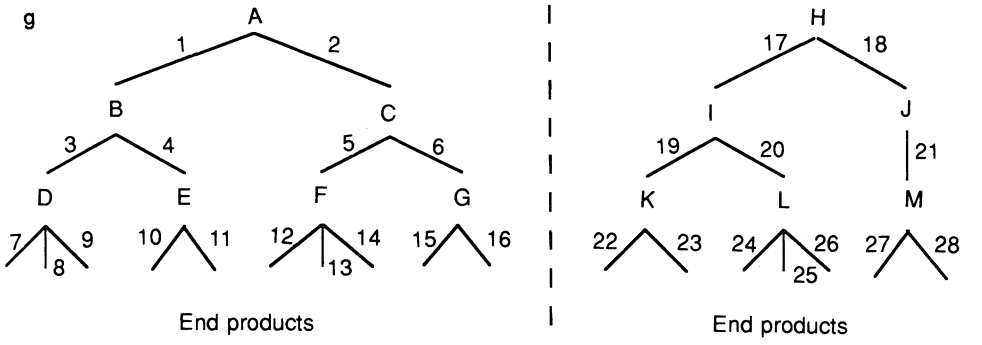


Figure 7-7. *(Continued)*

(Carr and Maslowski, Chapter 9: Figure 9-3), although many decisions are made simultaneously as sets, in either an independent or compensating manner. Weaving decisions do not tend to follow the hierarchical, state-dependent structure that Emery (1980) has constructed to classify fabrics and that is the standard in textile analysis.

Contemporary Western painting and drawing also involve decisions that are organized as a complex network, with simultaneous independent, compensating, and coordinating decisions. However, in painting and drawing, simultaneous compensating and coordinating decisions tend to be made for aesthetic, syntactic, and semantic reasons, in order to create integrated and meaningful compositions. In contrast, in basket making and weaving, the decisions more often reflect technological, formal, or functional constraints. For example, in weaving, the diameter, spacing, and number of elements, and their material, are chosen together (Carr and Maslowski, Chapter 9: Figure 9-6) in order to create a particular fabric texture and strength at a particular cost per unit area.

The manufacture of cordage involves decisions that are organized into multiple, independent pathways. Each, in turn, may have hierarchical attribute-dependent, hierarchical state-dependent, simultaneous-compensating, and/or simultaneous-independent aspects (Carr and Maslowski, Chapter 9: Figure 9-3).

Implications of Decision Hierarchy Structure for Selecting Relevant Attribute States for Analysis

S. Plog (1980:40–44) has stressed that intersite and intrasite studies of ceramic design similarity or diversity should be based on logically comparable design units. Specifically, the units should be attribute states that are "substitutable," in that they comprise a set of alternative choices at one decision node.

This analytic rule marks an advance over the approaches used in some previous ceramic stylistic analyses cited by Plog, where little attention was give to explicitly selecting comparable units. At the same time, Plog's rule is too narrow, given the varying structures that decision paths can have, in both ceramics and other media. The rule pertains correctly to only sequential, paradigmatic or hierarchical, state-dependent kinds of decision pathways (Figure 7-7a,b).

A broader criterion for selecting relevant design units, which can be applied to decision "hierarchies" of all kinds, is that the units be of the same decision *level*, or *order* in the hierarchy, as opposed to pertaining to one decision *node*. Design units that have this characteristic include not only the alternative states of single attributes, but also the states of alternative attributes at one level in attribute-dependent pathways (Figure 7-7c,d). Also included are the states of multiple attributes that can or must be selected simultaneously in an independent, compensating, or coordinating manner (Figure 7-7e,f). From this broader set of potentially relevant design units, those selected for a similarity or diversity analysis should also be similar in their AP visibility and in the scale of the social–spatial units that they reflect, as evidenced by their geographic distribution, if this is known. Considering the visibility and geographic distributional characteristics of the design units as well as their decision order makes it more likely that the selected attributes pertain to a single behavioral or other process.

Decision Hierarchies Compared to Related Approaches

A broad approach for analyzing artifact design that superficially resembles the use of decision hierarchies is the grammatical approach (e.g., Washburn 1977, 1983b; Muller 1979; Roe 1979, 1980). Design grammars are comprised minimally of a list of elementary shapes, and the syntactic and transformational rules for combining or elaborating shapes into more complex units. Design grammars and decision hierarchies are similar in that both are comprised of logical relationships between aspects of design. Also, tree diagrams can be used to visually represent both a sequence of

manufacturing decisions and the sequence of rules in phrase structure and other "competence" or "performance" models (e.g., Chippindale and Boast 1986; Knight 1986; Coyne and Gero 1986). At the same time, decision hierarchies can differ from design grammars in five fundamental ways. (1) A decision hierarchy is based on real-world technological, formal, and cultural constraints rather than on formal-mathematical relations that need not have real-world correlates. (2) In their goals, a decision hierarchy is outward-oriented, linking forms to processes, whereas most design grammars are inward-oriented, aiming ultimately at finding universal cognitive processes. (3) A decision hierarchy is largely an etic structure, whereas design grammars may be etic or emic. (4) A decision hierarchy is built "top-down" rather than "bottom-up." (5) A decision hierarchy is surficial, with a concern for how content constrains content, rather than depth-oriented with a concern for underlying generative rules.[26]

Another, decision-making approach to analyzing artifact design is McGuire and Schiffer's (1983). It complements the use of decision hierarchies in at least two ways. First, it considers utilitarian

[26]Archaeologists and ethnologists have borrowed grammatical methods from linguistics to describe and "explain" patterning in the designs of artifacts. Although static, structural approaches have been taken (Washburn 1977, 1983b), most grammatical approaches have been generative. These, in turn, have varied in the kinds of rules that they employ and the levels of structure that they address. Some grammars have been built with only simple phrase structures that summarize the underlying structure of a style (e.g., Muller 1979). These comprise "competence" models. Other grammars have extended competence models with context-sensitive or historical-derivational-transformational rules, which link underlying structures to actual surface forms (e.g., Roe 1979:210, 1980:58–62; Knight 1986; Chippindale and Boast 1986). These include both competence and performance models.

The five differences between decision hierarchies and design grammars that are mentioned in the text are made more precise here. First, the logical relations that structure a decision hierarchy pertain to the real world in being based primarily on technological and formal constraints that are determined by the physical world, and secondarily on syntactic and semantic constraints and message priorities that are determined culturally. In contrast, the logical relations in a design grammar are primarily formal-mathematical, and need not reflect real-world processes/constraints other than geometric–spatial limitations (Roe 1979:210, Chapter 2; Chippindale and Boast 1986). Alternative design grammars that similarly generate and account for a corpus of artifacts and artisan performance and competence are evaluated largely on the basis of their formal parsimony rather than the correspondence of their rules to real-world processes (Muller 1979:173–176; Roe 1979:209). However, to the extent that emic criteria are used to select among alternative grammars (see below in this footnote), some rules of a design grammar may correspond to the syntactically and semantically constrained decisions of a decision hierarchy.

Second, a decision hierarchy is outward-oriented in its explanatory goal. Decisions are ordered for the purpose of linking the attributes to which they pertain to the material or behavioral processes and constraints that determine them. Design grammars based on Chomskian linguistics are inward-oriented. They aim ultimately at finding repeated rules within and among design levels that reflect universal cognitive processes (e.g., Hassan 1986), although this goal has not yet been approached and is seen as perhaps irrelevant (Muller 1979:182–183). In making this distinction, the final, inward-oriented explanatory goal of Chomskian design grammars should not be confused with their immediate, outward-oriented, descriptive goal of developing an adequate competence or performance model.

Third, a decision hierarchy is largely an etic structure, in being primarily technologically and formally determined. Within this overall framework may be embedded local emic structures, which reflect syntactic or semantic constraints upon decisions. In contrast, a competence or performance model may be considered etic or emic, depending on the adequacy criteria used to select it from alternative models (Roe 1979:209).

Fourth, a decision hierarchy is a "top-down" structure. It flows from first-order, framing decisions that define the gross structure of an artifact to later-order, constrained decisions about the artifact's details. A design grammar is a "bottom-up" structure. It starts with minimal elements and rules for their combination and progresses to larger structures.

Finally, a decision hierarchy is surficial. It describes only directly observable structure—how content of one level constrains content at another. A design grammar is depth-oriented. It enumerates the rules that underlie and generate surface structures.

functional constraints on design and their interrelationships with other constraints. Second, it considers choices between the sometimes contradictory goals of artifact production, use, and maintenance, and of different social groups. Social–structural and ecological–adaptive contextual factors are seen as determining the weights given to contradictory goals during the planning of an artifact's design. Decision hierarchies do not consider these factors. Future work to integrate McGuire and Schiffer's approach with the use of decision hierarchies described here would likely prove fruitful.

THE PRODUCTION STEP SEQUENCE

The design attributes of an artifact can be ordered into a hierarchy by their position in a sequence of production steps, in addition to their positions in a visibility and a decision hierarchy. The order of production of attributes can correlate, more or less, and either positively or negatively, with their visibility level and decision order.

A production sequence is useful in at least two ways as a component of the unified middle-range theory built here. First, it can be used to substantiate or refine an attribute hierarchy already established with the visibility and decision hierarchies. The utility of the production sequence for this task depends on the strength of correlation it has with the visibility and decision hierarchies. Second, the production sequence can determine the strength with which processes map to form. This, in turn, depends on the direction of correlation of the production sequence with the visibility and decision hierarchies, as discussed on pages 231–234.

The utility of the production step sequence in assigning possible processual meanings to design attributes has not been fully realized in past archaeological studies. This is the case in part because archaeologists have tended to define design hierarchies with one criterion—attribute visibility, decision order, or production step, alone—rather than all three in a complementary fashion. Also, some archaeologists have not kept clear the distinction between the production step sequence and decision hierarchy, and have vacillated between the two criteria when ordering design attributes into a hierarchy (e.g., Whallon 1968; Hardin 1977, 1979; Graves 1982).[27]

This section first considers the nature of arrangement of a production step sequence. Its direction of correlation with the visibility and decision hierarchies, and how this varies among media, are addressed. Next, the factors that determine the strength of correlation between the production sequence and visibility and decision hierarchies are enumerated. Third, the manner in which the relative directions of these hierarchies limit or allow spontaneity in the creative process, and encourage

[27]The production step sequence, and decision hierarchy have not usually been clearly distinguished when ordering design attributes into a hierarchy. Whallon (1968:223) introduced the concept of levels of style without explicitly stating any criterion by which the levels should be defined. Early in her work, Hardin (1977:109, 1979:92–93) sometimes vacillated between the two criteria of position in the production sequence and position in a decision hierarchy when characterizing the levels of attributes and the structure of San José painted ceramic decorations. So, too, did Graves (1982:306) in his theoretical discussion of ceramic decoration. Later, Hardin (1983b:9) recognized the significance of the conceptual distinction: "the processual order in which design structure is realized must be distinguished from design structure, itself; . . . the fact that one element is painted after another does not necessarily mean that the second is structurally subordinate to the first." However, Hardin did not offer general operational methods for defining a decision hierarchy (one aspect of her "design structure") in contrast to a production sequence. In addition, Hardin (1977, 1983b), Redman (1977), Braun (1977), and Plog (1980) have tended to use one criterion or the other to order attributes, without justifying their choice in terms of middle-range theory (see Footnote 2, p. 179). Preferable to these past approaches to defining a design attribute hierarchy is to use all three of the visibility, decision order, and production step criteria together and in complement to order attributes. This is advantageous because the different criteria affect the mapping between process and form in different ways.

certain kinds of processes to be manifested in form, is defined. These relationships comprise middle-range theoretic bridging arguments.

The General Nature of Arrangement of a Production Step Sequence Compared to the Visibility and Decision Hierarchies

An artifact's production sequence can correlate either positively or negatively with its decision and visibility hierarchies. In other words, attributes of an artifact may be produced in approximately the same or reverse order as decisions about them are made, and they may be produced in approximately the same or reverse order as their AP visibility. This varying relationship differs from the constant one between the visibility and decision hierarchies, which always correlate positively.

Whether an artifact's production sequence correlates positively or negatively with its decision and visibility hierarchies depends on the medium. For many media, the production sequence approximately follows the planning sequence and the AP visibility of attributes. Production begins with attributes and corresponding decisions that define the gross structure, composition, layout, or outline of the artifact. It proceeds to attributes and corresponding decisions that define the finer details of design. This is generally true for potting, flint knapping, stone sculpting, carving, oil and acrylic painting, and drawing. In contrast, in other art forms, the sequence of production steps is the reverse of the planning sequence and AP visibility of attributes. The artisan begins by making a sequence of decisions about the artifact's attributes, from gross to fine, and then produces the artifact by creating its details and building toward its gross form. This is true of basket making, fabric weaving, cord making, and certain portions of the production steps of art forms that involve resist or masking procedures, such as batik and water color.

For example, in painting a landscape in oils or acrylics, the artist might begin production with the broad divisions of the land and sky spaces, which will serve as the background. The painter would then proceed to fill these spaces with various objects, working from their overall form and color to their details. Production proceeds from attributes that pertain to first-order, framing decisions to attributes that pertain to later-order, constrained decisions. In contrast, in watercolor, before applying washes to the land and sky spaces, the artist first must mask out the details within these spaces which are to be painted in other hues, later. Also, in weaving fabrics and manufacturing cordage, one begins with the details of spinning thread and twisting yarns, and then combines these primary elements or weaves them into larger structures. Thus, production begins with attributes that pertain to later-order, constrained decisions and that are less visible. Production then proceeds to attributes that pertain to first-order, framing decisions and that are more visible.

Carr and Maslowski (Chapter 9:Tables 9-1, 9-3) illustrate in detail the reversed relationship between the production sequences and the decision and visibility hierarchies of fabrics and cordage.

The Strength of Correlation between the Production Sequence and the Visibility and Decision Hierarchies

The production sequence of an artifact and its visibility and decision hierarchies can be compared for not only their direction of correlation, but also their strength of correlation. In other words, does the order of attributes by their production step correspond well with their order by their AP visibility and decision level?

Where the degree of correlation is high, the production sequence is useful for substantiating and/or refining an attribute hierarchy that has already been established on visibility and decision criteria. For example, Hardin (1977:109, 1979:92–93) was able to implicitly use the decision hierarchy and production sequence for San José painted ceramic decorations more or less interchangeably to establish an attribute hierarchy for the decorations. The strong correlation between production order and decision order in the San José case made this possible.

Correlation of the production sequence to the visibility and decision hierarchies of an artifact can range from strong to partial. Strong correlation is promoted when decisions in the decision hierarchy are made largely sequentially as opposed to simultaneously, and are arranged in a hierarchy rather than a complex network or multiple independent sequences. When decisions are made sequentially, most decisions will not have tied ranks and can correspond, one for one, with production steps.

Correlation between the production sequence and visibility and decision hierarchies varies with the medium. Correlation is greatest for subtractive manufacturing processes because, in general, these are dominated by sequential decisions. Flint knapping, stone sculpting, and wood carving are examples. Lower correlations can occur for fabric and basket weaving, which can involve many simultaneous decisions, although this depends on the item (Pryor and Carr, Chapter 8:Figure 8-3; Carr and Maslowski, Chapter 9:Table 9-3, Figure 9-3, Figure 9-6). Lower correlations can also occur for cord making (Carr and Maslowski, Chapter 9:Table 9-1, Figure 9-3), which involves multiple independent decision sequences. Correlation is moderately high for most other media. Thus, media differ in the degree to which the production sequence is useful for substantiating and/or refining the attribute hierarchy of an artifact.

Bridging Form to Determining Process: The Role of Spontaneity during Production

When inferring the processes that are reflected in an artifact's form, it is essential to evaluate the degree to which the artifact in general and its individual attributes have been produced spontaneously rather than with planning. This is so for two reasons. First, the degree of spontaneity during the production of an artifact determines, in part, the degree to which personal messages, projections, or other forms of self-expression, are actively invested in its attributes. Spontaneity encourages the expression of the individual. Through spontaneity, by definition, the artisan momentarily breaks free from the active or passive conventions of his society and culture, from the traditions of the artisans with whom he or she interacts, and from personal habits, which might otherwise have constraining effects in a well-planned creation. Second, the degree of spontaneity during production determines the degree to which the unconscious mind and its stores of personal and depth-psychological, archetypal imagery, rather than the culturally constrained imagery of the conscious mind, are formally expressed (Carr and Neitzel, Chapter 14). Thus, information about spontaneity during production is useful in assessing the likelihood that certain kinds of processes have caused an artifact's form.

The level of spontaneity during production depends minimally on six factors. These are: (1) the relative directions of the production sequence and decision hierarchy; (2) the extent to which decisions about attributes are made simultaneously or sequentially; (3) the medium; (4) whether inspiration for the artifact's manufacture stems from a detail of its design and a later-order decision, which requires more complete planning of the artifact and permits less spontaneity in order to realize that detail; (5) cultural values about the acceptability of creativity (Roe, Chapter 2); and (6) whether the artisan's personal approach to creation is more spontaneous or disciplined (Roe 1979:207).

The first three factors are technological and are archaeologically visible without contextual information. Thus, they are quite useful in assessing whether spontaneity and the expression of the individual and the unconscious were allowed during production. Let us consider these three.

Spontaneity and the Production Sequence. The relative directions of the production sequence and decision hierarchy of an artifact determine the degree to which spontaneity is allowed during production in a very direct way. Their relative directions set the degree to which the artisan must envision the final product in detail and make a full hierarchy of decisions before production or early in production, so that the desired details can be realized.

Three situations can arise in this regard (Figure 7-8). The first two occur when the decision hierarchy and production sequence have the same direction and define a similar ordering of attributes.

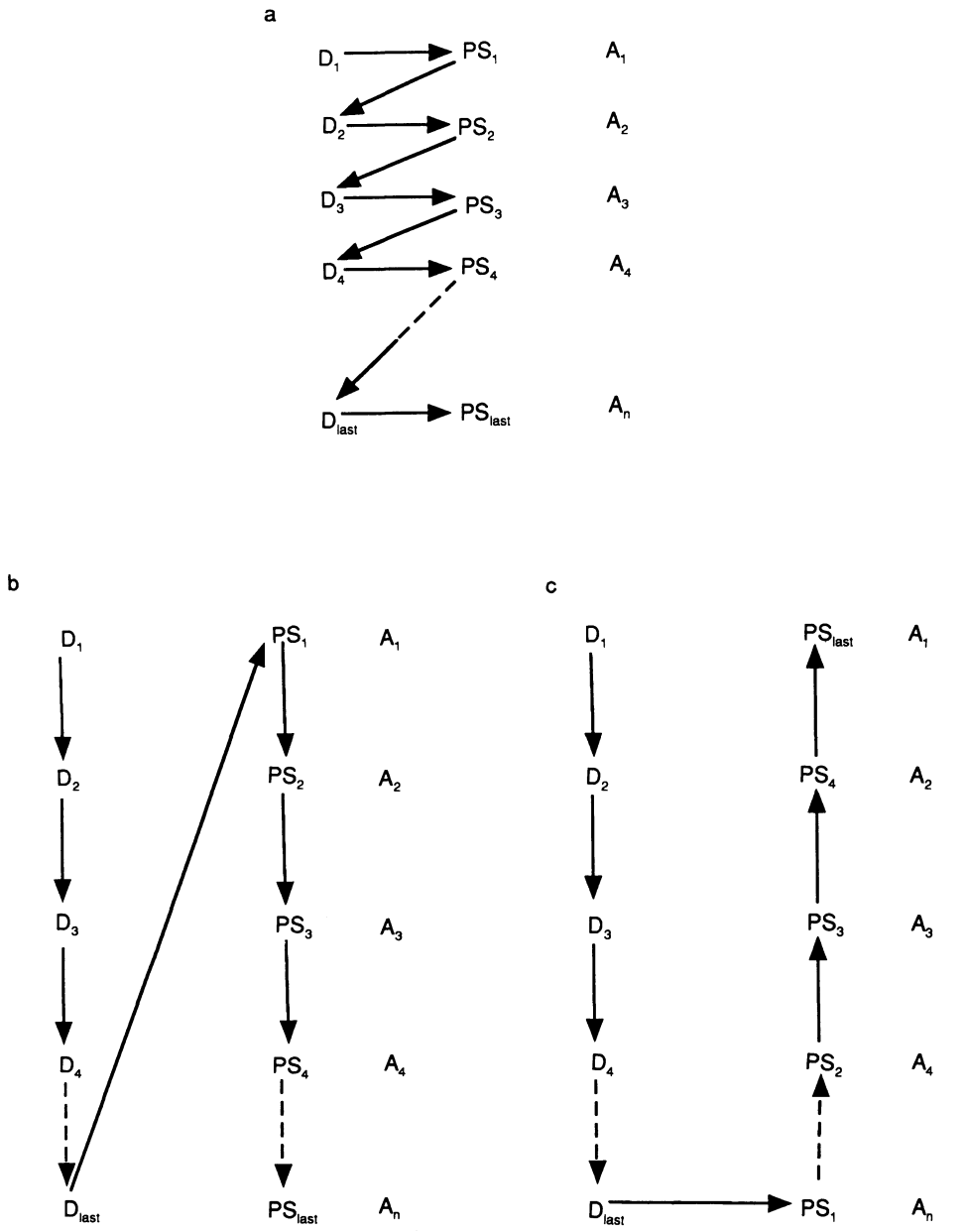


Figure 7-8. The relative directions of the decision hierarchy and production sequence determine whether it is necessary to envision the artifact end product in detail, and to make a full hierarchy of decisions, prior to production. (a) The decision hierarchy and production sequence have the same direction, which allows spontaneity during production. In this case, the end product is not envisioned at the beginning of production and spontaneity occurs. (b) Same as A but the endproduct is envisioned in its entirety before production and the opportunity for spontaneity is not taken. (c) The decision hierarchy and production sequence have reverse directions, which does not allow spontaneity. The end product must be envisioned before production. S = a decision; PS = a production step; A = an attribute.

In this case, spontaneity and changes in plans can occur along the way as the artisan progresses from creating the broader aspects of the artifact's design to creating its details (Figure 7-8a). There are many opportunities for the artisan to spontaneously invest his or her own personal touches in the artifact, or for the artisan's unconscious mind to express itself. Tarascan painted ceramics (Hardin 1979:92) illustrate this situation.

However, spontaneity and spontaneous expression of the individual and the unconscious need not occur, even though they are allowed by the similar directions of the decision and production hierarchies (Figure 7-8b). Whether these opportunities are taken depends on the artisan's preferences for and cultural values about spontaneity in the creative process. The outcome also depends on whether a detail of design and a later-order decision have inspired the item's manufacture. To realize a detail that serves as the inspiration for producing an artifact requires more complete planning and disciplined production of an item's design, from the item's gross form to its details.

The third situation, in contrast to the first two, occurs when the decision hierarchy and production sequence have the reverse direction and define approximately opposite orderings of attributes. By definition, the artisan must envision much of the finished product, from its gross form to its details, and make many of the hierarchy of decisions about these attributes, before production is begun. Less spontaneity and spontaneous expression of the self and the unconscious is possible (Figure 7-8c). For example, a weaver's decision to create a fabric that has the perceptual texture of a very ribbed plain weave—a gross characteristic—requires the weaver to envision and decide upon not only this attribute, but also a whole chain of attributes before production. These attributes range from gross to fine, are technologically and formally constrained by the grosser attribute of perceptual texture, and must be produced before that texture is realized. The chain of decisions and attributes includes whether to use two sets of elements instead of one, whether to use interlacing warps and wefts rather than interacting ones, whether to interlace warps and wefts in a compact manner, and whether to use thick concealed elements of many ply or of thick fibers rather than thin concealed elements. With this required planning, there is less room for spontaneity and spontaneous expression of the self and the unconscious during production.

The three situations shown in Figure 7-8 are idealized models. Any given manufacturing process may exhibit a mixture of them. Different models can apply to different stages of manufacture.

Spontaneity and the Structure of the Decision Hierarchy. When the production sequence and decision hierarchy for an artifact have the same direction, spontaneity during manufacture is not limited. If and only if this is the case, then a second technological factor also bears on the degree of spontaneity that is possible. This is whether the structure of the decision hierarchy is dominated by simultaneous or sequential decisions. Simultaneous independent, compensating, or coordinating decisions at a single decision level offer more alternative combinations of attribute states and artifact designs than does a series of single decisions in a sequential hierarchy. The greater range of choices affords more opportunity for spontaneity during production.

Spontaneity and the Medium. The relative directions of the production sequence and decision hierarchy, and the degree to which simultaneous decisions dominate a decision hierarchy, both depend fundamentally on the medium. As a consequence, media differ systematically in the potentials that they offer during production for spontaneity and spontaneous expression of the individual and the unconscious. Table 7-11 summarizes these relationships. Sackett (1982:80–104) has discussed, at length, the different potentials that ceramics and lithics offer for active expression during production (see also Clark 1989:29–30,33).

In sum, the level of spontaneity that is possible during an artifact's production is technologically determined by the relative directions of the production sequence and decision hierarchy, the extent to which decisions are made simultaneously, and the dependence of these two factors on the medium. In turn, the level of spontaneity determines, in part, the degree to which personal messages, projections

Table 7-11. Some Fundamental Characteristics of the Production Sequences and Decision Hierarchies of Various Media

Characteristic	Subtractive production processes	Additive production processes		
Relative directions of the production sequence and decision hierarchy	*Same for*: flint knapping, stone sculpting, wood carving	*Same for*: potting, ceramic decoration, oil painting, acrylic painting, drawing	*Mixture for*: watercolor painting	*Opposite for*: fabric weaving, basket weaving, cord making
Kinds of decisions that predominate in: the decision hierarchy	*Sequential for*: flint knapping, stone sculpting, wood carving	*Sequential for*:	*Mixture for*: potting, ceramic decoration, oil painting, acrylic painting, watercolor painting, erasable drawing	*Simultaneous for*: fabric weaving, basket weaving, cord making
Degree of spontaneity allowed during production, as a function of the first two characteristics	*Little for*: flint knapping, stone sculpting, wood carving	*Little for*: fabric weaving, basket weaving, cord making	*Moderate for*: potting, ceramic decoration, watercolor painting, pastel drawing	*Much for*: oil painting, acrylic painting, erasable drawing

of the unconscious mind, and other kinds of self-expression can be manifested in attributes of high to moderate AP visibility. Because the three technological factors that influence spontaneity can be known from an artifact's design alone, they are useful for reconstructing the potential etic meanings of its attributes.

Spontaneity, the Medium, and Additive versus Subtractive Production. Archaeologists emphasize the distinction between additive and subtractive production processes, especially those of potting and flint knapping, in characterizing stylistic variation and communication. Artifacts produced by subtractive processes are seen as more constrained in form and in their message potential (e.g., Sackett 1982; Clark 1989).

Although there is some value to the distinction between additive and subtractive production, the distinction is also confusing and does not especially encourage the building of middle-range theory. This is so because it divides technologies inconsistently (Table 7-11) along two dimensions that affect the mapping of process to form. These dimensions are: (1) whether the directions of the production sequence and the decision hierarchy are the same or different, and (2) whether the decision hierarchy is dominated by sequential or simultaneous decisions (see pp. 225, 228, 231–232). Both of these dimensions affect the degree to which spontaneity is possible during production and, thus, in part, the potential for stylistic variation and the communication of personal messages.

It is true that artifacts manufactured by subtractive processes such as flint knapping, stone sculpting, and wood carving are generally uniform in these dimensions (Table 7-11). The production sequences and decision hierarchies of such artifacts have the same direction and their decision hierarchies are predominantly sequential. Thus, artifacts made by subtractive processes usually do not encourage spontaneity and have limited communication potential. However, artifacts that are produced by additive processes, such as painting, drawing, weaving, and cord making are quite

diverse in the two dimensions (Table 7-11). They are more diverse in the potentials for spontaneity and personal communication that they offer. Herein lies a potential for confusion and the basis for the infertility of the additive–subtractive distinction for building middle-range theory.

THE GEOGRAPHIC DISTRIBUTION HIERARCHY AND CONTEXTUAL INFORMATION

Attributes that have been ordered by their AP and/or AC visibility and by their positions in the manufacturing decision hierarchy and production sequence can be interpreted for the broad kinds of processes and constraints that they might reflect. Technological, social, or finer-scale processes, and active or passive processes, can be inferred as the possible determinants of higher and lower-order attributes (Table 7-1). However, the specific processes (Table 7-2) that determined the attributes cannot be known from this information, alone. The possibilities remain wide. This is especially true for higher-order, more visible attributes. These can reflect a greater range of processes than lower-order, less visible attributes.

More specific interpretations of the etic meaning(s) of an attribute can be made when one also considers additional data of several kinds. First are the expanses over which the attribute's alternative states are distributed geographically. Their distributions in absolute space, in comparison to each other, and in comparison to the states taken by other attributes can offer insight into etic meanings (Table 7-1, column 5). Second are the forms of these distributions (Table 7-2). Third are kinds of other contextual information. In this section, each of these kinds of additional data are considered. Further bridging arguments for linking process to form are also offered.

The Scale of Attribute Distribution and the Geographic Distribution Hierarchy

The geographic areas over which the attribute states of an artifact extend can be envisioned as a hierarchy. Some attributes may have one or more states that are widely distributed. Other attributes may have states that are more locally distributed. The order of attributes by the scales of their geographic distributions reflects the processes that determine both their form and distribution. Consequently, the geographic hierarchy can be used like other hierarchies to bridge form to process (Table 7-1).

Bridging the Scale of Attribute Distributions to Determining Processes

The geographic area over which an attribute state is distributed indicates the scale of the processes and constraints that caused it. In turn, information on the scale of causal processes provides insight into the kind of ecological or social unit that the attribute might reflect.

Specifically, people in a landscape are organized into a hierarchy of units of increasing size. These range from the individual, through the household and networks of interacting artisans, through various social subgroups and the community, to the society at large, broader regional networks, and areas of similar resources, ecology, and techno-adaptation. These units are shown in Table 7-2. In turn, each kind of unit is definable by, and functions through, processes that are unique to it. Some of these are listed in Table 7-2 (e.g., communication, projection, enculturation, active interaction). At a yet more basic level, each unit's processes are the product of various constraints and triggering events that tend to occur at and be unique to the scale of the unit. Examples of such constraints and triggers include the unit's basic needs for survival, social and environmental conditions that constitute its adaptive milieu, and its economic, social, political, and ideological values, themes, and agendas, be they adaptive over the long run or not. In the case of the individual, the constraints and triggers also

include personal preferences and motives. Other examples are enumerated at length by Carr and Neitzel (Chapter 1:Table 1-1) and in Table 7-2. The distinction between processes, constraints, and triggering events is defined by Carr and Neitzel (Chapter 1). Finally, some of these different processes and constraints may have stylistic correlates in different attributes of varying visibility, decision order, and production order. This follows by reason of all the bridging arguments that have previously been presented in detail. The states taken by these different attributes will extend over areas that correspond to the expanse of the processes and constraints that they reflect. Thus, the absolute and relative geographic areas over which an attribute's states are distributed can be used to infer the ecological and social units, and their defining processes and constraints, which the attribute reflects.

For example, the society and the family are units of differing size and geographic scale. They are distinguished by different sets of processes, which pertain to their different issues and problems. The society is the unit within which, for example, social roles are defined and mythology is selected and elaborated. The family or household is the unit within which enculturation occurs. These different processes are the product of different constraints and/or triggering events, often of the scale of the unit within which the processes operate. For example, the process of definition of social roles is a response, in part, to basic tasks that must be accomplished within any society. The process of creation of a society's mythology may be constrained by the content of the cultural unconscious levels of the psyche. It may also reflect the society's history of contacts, which have triggered the diffusion of ideas and images from elsewhere. In contrast, the enculturation process within a household might be constrained by the specific kin and power relations between teachers and students, or by the mobility of the family members. Finally, a society's roles and mythology, and enculturation within a household, might be reflected in different attributes of varying visibility, decision order, and production order. Social roles and mythological personages and themes might be coded within highly visible attributes, while patterns of enculturation might be reflected in less visible attributes. The states taken by these attributes would extend over areas that correspond to the expanse of the processes and constraints that define the society and the family, respectively. Thus, the absolute and relative geographic areas over which an attribute's states are distributed can be used to infer the ecological and social units, and their processes and constraints, which the attribute reflects.

Significantly, this understanding of an artifact's design and styles, its attribute distributions, and their causes differs from the traditional and New Archaeology's view of a material style as simply an "indicator," "correlate," "symptom," or "index" of a social unit or cultural subsystem (Conkey 1990:8–10). The concepts of design and style are bridged here not directly to ecological or social units (Figure 7-9a), but to intervening processes and their causal constraints and triggering events, which pertain to those units (Figure 7-9b). Thus, the approach is "contextualizing" rather than "decontextualizing" (Conkey 1990:10). By definition, this perspective integrates contextual factors, such as the adaptive milieu, values, themes, strategies, preferences, and motives, which constitute the context of artifact production, use, and display.

Detailed examples of spatial–social units that differ in scale, in the processes and constraints that operate within them, and in the design attributes that reflect those units, processes, and constraints are given by Pryor and Carr (Chapter 8), Carr and Maslowski (Chapter 9), Rosenthal (Chapter 10), Morris (Chapter 13), Wobst (1977), and Wiessner (1983, 1984) for several media. Hodder (1982a:189) documents similar relationships, but focuses on different artifact classes rather than on different design attributes within one artifact class.

The General Nature of Arrangement of the Geographic Distribution Hierarchy

As a first approximation, it is expectable that the order of an artifact's attributes according to the geographic expanse of their states will correspond with their order according to their AP visibility and positions in the decision hierarchy and production sequence. Attributes with states that are more

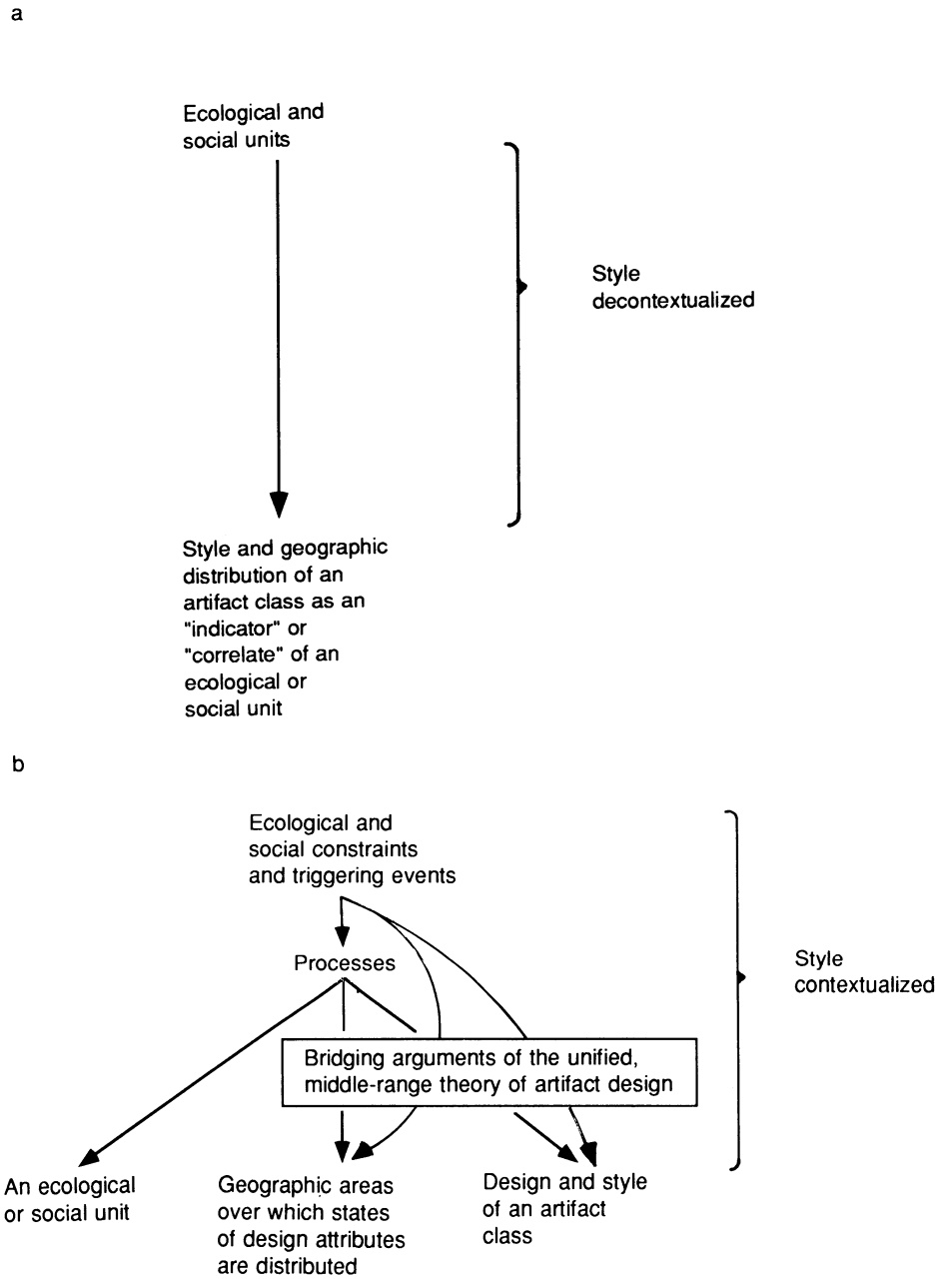


Figure 7-9. (a) The decontextualized, traditional and New Archaeology view of style and stylistic distributions as "indicators" or "correlates." (b) The contextualized perspective of an artifact's design, styles, and attribute distributions that is taken by the unified, middle-range theory presented here and by postprocessual archaeology.

widely distributed will tend to be attributes that are more visible, higher in the decision hierarchy, and at the corresponding extreme of the production sequence. This correlation is an indirect one. It arises because the factors that determine an attribute's AP visibility and the factors that determine its distributional scale are both affected by the size of the social unit to which the attribute pertains (Figure 7-10). Correspondence between the geographic distribution hierarchy and other hierarchies for two or more hierarchical levels is well documented in the archaeological literature.[28]

Correlation between the geographic distribution hierarchy and other hierarchies can be disrupted by a number of circumstances. First is when the properties of raw materials vary significantly over a landscape. In this case, the alternative states taken by highly visible, strictly technological attributes of an artifact may have localized distributions rather than the widespread distributions expected on the basis of attribute visibility and decision order alone. Second, when artifacts are exchanged, the states taken by poorly visible attributes may have a wide distribution rather than the localized one expected on the basis of attribute visibility and decision order alone. Similarly, when local groups are highly mobile and share sites and territories within a region, poorly visible attributes may have a wide distribution rather than the localized one expected on the basis of attribute visibility and decision order alone (e.g., Yellen and Harpending 1972:251). This is likely among hunter-gatherers with nonterritorial local bands and among pastoralists. A final disruptive circumstance is when less inclusive social units and their messages become more important for expression than more inclusive units and their messages. In this case, the smaller-scale units and processes pertinent to them will tend to be expressed in more visible attributes of a higher decision order. Although one would expect the states of these attributes to be distributed widely on the basis of their visibility and decision order, alone, they will instead tend to have a restricted distribution that corresponds to the small-scale units that they reflect. Any of the eight factors that lead to exceptions to the cross-cultural relationship between social unit inclusiveness and attribute AP visibility (see pp. 204–205) can cause this situation. Decreasing ecological risk and prosperity, short-term local stresses, and cultural values that emphasize local groups are among these factors.

The Form of Attribute Distribution

The form of distribution of an attribute's alternative states over space, like their extent, gives insight into the processes and constraints that determine the attribute and the kind of ecological or social unit that it reflects. Four types of model distributions are useful for characterizing the distributional form of an attribute and identifying its determinants. These are clinal, uniform-unbounded, patchy-bounded, and random distributions (Table 7-2).

Operational Issues in Defining Distribution Form

The model that characterizes the form of an attribute's distribution depends not only on its distribution, but also on two analytical parameters. The effects of these must be considered during

[28]Correspondence of the geographic distribution hierarchy to the visibility and decision hierarchies, and to the production step sequence, for multiple levels of artifact design are shown by Carr and Maslowski (Chapter 9:Table 9-6) for Ohio Hopewell weavings, by Wobst (1977:Tables 2,3) for Yugoslavian clothing, by Wiessner (1983; see also above, pp. 203–204) for San projectile points, and in the above syntheses of Hardin's (1977, 1983b; Friedrich 1970) data on Tarascan ceramic decorations (Table 7-7) and Lowman and Alland's (1973) data on New Guinea Maring war shield decorations. Other cases that illustrate the correspondence for simply two hierarchical levels include Kent's (1983:121–124) data on Pueblo III period fabrics of the American Southwest, Graves' (1982) study of Philippino Kalinga ceramic decorations, Voss's (1982) study of Neolithic ceramic decorations, Washburn's (1983b) study of Neolithic Greek ceramic decorations, and Pryor and Carr's (Chapter 8) study of Pomo Indian basketry. All of these have been discussed previously.

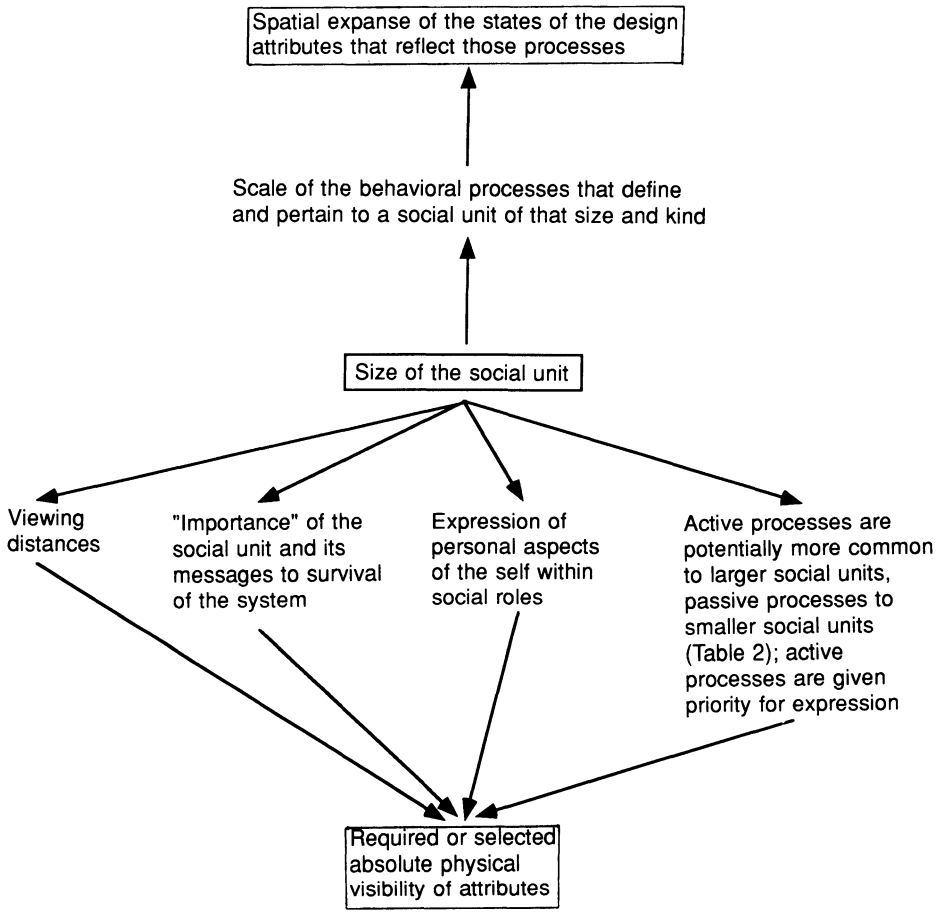


Figure 7-10. The scale of distribution of an attribute's states often correlates with the attribute's AP visibility, and its positions in the manufacturing decision hierarchy and production sequence, because all of these characteristics are determined in part by the size of the social unit. See text on the visibility and geographic hierarchies for descriptions of these relationships.

interpretation. The first parameter is the area of the research universe and the number of social units it encompasses. For example, an attribute that communicates social affiliation might have a uniform-unbounded distribution at the scale of one social unit, but a patchy-bounded distribution at a larger scale containing multiple units. Thus, the relationship of processes to the forms of attribute distributions that they determine can be defined only when the area of the research universe is specified.

This qualification has not generally been appreciated when deducing the spatial–stylistic correlates of processes (e.g., Braun and Plog 1982:512; Voss and Young, Chapter 3; Plog, Chapter 11). In contrast, it is well understood in other geographic applications, such as the analysis of artifact distributions. (See Carr [1984:143–161] for a review.) In this chapter, the area of the research universe is specified when relating processes to distributions (Table 7-2).

The second analytical parameter that affects how the form of a distribution is characterized is the number of alternative states that the attribute can assume. An attribute with a clinal distribution can be

analytically constrained to and appear as a patchy-bounded or uniform-unbounded distribution if the attribute takes only two or a few states, as opposed to many rank or continuous-scale states (Figure 7-11). This effect can confuse processual interpretation unless it is taken into consideration. Carr and Maslowski (Chapter 9) point this out when interpreting the distribution of a two-state attribute, the direction of twist of yarns in fabrics.

Bridging the Form of Attribute Distributions to Determining Processes

Considering the two operational issues just discussed, it is possible to posit the different forms of distribution that an attribute will have when it is determined by various processes or constraints (Table 7-2). The expectations are made under several assumptions. First, raw materials are consistent over the research universe. Second, artifacts are not exchanged between local groups (Plog 1978:153). Third, local groups are sedentary or have tethered mobility (Yellen and Harpending 1972:250–251). Fourth, specific design attributes have become associated with specific social units and/or processes over the course of a stable history of social relations and their stylistic expression (Wiessner 1984:226). Table 7-2 elaborates on patterns discussed by Voss and Young (Chapter 3).

Table 7-2 reveals that processes at the social, interacting artisan, and personal levels tend to be distinguished respectively by patchy/uniform, clinal, or random regional distributions of attribute

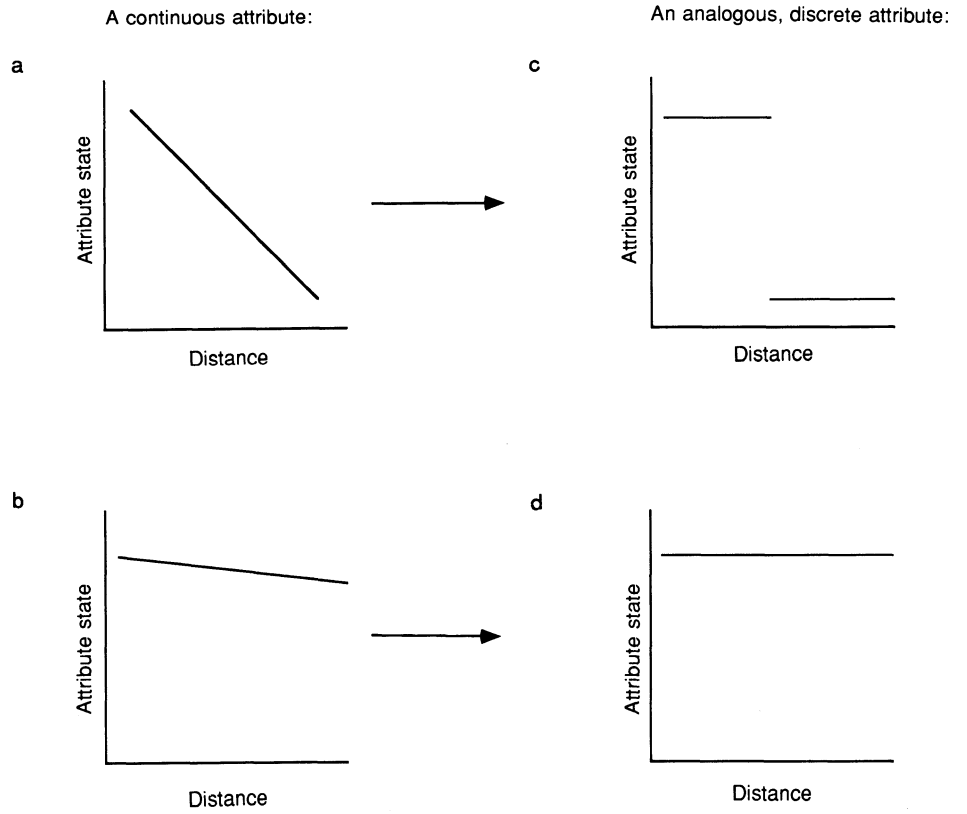


Figure 7-11. A clinical distribution (a, c) can be constrained to and appear as a (b) patchy-bounded or (d) uniform-unbounded distribution, if the attribute of interest can assume only two or a few states.

states. These differences can be used to refine the interpretations of an attribute that are inferred from its positions in the visibility and decision hierarchies and the production sequence, and to corroborate the finer interpretations that are inferred from the scale of the attribute's distribution.

However, specific kinds of processes within each of the social, interacting artisan, and personal levels are usually not distinguishable from an attribute's visibility, manufacturing decision, production step, and geographic distributional characteristics, alone. Perhaps most problematic are the similar correlates of certain basic categories of processes that archaeologists often attempt to distinguish. These are: (1) active social-level processes versus the passive sharing of a history of interactions by a social group; (2) active communication of boundaries between groups versus the active communication of intragroup cooperation; (3) active communication of boundaries between groups to express their competition or differentiation versus active communication of boundaries between groups as part of the strategies of competitive subgroups within them; and (4) active personal-level processes versus the passive history of a person's interactions.

The first distinction, between active social-level processes and the passive sharing of a history of interactions by a social group, can be made under only one circumstance within the theoretical framework presented here. When an attribute is a nonrelational, obscure trait, and has a patchy-bounded, uniform-unbounded, or clinal distribution over a society, community, or social segment, the attribute can be inferred to reflect the passive sharing of a history of interactions by that group. It may also possibly reflect the active or passive interaction among groups. When an attribute is more visible, and has a patchy-bounded or uniform-unbounded distribution, it can reflect many social-level processes and the appropriate interpretation is unclear (Table 7-2).

This ambiguity is perfectly expectable. Highly visible isochrestic patterning that reflects the passive sharing of a history of interactions by a social group can later be imbued with social meaning and come to be used iconographically to express group identity and other messages (Barth 1969; Sackett 1968:75, 1985; Wiessner 1985:162) as the adaptive context changes and the expression of identity and other messages becomes important. Also, passive, environmentally and technologically determined isochrestic variation (Figure 7-12a) or environmentally determined functional variation (Figure 7-12b) in an artifact class that varies among social groups can come to have social meaning and be used to actively express social messages (Adovasio and Gunn 1977:151; Carr, Chapter 6:166–167). Moreover, those social meanings can wane when they no longer remain essential. The criteria that distinguish active social processes with iconographic material correlates from passive social processes with isochrestic or functionally alternative material correlates are contextual as much as formal (see p. 245).

From this perspective, Wiessner (1985) and Sackett's (1985) debate over the iconologic versus isochrestic interpretation of regional similarities and differences in visible attributes of San projectile points is understandable. The answer to the debate can be found only in contextual data, which apparently was not available to either researcher.

The second distinction, which concerns the active communication of differences between groups versus the active communication of within-group solidarity, cannot always be inferred from the visibility and geographic distribution of design attributes. Both processes, as well as many others, manifest formally in physically visible attributes with patchy-bounded regional distributions. Communication of "us versus them" and "us" both produce patchy-bounded distributions of styles. However, within-group solidarity may also be communicated with visible attributes that are shared among adjacent social groups and that have uniform-unbounded distributions across them. Attributes that are emphasized as "us" within a group may occur among adjacent groups where they are not so valued. The extension of the Norwegian language beyond Norwegian ethnic groups into adjacent Lappish communities (Eidheim 1969:39–44) is a nonmaterial example. In such cases, the process of communicating solidarity within a group is distinguishable from the process of communicating between-group differences, but not from other processes that are reflected in visible attributes with uniform-unbound distributions (Table 7-2).

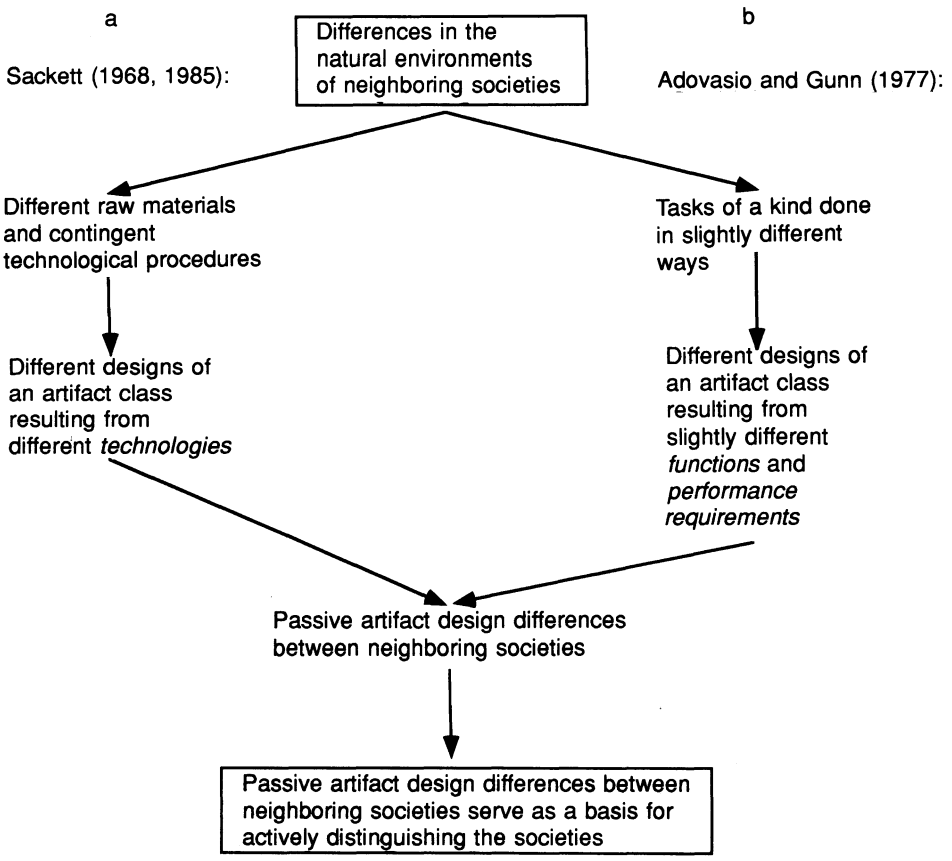


Figure 7-12. Natural environment differences between neighboring societies can cause the design of an artifact class to vary between the societies. One or both of two passive processes of differentiation—technological and functional—may be encouraged by the environmental differences. The resulting, passive stylistic differences may later serve as a basis for active social differentiation.

An inability to always distinguish the two processes of communicating within-group solidarity and communicating between-group differences is expectable. In the creation of ethnic identity, the two processes of creating "us versus them" and creating "us" are closely interrelated and sometimes manifested in the same symbols (Royce 1982), although not always (Hodder 1982a:35).

At the same time, it is important theoretically to be able to distinguish these two processes archaeologically because they may have different causes. They may relate to different kinds of stresses at different scales (Wiessner 1983). For example, communication of within-society cooperation might reflect local, climate-related subsistence risks which require food sharing among communities. In contrast, communication of between-society boundaries might reflect political and territorial tensions. The two processes may also vary in their historical distribution in response to changes in kinds of stresses through time. A possible example of this is given by Roe (1979:197). He notes that the Shipibo of Peru do not know why they use the characteristic style of decorations on their clothing that they do, other than it is traditional ("they have always used these forms"). The maintenance of the style through time may lie in the passive sharing of a history of interactions by the Shipibo and/or the active

use of the style to communicate within-group solidarity. The Shipibo do not think that the style originated to communicate social differences with neighboring societies. Yet, today, in a context of acculturation, these decorations signify Shipibo ethnic identity to outsiders as well as those who wear them.

The third distinction has been made by Barth (1969) and by Hodder (1982a:187, 104). Hodder emphasizes that differences between groups are symbolized only sometimes to communicate their competition in response to ecological stresses (Hodder 1982a:13–36). In other instances, between-group differences are symbolized as a part of the intentions and strategies of competitive subgroups within one or both of the groups (Hodder 1982a:75–86). Distinguishing these two between-group, boundary-creating processes is important because they may have different kinds of causes at the different scales of the region, group, or subgroup. However, both processes are reflected in physically visible attributes with patchy-bounded geographic distributions, and are thus indistinguishable in their material correlates from each other and many other processes.

The fourth distinction, between active personal-level processes and the passive history of a person's interactions, cannot be inferred from the visibility and geographic distribution of design attributes. Both kinds of processes are reflected in attributes of high to low AP visibility with random distributions. This is unfortunate. The distinction is important for finer-scale studies that attempt to understand the social dynamics behind the expression of personal identities (Wiessner 1984), to reconstruct residence rules and patterns of interaction among social segments within sites (Brose 1968; Longacre 1970; Roe 1980; Lathrap 1983), to reconstruct intrasite activity organization (Cahen and Keeley 1980), and perhaps other applications (Hill 1977:57–60).

Other Spatial and Contextual Information

In this section, we turn from the general principles of the unified theory of design to several kinds of contextual data that lie formally outside the theory. These data are essential to using the theory to its full potential in three ways. First, they allow its context-specific parameters to be defined. Second, they allow its basic assumptions to be checked. Finally, they can be used to reconstruct or discriminate the specific processes (Table 7-2) that are indistinguishable with information on only an attribute's spatial distribution, AP visibility, and position in a decision hierarchy and production sequence.

Data that are useful for these purposes include the following: (1) characteristics of the contexts of production, use, display, and deposition of the artifact class, including the kinds of intrasite proveniences and settlements in which its various attribute states occur; (2) the source(s) of the material from which the artifact class was manufactured; (3) the labor invested in the manufacture of the artifact class; (4) the degree of curation of the artifact class; (5) whether prototypes that might otherwise be used for learning were purposefully destroyed periodically; (6) regional–ecological, raw material, and culture–historical provinces within the study area; (7) the regional, ecological–adaptive milieu, including natural environmental, demographic, political, and economic stresses and opportunities; (8) within-group social organization and ideology; (9) culture history; (10) the differing distributions of multiple versus single artifact classes; (11) rates of attribute change through time; and (12) patterns of covariation among attributes within an artifact class through time (Winters 1968:177–202; Braun 1979:67,69-71; Hodder 1982a; Wiessner 1985; McGuire 1988:95–98; Carr and Maslowski, Chapter 9; Rosenthal, Chapter 10; Plog, Chapter 11).

Examples of the context-specific parameters of the unified theory of design that these data can be used to infer are: the size and composition of potential audiences; viewing distances and the absolute contextual visibility of attributes; the degree of continuity in the enculturation of crafting techniques and stylistic patterns across generations and among fissioning social groups; the nature of the social situation of artifact use and display; probable message priorities; and the degree of spontaneity during artifact production.

Information on the context of artifact use and display affords especial insight into communica-

tion processes when it allows audience characteristics and the nature of the social situation, not simply viewing distances (Braun, Chapter 5), to be known. An understanding of the general ideological, social, political, economic, emotional, motivational, and functional characteristics of the social situation in which an artifact is used or displayed permits one to predict the kinds of messages, if any, that are most likely to be encoded in the artifact, the probable value of the messages, and their likely priority for expression. Examples of the characteristics of social situations that determine message relevance, value, and priority are listed in Table 7-8, above. Some examples of social or personal messages that are so determined include social identities and roles, socially recognized emotional states of being, religious or mythological information, differentiation, affiliation, cooperation, negotiation, competition, coercion, rejection, regulation, or ownership (Table 7-2).

Examples of basic assumptions of the unified theory that the above data can be used to check include: raw material uniformity over the research universe, the lack of artifact exchange, localized group mobility, and the eight assumptions behind the ecological–evolutionary argument for a cross-cultural relationship between the AP visibility of an attribute and the inclusiveness of the social unit that it reflects (see pp. 204–205).

Distinguishing Processes. A number of authors have convincingly argued or illustrated the utility of some of these kinds of contextual data in reconstructing and distinguishing among the processes and constraints listed in Table 7-2. Three of the four important pairs of processes that were discussed above as having ambiguous design and geographic distributional correlates can be distinguished with contextual data.

First, the active communication of social identity through iconographic style can be distinguished from the passive group sharing of a history of interactions that results in isochrestic patterning. This can be done using two kinds of data (Wiessner 1985:162–163). Whereas iconographic styles that communicate social identity are susceptible to fashion swings through time, the isochrestic patterns that result from the passive sharing of interactions by a group tend to remain stable. Also, whereas iconographic stylistic attributes are likely to exhibit numerous local patterns of covariation that shift over a region, isochrestic attributes can be expected to covary in a consistent pattern over a region, in line with traditional norms. Plog (Chapter 11) has elaborated this argument to allow some finer processual distinctions to be made.

Second, the communication of between-group differences and boundaries can sometimes be distinguished from the communication of intragroup cooperation and solidarity. This can be done by documenting the different distributions of styles of several different artifact classes, by considering their contexts of use, and by evaluating the competitiveness of the adaptive milieu. Hodder (1982a:35) has illustrated this. Geographic variations in the attributes of a single artifact class often do not bear enough information to accomplish this task. In part, this difficulty arises from the fact that intragroup solidarity can be codified in different kinds of artifacts by adjacent societies. Moreover, the selected artifact classes need not be obvious complements (Eidheim 1969:40). Rosenthal (Chapter 10) has concluded the same.

Third, the communication of boundaries between groups to express their competition or differentiation can sometimes be distinguished from the active communication of boundaries between groups as part of the strategies of competitive subgroups within them. Hodder (1982a:75–86,104,187) has illustrated this. This discrimination requires the contextual study of multiple kinds of artifact classes for both their intrasocietal and intersocietal geographic distributions. It also requires contextual information on the regional ecological adaptive milieu (e.g., economic and demographic stresses), within-group social organization, and sometimes within-group ideological structure. The latter is necessary when the communication of between-society boundaries, as a product of intrasociety tensions, is played out within the constraints of the dominant principles of symbolic meaning and the world view of the society (Hodder 1982a:125–184).

Finally, Carr and Maslowski (Chapter 9), Neitzel (Chapter 12), and Morris (Chapter 13) have all

illustrated how considering the varying settlement types within which multiple kinds of artifacts or attribute states occur can be useful in identifying and discriminating among the processes that cause styles.[29]

In sum, contextual data of the kinds just discussed are essential to most analyses of artifact design. Although these data lie formally outside the unified theory of artifact design, they are critical to its appropriate and full application. They are also useful for reconstructing and discriminating among processes that the unified theory cannot distinguish.

AN ANALYTICAL STRATEGY FOR APPLYING THE UNIFIED THEORY OF ARTIFACT DESIGN

The purpose of the unified theory of artifact design, as a middle-range theory, is to assign potential etic meanings to the design attributes of a class of artifacts. Possible etic meanings include processes and constraints that are technological, sociocultural, social psychological, personal behavioral, personal psychological, personal physiological, panhuman depth-psychological, and panhuman physiological in nature (Table 7-2). This "identification" process (Binford 1977) is important. The potential meanings that are assigned to attributes can be used as a basis for selecting for analysis a subset of attributes that are most likely to be relevant to the kinds of processes, constraints, and/or social units that are of interest. The probability of analytic concordance between the phenomenon of interest, selected data, and theoretical goals is thereby increased.

Applying the unified theory of artifact design for these purposes involves several steps, as follows.

1. Defining a Homogeneous Population. The population of artifacts to be analyzed should be restricted, initially, to those that are similar in their material and their utilitarian function, and that have comparable attributes and attribute states. There are two reasons for this restriction. First, the unified theory assumes that the attributes to be analyzed comprise a single, coherent system. It is the constraints that attributes come to pose on each other as a physical, formal, logical, technological, syntactic, and semantic system during the production of an artifact for its use and display in a set range of contexts that lead to a systematic ordering of attributes by visibility, decision, and production criteria, and the relevance of that ordering to causal processes and constraints (Carr, Chapter 6). Second, when material and function are held approximately constant, variability attributable to personal, social, and socially relevant technological variation can become the focus of analysis.

2. Selecting Attributes. Some stylistic studies aim at understanding much or all of the design of an artifact class and its many determinants. Others aim at identifying and measuring a select range of processes and constraints reflected in some targeted subset of the design of an artifact class. In either case, it is important to begin analysis with a selection of attributes that vary widely in their visibility, decision order, and production order and that, to the extent possible, represent the "total design" of the artifact (Carr, Chapter 6). This is necessary for subsequent steps to be effective. In particular, by exploring and comparing the nature of diverse attributes to each other as a system, the many possible mappings between attributes and their causes can be narrowed to a more limited array. Diverse

[29]For example, Carr and Maslowski (Chapter 9:Table 9-6) found that a suite of attributes of Hopewell mortuary weavings distinguished geographic areas, regardless of whether the mortuary facilities were major earthworks or minor mound sites. In contrast, one attribute distinguished major earthworks and minor mound sites for each of several geographic areas. Given these contrasting spatial–stylistic patterns, as well as the differences between earthwork and mound sites in the elite items that they contained, the first suite of attributes was interpreted as reflecting ethnic or local group distinctions. The latter attribute was interpreted as reflecting panethnic social stratification.

attributes must be compared for their hierarchical relationships (Table 7-1), geographic distributions, and contextual variations, each in light of the bridging arguments of the unified theory, in order to infer their possible meaning(s). This exploratory process is analogous to calibrating the scale of an instrument before using it to measure: the full scale must first be surveyed and defined.

3. *Defining Relevant Attribute States.* The alternative states that each descriptive attribute can assume must be defined explicitly. Alternative attribute states must represent alternative decisions in the manufacturing process that are equivalent in their utilitarian function—what Sackett (1982, 1985) calls "isochrestic variation." This is necessary to accurately establish the visibility, decision, and production step hierarchies. Plog (1978:161; 1980:40–44) has summarized some additional basic reasons for why attribute states must be defined in this way, and the interpretive consequences for not doing so.

The scale of measurement and level of generality of an attribute's states must be defined such that the visibility and decision order of the attribute is relevant to the processes or constraints of interest (see pp. 186–188, 222–223, 240–241). For example, fabric material might be coded as plant versus animal or by species. Often the appropriate scale and level of generality cannot be known a priori. Several exploratory analyses and/or several analytic cycles of attribute definition, pattern searching, and interpretation may be required to find the scale and level of generality that reveal geographic and contextual data patterns clearly relevant to the process of interest (Carr 1985:18–44).

4. *Ordering Attributes.* Attributes are next ordered hierarchically according to their visibility and their positions in the manufacturing decision hierarchy and production sequence. Ordering attributes by these criteria allows the attributes to be linked to a range of potential general etic meanings (Table 7-1), using the many bridging arguments on form–process relationships presented above.

Attributes should always be ordered first by their AC or AP visibility levels. The visibility of an attribute is the primary dimension that determines the kinds of processes that it can reflect.

The AC visibility of attribute should be estimated to the extent possible and used instead of their AP visibility to characterize and order them. It is an attribute's AC visibility, which summarizes both physical and contextual conditions, that ultimately restricts the kinds of processes that the attribute can reflect. Table 7-5 provides the physical and contextual conditions that are important to consider when estimating AC visibility. Of the contextual conditions, approximate viewing distances, the openness or closure of the context of viewing, and the number of viewers are especially critical.

Once attributes have been arranged into a hierarchy by their visibility, their order then can often be substantiated and refined by their decision order and/or order of production. The relative usefulness of the decision and production step hierarchies in ordering attributes and in bridging them to causal processes and constraints will vary from case to case. The situation depends largely on the medium, whether the decisions in the decision hierarchy were made sequentially or simultaneously, and whether the decisions were made hierarchically, as a complex network, or in multiple independent sequences. These qualifications are largely inferrable from the artifact's technology.

If most decisions were made sequentially and hierarchically and, consequently, do not have tied ranks, the decision levels of attributes will correlate strongly with their visibility levels. In this case, the decision order of attributes is useful for substantiating and refining their order by their visibility. This situation is typical of artifacts that have been manufactured by subtractive processes (Table 7-11). In contrast, when the decision hierarchy is dominated by simultaneous decisions, or is a complex network of multiple independent sequences, many decisions will have tied ranks. In such cases, decision level is not as useful for substantiating and refining the order of attributes by their visibility.

It is essential to use the decision level of attributes as well as their visibility to order them when tied decisions are few and when the attributes are highly to moderately visible and, thus, potentially communicated messages. This is necessary because both the visibility and decision levels of an

attribute constrain its communication potential and message content, but in different ways. The visibility of an attribute, and especially its size, set the distance from which it can be seen, the potential size of the viewing audience, and thus the social situations in which it can effectively communicate messages. The decision order of an attribute limits both its size and form, and the degree to which form can be tailored to message content. When several attributes are similar in their visibility, then their decision level becomes critical for ordering them and inferring the kinds of messages that they might communicate.

The position of attributes in the production sequence can be used to substantiate and refine their order by visibility and decision criteria when these three hierarchies correlate strongly. When attributes differ subtly in their visibility levels and when their decision levels are unclear, their order of production can clarify their decision level, providing that decisions were made sequentially. For example, overlap in the painted lines of a decorative pattern may reveal their production order and probable decision order, if decisions were made sequentially.

5. *Assigning General Etic Meanings to Attributes.* On the basis of an attribute's hierarchical order, absolutely and relative to other traits, the attribute is next assigned a range of general possible meanings, as shown in Table 7-1. More visible attributes have the potential for reflecting a wider range of processes and constraints.

6. *Refining Meanings by Evaluating Spontaneity.* The potential etic meanings of attributes can be refined by considering the probable degree of spontaneity with which they, and the artifact in general, were produced. Spontaneous production encourages the active, conscious communication of personal messages, expression of personal preferences, and the active projection of personal or depth-psychological imagery from the unconscious mind. Active or passive conventions of the artisan's society, the traditions of fellow, interacting artisans, and personal habits are less likely to be reflected in spontaneously produced attributes.

The degree of spontaneity with which attributes were produced can be assessed only partially from conditions that are inferred easily with archaeological evidence. Two such conditions are useful. First is the relative directions of the production sequence and decision hierarchy. This determines the degree to which the artisan must have envisioned the endproduct in detail before or early during its production. Second is the extent to which decisions about attributes were made simultaneously or sequentially. Other factors that affect the spontaneity with which attributes are produced can rarely be known archaeologically. These include which if any attributes may have inspired production, cultural values about creativity, and the artisan's predisposition to creativity.

7. *Refining Meanings with Geographic and Other Contextual Information.* The processes, constraints, and/or social units that attributes might reflect can be defined more specifically by considering their position in the hierarchy of geographic areas over which attribute states are distributed, the forms of their distributions, and the many kinds of spatial and nonspatial contextual information enumerated above. For example, the distinction between isochrestic patterning that results from the passive group sharing of a history of interactions, and iconographic style that actively communicates social identity, might be made at this juncture on the basis of the temporal variation and covariation of attributes. In addition, any attribute patterns that are found archaeologically can be interpreted by comparing them to close ethnographic analogs.

8. *Checking Assumptions of the Unified Theory.* Contextual data should be used at this point to check whether the assumptions made in the bridging arguments of the unified theory apply to the artifact class under study. These assumptions include the eight made in the ecological–evolutionary argument for a cross-cultural relationship between the AP visibility of an attribute and the inclusiveness of the social unit that it reflects (see pp. 204–205). They also include the several assumptions

made in arguments that link distribution scale and form to determining processes (e.g., raw material uniformity over the research universe, no artifact exchange, localized group mobility; see pp. 239, 241). If any assumptions are not met, their manner of exception may be used to suggest possible alternative, expectable relationships between material patterns and determining processes.

9. Refining Meanings by Defining Message Priorities. The distribution of specific kinds of messages (Table 7-2) among attributes of various hierarchical levels can be inferred by reconstructing, to the extent possible, the priorities that those messages might have been given for expression in the society under study. Priorities that are constant over the society at large, that vary with consistency among different kinds of social situations, and that vary more freely over the short-term within and among social situations, should be considered.

Several kinds of contextual data are useful for deducing such message priorities. These include the ecological–adaptive, ideological, political, social, emotional, motivational, and functional characteristics of the contexts of artifact use and display (e.g., sacred/profane, public/private; Table 7-8). Contexts of several scales should be evaluated for these conditions, including the region, the society, and various social situations, over both longer and shorter durations of adjustment and selection.

10. Refining Meanings by Considering Multiple Artifact Classes. A final way in which the etic meanings of attributes can be refined is by contrasting different artifact classes to each other for the patterns of geographic distribution and contextual association of their attributes and attribute states. Insight can also be gained by considering the different patterns of distribution and association of the artifact classes themselves.

There are several reasons for progressing beyond the analysis of a single artifact class to multiple classes. First, artifacts of different classes and media may differ in the sociocultural and other processes that they reflect. This phenomenon is what Roe (Chapter 2) calls the "semantic weighting" of artifact classes. Semantic weighting occurs in part because different kinds of artifacts vary in their scale, AP visibility, decision structures, rarity, durability, malleability, portability, and many other qualities. These differences, in turn, influence the function(s) of the artifacts, their contexts of production, use, display, and disposal, and, thus, how they articulate with and become a part of ecological, social, personal, psychological, and physiological processes. Different media and classes may reflect different processes also as a result of simply the vagaries of culture history. Thus, no one artifact class reflects all of the hierarchy of processes (Table 7-2) that its attributes potentially could. Instead, artifact classes complement or reinforce each other in the processes in which they participate as they function together as a system. As a consequence, it is possible to gain a perspective on the processes that each artifact more probably reflects by considering how different artifact classes correlate or contrast in the distributions and associations of their attributes and attribute states. Morris (Chapter 13) demonstrates the utility of this tactic by contrasting the distributions of attributes of different artifact classes. Neitzel (Chapter 12), Hodder (1982a:35), and Wiessner (1984:227–228) focus on the contrasting distributions of artifact classes, themselves.

A second reason for studying multiple artifact classes is that different classes may be more or less protected culturally from critical judgment of craftsmanship. Thus, the classes may vary in the degree to which they afford freer experimentation, innovation, and expression of personal conscious and unconscious level processes. Roe (Chapter 2) calls such classes "realms of protected deviation."

A third reason for analyzing multiple artifact classes is that there can be a shift through time in the particular kinds of artifacts and media in which stylistic elaboration and various kinds of messages are invested. Roe (Chapter 2) calls this process "media displacement." Tracing and comparing the distributional and associational patterns of artifact classes and their attributes and attribute states through time can give insight into their processual meanings.

A final reason for studying multiple artifact classes is that some processes are usually manifested in only the relationships among artifact classes and can be reconstructed only when multiple classes

are compared. The active institutionalizing of positions of power and privilege in complex societies through a system of covarying and complementary symbols is one such process. Neitzel's (Chapter 12) analysis of several artifact classes of the Chacoan elite illustrates the reconstruction of this process. Another such process is the active expression of a symbolic fabric, configuration (e.g., Benedict 1934; Kroeber 1963) or "essence" (Hodder 1990:47) that integrates cultural life in a society. That fabric may include world views and values, mythological themes and personages, conscious or unconscious metaphoric information about the organization of society and the cosmos, as well as unconscious structural principles such as dualism or triadic dualism. Penny (1983, 1985), Roe (1979:194–195, 1989, Chapter 2), and Rosenthal (Chapter 10) provide examples of the reconstruction of cultural fabrics with multiple artifact classes.

11. Measurement of Processes. Those attribute states, attributes, and artifact classes that appear empirically and theoretically to reflect the particular processes or constraints that are of interest are selected as the optimal measures of them. At this point, middle-range theoretical work is complete and analysis can focus on the states and patterns that relevant attributes or artifact classes take compared to those expected on the basis of some higher-level theoretical framework.

Steps 1 through 9, and 11, are illustrated in detail by Carr and Maslowski (Chapter 9) in an analysis of Ohio Hopewell fabrics.

CONCLUSION

The cross-cultural relationship of design attributes to the processes and constraints that cause them is complex. It is best described as *constrained indeterminacy*. It is not the highly predictable phenomenon assumed by early social interaction theoretists and posited by information exchange theoretists. Nor is it the culturally and historically particularistic phenomenon concluded by Barth and more recently by Wiessner, Sackett, and Hodder. Nor is it the elusive concept that Conkey thought it was.

The unified theory of artifact design presented here and illustrated in subsequent chapters strikes a balance between these positivist–nomothetic and particularistic views of material culture, and bridges them by taking a broader and middle-range theoretic, operational approach. The approach encompasses the tactics and perspectives on design discussed in Chapter 6.

Most basically, the theory broadens the scope of the research universe from the style of artifacts to their design, including all material traits. Likewise, it broadens the range of causal processes and constraints that are considered (Carr, Chapter 6). Technological, social, social-psychological, personal behavioral, personal psychological, personal physiological, panhuman depth-psychological, and panhuman physiological determinants of artifact design are considered.

Integration of these forms and processes into a single predictive framework is then achieved through three steps. First is envisioning an artifact as a hierarchy of attributes. The hierarchy can be defined by criteria that are largely archaeologically observable. These criteria include the visibility, decision order, production order, and geographic expanse of attributes. Second, integration is achieved by envisioning the processes and constraints that can determine an attribute's form, and the social and other units to which they may pertain, as hierarchically arranged. Finally, a large number of bridging arguments that link these hierarchies are drawn. The arguments make explicit the specific kinds of attributes that usually are or are not determined by certain kinds of processes and constraints, taking the medium and technology into consideration. Also defined are the ecological, social, and other contextual conditions under which these relationships hold or do not hold. These bridging arguments and boundary conditions become clear only through the study and comparison of many artifact classes in many media, and many social situations in many societies. Some of these cases have been summarized here.

This broad and integrated approach to material design contrasts with the many recent approaches to "style." These tend to focus on more limited and differing suites of causal processes and constraints, do not specify the material attributes that are most probably affected by those factors, and, consequently, have been drawn as competing theories. The result has been the unnecessary and artificial theoretical and paradigmatic debates over the social interaction versus information exchange theories, the isochrestic versus iconological viewpoints, and historical–contextual–particularistic versus positivist–nomothetic approaches.

Beyond the concepts of hierarchies and mapping relations among hierarchies, there are two additional components of the unified theory of design that are essential to bridging process to form and to integrating the positivist–nomothetic and particularistic viewpoints. First is the concept of message priorities. Message priorities and the mapping of messages to form are given some cross-cultural regularity by basic physical–perceptual, ecological–evolutionary, and social–psychological constraints. However, message priorities and the mapping of messages to form also vary with the social situation and its ecological–adaptive, ideological, political, social, economic, emotional, motivational, and functional characteristics. These factors introduce indeterminacy and particularism into form–process relationships. Their effects can be accommodated when assigning etic meanings to attributes only through a contextual analytic approach.

A second component of the unified theory of design that is essential to bridging process to form is nested within the concept of message priorities. This is the ecological–evolutionary argument for a cross-cultural relationship between the inclusiveness of social units, their structural vulnerability to external stresses, and the cultural value consequently given to these units and their messages. This argument is based on Slobodkin and Rapoport's more general systems theory of ordered sequences of adaptation. It is primary in accounting for cross-cultural regularities between the visibility of attributes and the kinds of messages that they may convey. At the same time, the argument considers various causes for exceptions: the prosperity of the system, localized short-term stresses, cultural values, self-serving social groups, the coming and going of social–structural poses and roles with the social situation, and changes in role ambiguity with the social situation. Accommodating these factors, too, demands that a contextually sensitive approach be used when assigning etic meanings to attributes.

At a more operational level, the unified theory of artifact design helps the archaeologist to select relevant design attributes for analysis. Only some kinds of design attributes are likely to reflect and give insight into a given process or constraint of interest. The unified theory specifies which kinds of attributes these are likely to be, according to their visibility, decision order, production order, and geographic distribution.

In meeting its operational goal, the unified theory goes beyond the decontextualized approaches to material style taken by traditional archaeology and the New Archaeology. These schools of thought saw styles as direct "indicators" or "correlates" of social units or cultural subsystems. In contrast, the unified theory bridges attributes to social units through the dynamic processes that define and maintain those units (Table 7-2) and through the contextual constraints and conditions which, in turn, mold those processes (Table 7-3; Carr and Neitzel, Chapter 1:Table 1-1). The latter include the historical and adaptive milieux, characteristics of the social situation, cultural values and themes, group and personal preferences and motives, and so on. These factors constitute the rich contexts of human decision making and action in the production, use, display, and disposal of artifacts. In this way, the unified theory is a contextualized approach to style.

At the level of definition, the unified theory as a middle-range theory makes the careful conceptual distinction between causal processes in the systemic domain and resultant forms that function or occur in either the systemic or archaeological domains. The theory defines style in terms of archaeological observables rather than processual intangibles. By doing so, the theory discourages implicit tautologies that have crept into current archaeological discussions.

The unified theory also defines and distinguishes several other concepts: decisions versus production steps and design grammars; decision structures of many kinds; several kinds of attribute

visibility; and the conscious–unconscious dichotomy versus the active–passive dichotomy. The analytical utility of the contrast between additive and subtractive technologies is also evaluated.

Finally, the unified theory of artifact design, as well as the subsequent chapters that illustrate its application, point to the detailed understanding of primitive technologies, crafting processes, and raw materials that the archaeologist must have to assign etic meanings to design attributes. Relationships between form and process are structured to a considerable degree by technological (procedural, raw material), and logical–formal constraints. These constraints largely determine the decision level, production order, and visibility level of attributes and, thus, the range of behavioral and other meanings that they can assume. As Sackett correctly stresses, style is embedded in technological decisions. At the same time, assigning detailed etic meanings to design attributes requires an appreciation of the local ecological, ideological, political, social organizational, social-psychological, emotional, motivational, and functional contexts within which actors and material culture operate. We must become closer to both the artforms and the lifeways of the people that we study.

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Style, Society, and Person

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