

The Units of Culture

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Western science is built on the obsessive and hitherto successful search for atomic units, with which abstract laws and principles can be derived. Scientific knowledge is written in the vocabulary of atoms, subatomic particles, molecules, organisms, ecosystems, and many other units, including species ... both theory and experimental analysis in science are predicated on the assumption—the trust, the faith—that complex systems can be cleaved into simpler systems. And so the search proceeds relentlessly for natural units until, like the true grail, they are found and all rejoice.

E. O. Wilson (1992)

The reduction of large, complex entities into smaller, simpler units has been one of the most successful strategies in Western science for more than two millennia. The Greek philosopher Democritus (c.460 - c.370 BC), for example, developed and systematized *atomism*, a proposition that matter consists of hard, indivisible (hence, atomic, from Greek *atoma*, or "uncuttable") particles that move through empty space. In the 20th century, the atom itself has been divided into ever smaller and more fundamental units. Similarly, in biology, understanding of living organisms has improved by reducing them into constituent organs, cells, cell organelles, and the various molecules and chemicals of which these subunits themselves are composed. Reductionism has also been attempted in social science. In 19th century Europe, Adolphe Quételet and Auguste Comte proposed a scientific, reductionistic approach to the study of human culture and society. Though the initial term that each used for the new field, "social physics," was never adopted, they provided the foundations for what Comte later called "sociology."

However, the principle of reductionism has not been universally accepted, despite its clear line of successes in Western science. The ancient Chinese, for example, acquired a large

store of scientific knowledge but always emphasized the holistic and continuous character of the universe. According to Joseph Needham (1978), the primary Western student of Chinese science, the Chinese focused on the harmonious and hierarchical properties of nature. In such a view of the world, nature cannot be subdivided into discrete and constant elements, as proposed by Western thinkers during the Enlightenment. The distrust of reductionism has also been widespread among many 20th century Western social scientists. The fear seems to be either that efforts to reduce social phenomena into smaller, more elemental, units somehow robs people of their humanity or that reductionism means oversimplification. The latter position comes from the belief that human social and cultural behavior is too complex and integrated for the study of smaller, simpler components to be of any value. This view has been bolstered by the recent study of complexity, where higher levels of organization exhibit emergent properties that neither exist at lower levels of organization nor could be predicted from them.

But there is also a political agenda to the distrust of reductionism among social scientists. The ultimate agenda of reductionism is to incorporate the laws and principles of each level of organization into those at more general and fundamental levels. Hence, the laws of chemistry must obey and be subsumed under the laws of physics, those of biology must conform to those of chemistry, and so on. In turn, the laws of culture, if such things exist, cannot operate in contradiction to those of biology, chemistry and physics. But, opponents of reductionism claim, biology does not predict any of the emergent properties that are characteristic of human culture. Hence, there is no purpose to be served in attempting to reduce culture to biology. Moreover, politically speaking, if culture was reducible to biology, a major portion of the research domain of social scientists would be lost to others.

Despite these fears, over the last two decades the concern over cultural evolution, cultural transmission, and culture change in American anthropology has involved a debate over whether some sort of fundamental, particulate unit of culture is either possible or necessary. The discussion is framed by the following two quotations:

Formulation of a theoretically plausible, and empirically usable, characterization of a unit for storage and transmission of cultural information is, in my view, the major task that must be completed before further advance can occur in the study of cultural evolutionary processes. (Rambo 1991: 69)

Our definition of culture is not at all specific about the nature of the information that affects phenotypes. In particular, we do not assume that culture is coded as discrete “particles.” Moreover, ... it is possible to construct a cogent plausible theory of cultural evolution without assuming particulate inheritance. (Boyd & Richerson 1985: 37-38)

If one accepts Rambo’s view, that some unit of culture is required before progress in the study of cultural evolution is possible, a second question then immediately emerges. That is, which, if any, of the units of culture proposed so far have both theoretical and empirical merit? The issue of whether culture is encoded in discrete units is also germane to another, more general, issue in cross-cultural research and culture theory. That is, what is the nature of the culture-bearing unit? How can cultures be distinguished from others? How different, and what should the basis of difference be, for two cultures to be regarded as distinct? Questions regarding the unit of culture and the culture-bearing unit are obviously intricately related to each other. If, in fact, some theoretically plausible and empirically useful unit of culture is discovered, it could be used to delineate and, therefore, differentiate cultures as these would simply be different arrangements of different units. It would still be necessary to know, or to decide, what degree of difference between two culture-bearing units, in fact, makes them different cultures.

With respect to the units of culture debate, over the past 150 years numerous labels have been applied to the “parts” of culture. Some of these, such as “themes,” “configurations,” “complexes,” and “patterns” appear to be at high levels of cultural organization. Other terms, including “ideas,” “beliefs,” “values,” “rules,” “principles,” “symbols,” “concepts,” and a few others, seem to be operationalized at lower, more fundamental levels. The higher level labels appear to be particular arrangements of the lower level units. But which of these, if any, is the (or, an) useful unit of cultural transmission? Which is basic to cultural learning, cultural diffusion, and cultural evolution?

A substantial part of the concern over the units of cultural transmission derives from analogies made between cultural evolution and biological evolution. Though the unit of selection in biological evolution is still hotly debated (some choosing the gene, most preferring the individual, and a few still holding out for the group), many researchers interested in cultural evolution have seen the need to adopt a particulate unit of cultural transmission that is analogous to the gene. Hence, in recent years, several have been proposed. The most notable of these include Lumsden and Wilson’s (1981) “cultorgen”

and the “meme,” originally proposed by Dawkins (1976). Of these two, the “meme” has apparently been “selected.” Durham (1991), for example, has adopted it as the unit of cultural transmission as part of his theory of coevolution while several individuals outside of anthropology (e.g., Blackmore 1999; Delius 1989; Dennett 1991, 1995; Lynch 1996) have embraced the notion with few apparent misgivings. Some have even proposed a new field of “memetics” (e.g., Lynch 1996; Blackmore 1998). Wilson (1998) has abandoned his “cultorgen” construct and adopted the meme, although his definition of it differs somewhat from definitions proposed by others.

Yet, within American anthropology, either indifference to or skepticism about the meme seems to be the most common position. Rambo (1991), for example, suggests that we presently lack any credible unit of cultural selection at the present. Boyd and Richerson (1985), as noted above, indicate that they do not necessarily assume that culture is composed of discrete particles nor that such an assumption is required for a plausible theory of cultural evolution. Hence, the purpose of this paper is to examine the units of culture concept. In particular, two questions will be addressed. First, is it necessary to have a particulate unit of culture in order for research in cultural evolution, transmission, and change to progress? Second, of the various units of culture that have been proposed, which, if any, offer the most hope in terms of being theoretically plausible and empirically useful? In order to answer these questions, other important—and mostly unresolved—issues with respect to the units of culture notion must also be addressed. First, in order to consider the units of culture, it is important to have a working definition of culture itself.

What is Culture?

Culture has been defined in many ways since the term came into use in the 19th century. Kroeber and Kluckhohn (1952) listed 164 different definitions of culture and many more certainly have been generated since their summary was published. However, essentially all definitions of culture can be grouped into four major types. First, culture has been defined as something that resides in the heads of members of particular societies in the form of shared knowledge, beliefs, attitudes, values, ideals, and so on. This may be termed “ideational culture.” Second, culture has been defined both as shared knowledge and behavior patterns. Third, other definitions add characteristic material culture to shared knowledge and behavior patterns. Finally, a form of definition that is terminologically

different but very similar to the third type in meaning is that of culture as information shared by a social group. Table 1 provides an example of each type of definition.

TABLE 1
Examples of Four Types of Definitions of Culture
Arranged in Terms of Increasing Inclusiveness.

Culture as Ideas:

[Culture refers to] systems of shared ideas, to the conceptual designs, the shared systems of meaning, that underlie the ways in which a people live. (Keesing 1976)

Culture as Ideas and Behavior:

[Culture is] the set of learned values, behaviors, and beliefs, that are characteristic of a particular society or population. (Ember and Ember 1988)

Cultural as Ideas, Behavior, and Material Artifacts:

Patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artifacts. (Kroeber and Kluckhohn 1963)

Culture as Information:

It is possible to regard all culture as information and to view any single culture as an “information economy” in which information is received or created, retrieved, transmitted, utilized, and even lost. (Roberts 1964)

The view of culture as information is nearly identical with the third set of definitions in Table 1 (ideas, behavior, and material artifacts), though stated in different terms. This seems to be most inclusive definition and may be superior for evaluating the value of the units of culture concept than the other types of definitions. When viewed as information, culture includes shared knowledge, behavior patterns, material artifacts and may be characteristic of either small groups of individuals or of large aggregates of people. Culture as information may be stored in the heads of people, in artifacts, or recorded in artifacts specially designed and constructed for information storage, such as stone tablets, books, or computers. Culture change and evolution may be viewed as additions to, deletions from, or alterations to the store of shared information (Chick 1986; 1997). Most often, cultural evolution involves altering and adding to the store of information but, sometimes, cultural

information can also be lost. When societies have collapsed on their own or have been conquered by outsiders, as in the case of the Mayans or the Roman Empire, massive information loss, or deculturation, has occurred. Moreover, until relatively recently in human history, there seems to have been relatively little alteration or addition to cultural inventories around the world. Though archeological studies show that artifacts did change over time, the changes were nowhere near as dramatic as those that have taken place during the last 12-15,000 years.

Defining culture as shared information removes the need to restrict the information to specific types, that is, knowledge and ideas, behavior patterns, or material artifacts. Further, information theory suggests that information can be defined in terms of discrete units known as “bits.” It would therefore seem reasonable, if culture is information and information can be treated as discrete units, for culture to be considered in terms of discrete units.

The “Units of Culture”

Higher Level Units. According to the American anthropologist A. L. Kroeber, patterns of art, religion, philosophy, technology, and science wax and wane regularly in cultures, often without the knowledge of the members of the cultures. In particular, he showed how Western dress styles, in terms of width and length of the skirt and décolletage changed with periodic regularities over a 300-year period (Kroeber and Richardson 1940). In a later work, which was to have been the crowning achievement of his career, Kroeber (1944, p. 7) sought to uncover “the common features in the growth” or “configurations,” of philology, sculpture, painting, drama, literature, and music in Egypt, Mesopotamia, India, Japan, Greece, Rome, Europe, and China. Unfortunately for Kroeber, his efforts resulted in failure. He found “no evidence of any true law in the phenomena dealt with; nothing cyclical, regularly repetitive, or necessary” (Kroeber 1944, p. 761). Neither the pattern nor the configuration, at least as conceptualized by Kroeber, seemed not to have much utility as a unit of culture, at least for comparative purposes.

The most famous proponent of the culture pattern among American anthropologists was Ruth Benedict. In her “configuralist” approach, Benedict proposed that entire cultures could be described in terms of one or two major psychological characteristics. Her theme in *Patterns of Culture* (1934) was that there are an infinite variety of behavioral possibilities from which the members of each culture select those that then characterize their society.

For her, cultures were the chance assemblages of culture elements (or traits) that came together through diffusion. These elements are then modified to form a relatively consistent pattern of thought and behavior.

The work of both Kroeber and Benedict was heavily influenced by the thought of the man generally regarded as the founder of American anthropology, Franz Boas. Boas believed that cultures are the result of processes of diffusion. That is, the content of any particular culture is simply the sum of traits that have diffused from others. Newly acquired traits, however, are soon shaped to fit their new context and become part of an integrated whole. Boas also believed that cultures emphasize particular themes and that the traits that compose cultures emphasize these larger themes. For example, Boas found the native Americans of the Northwest Coast (what is now the states of Oregon and Washington in the US and the province of British Columbia in Canada) to emphasize the themes of social competition and the pursuit of prestige. Hence, the culture trait of the potlatch, the ritual gift-giving or even destruction of valuable materials in order to demonstrate wealth and prestige, to characterized this theme among tribes such as the Kwakiutl and Tsimshian.

Hence, while they were not termed “units of culture” or described as units of information, the idea that cultures are patterned or have themes at their highest levels of organization and that these patterns and themes are composed of specific traits or elements dates to the earliest days of American anthropology. While the configurationalist approach disappeared long ago, the idea that cultures are composed of distinguishable parts is still strong. There has not been much consistency in either using a single term for such parts nor in operationally defining the parts, however.

Lower Level Units. During most of the 20th century, American anthropologists used terms that referred to components or parts of culture but they rarely provided operational definitions of those terms. Examples include “elements,” “traits,” “habits,” “ideas,” “beliefs,” “values,” and “principles.” Although Durham (1991) reports that “idea” is the most common ideational unit of culture in the anthropological literature, I believe that “trait” (a term that can include ideational, behavioral, and material aspects of culture) has been used much more extensively. Lewis Henry Morgan (1877) proposed that cultural evolution proceeds by the successive acquisition of traits, such as the knowledge of the use of fire, the bow and arrow, and the domestication of animals. Later, indices of cultural complexity were developed by anthropologists, such as Raoul Naroll (1956) and Robert Carneiro (1970), that were based on the presence or absence of particular traits. Carneiro

used Guttman scaling in order to develop an index of cultural evolution based on the presence or absence of a large list (initially 358, later 618) of culture traits. Examples of these traits are (the presence or absence of): two or more cities, temples, papermaking, peace-keeping machinery, special religious practitioners, markets, full-time craft specialists, calendrical system, and arch used in construction. While Carneiro indicated why certain traits were selected for use in his study, he did not provide a definition of what a trait is, or is not.

George P. Murdock's great achievement was the development of the Human Relations Area Files (called, until 1949, the Cross-Cultural Survey), a system of indexed ethnographic materials that permitted statistical comparisons of traits across samples of cultures. The indexing system is updated from time to time and currently contains more than 700 topical categories (Ember 1997). The index evolved from earlier work by Murdock (1945) in which he listed what he believed to be universal features of cultures. So, again though they were never described as such, the topical categories developed to index the ethnographies in the Human Relations Area Files (which are listed and described in the *Outline of Cultural Materials* [Murdock, Ford, Hudson, Kennedy, Simmons, & Whiting 1987]) constitute a list of culture traits that presumably can be applied to any society. Of course, many traits will be present in some societies and absent in others.

Durham (1991) suggested that candidates for a unit of culture should "(1) consist of information that actually or potentially guides behavior; (2) accommodate highly variable kinds, quantities, and ways of organizing information (that is, with variable amounts of hierarchy and integration); and (3) demarcate bodies of information that are, in fact differentially transmitted as coherent, functional units" (p. 188). Based on these criteria, Durham eliminated all terms with the exception of "symbol" and "meme."

The term "symbol" has been in widespread use in anthropology for many years. Indeed, there are individuals who call themselves "symbolic anthropologists" and who study "symbolic anthropology." However, Durham (1991) eliminated the symbol as a useful unit of culture because the term has a priori connotations that come from common usage while "meme" has few such connotations and little prior use. I would add that since the primary dictionary definition of symbol in English is "something chosen to stand or represent something else," (Funk & Wagnalls 1997) it is difficult to understand how a culture composed purely of things that stand for other things would work.

While it can be argued that traits, elements, ideas, symbols, and so on constitute units of culture that may comprise larger culture patterns or support culture themes, the concept of “unit of culture” itself seems to be relatively recent. One of the earliest mentions of “units of culture” was by Herskovits in 1945. Since then, some 50 different terms and concepts have been suggested as units of culture (Durham & Weingart 1997). Stuart-Fox (1986) indicated that proposed units of culture fall into three categories. These are: (1) material culture traits, (2) behavioral culture traits, and (3) mental culture traits. The similarity of Stuart-Fox’s categories of units to the ways of defining culture that I proposed above is easy to see, though he did not propose a unit of culture as information. Durham & Weingart (1997) thoroughly discuss the problems involved in treating artifacts, behaviors, or mental states as units of culture. They find very serious flaws with each.

Is a Unit of Culture Necessary?

But, is it necessary to have a unit of culture in order for our understanding of cultural change and evolution to progress? Years ago, the well-known naturalist Jacob Bronowski blamed our lack of understanding of the processes of culture change on the lack of a suitable unit (Hull 1982). By analogy with biological evolution, the question is, “When cultures change, what exactly is it that changes?” In the case of biological evolution, we can state with confidence that changes in genotypes bring about changes in phenotypes. If any particular culture is regarded as a phenotype, then what is the equivalent of the cultural genotype? For most of the history of anthropology, the culture trait or assemblages of traits (patterns, configurations, themes, etc.) was what presumably changed but since it was rarely specified what a culture trait actually is, to say that cultural change involved change in traits is not very informative.

As they indicated in the quotation above, Boyd and Richerson (1985) clearly did not believe that a particulate unit of culture was needed in order to understand cultural evolution. Or, at least, the debate over units of culture may be premature. Durham and Weingart (1998) point out that a Darwinian analysis of evolution is possible, regardless of the kind of inheritance system employed. So both unit-like systems and qualitative blending models can lead to consistent theories of change. Lakoff (1987), for example, has proposed linguistic units that seem to have very little in common with genes, either in reality or by analogy. Cavalli-Sforza and Feldman (1981, p. 71) indicate that “many traits are more naturally described on a continuous scale.” And Boster (1987, p. 152-153), though not in reference to units of culture specifically, described some conceptualizations

of culture as “particle models” while others are “wave models.” He suggested that both may be useful, much as light is appropriately described either in particulate or wave terms, depending on conditions.

Durham and Weingart (1997, p. 301) propose that a genuine unit of culture must have at least three properties. First, it “must have conceptual or ideational reality.” That is, it must be capable of influencing behavior and artifacts through cultural analogs of “epigenetic processes,” the processes that relate genes to their phenotypic effects. Second, “a bona fide unit of culture must have a history of social transmission” since, by most definitions, culture is socially transmitted information. Third, “a unit of culture must be an embedded component part of a greater conceptual system, the ‘culture’ from which it comes.” In other words, it must both maintain its coherence and individuality but also function as an integrated part of the system in which it resides. To this, they add Dawkins’ (1976) requisite properties of replicators, including (1) *fecundity*, or the capacity to successfully replicate, (2) *longevity*, or the capacity to persist through repeated replications, and (3) *fidelity*, the capacity to replicate with relative accuracy.

It is not clear that memes or any of the other proposed units of culture do all of these things. Indeed, Durham and Weingart (1997, p. 311) conclude, “Not one unit described in the literature has shown itself to be adequate for the task” of conceptualizing culture and culture change. On the other hand, they do not seem to be opposed in principle to the general concept of units of culture. Perhaps the strongest argument in favor of the meme (or other possible units of culture) is that relatively little progress has been made in terms of understanding cultural evolutionary processes so far without such units.

The Meme as a Unit of Culture. Though Dawkins (1976) is credited with introducing the meme, he has not, however, taken the lead in advocating it as a unit of culture. Others, such as the American philosopher Daniel Dennett (1991, 1995), the American biological anthropologist William Durham (1991), and the British psychologist Susan Blackmore (1999), have instead adopted and vigorously advocated the use of the meme term and concept. Edward O. Wilson (1998), the distinguished Harvard University biologist, has now adopted it though his definition seems to differ from those of most meme advocates.

Defining and Operationalizing the Meme. Memes have been defined in a variety of different ways and this, naturally, constitutes a problem. It is probably best to attempt to

determine which, if any, of the definitions leads, or could lead, to a useful operationalization of the concept for empirical purposes. Dawkins defined the meme as follows:

“A meme should be regarded as a unit of information residing in the brain ... just as genetic information is stored in the DNA. Its phenotypic effects, in contrast, are its consequences in the outside world. The phenotypic effects of a meme may be in the form of words, music, visual images, styles of clothing, facial or hand gestures, skills such as opening milk bottles in tins, or panning wheat in Japanese macaques. They are the outward and visible (audible, etc.) manifestations of memes within the brain. They may be perceived by the sense organs of other individuals, and they may so imprint themselves on the brains of the receiving individuals that a copy (not necessarily exact) of the original meme is graven in the receiving brain. The new copy of the meme is then in a position to broadcast its phenotypic effects, with the result that further copies of itself may be made in yet other brains.” (Dawkins 1982, p. 109)

Earlier, Dawkins gave examples of memes and suggested how they might act as cultural replicators:

“Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches. Just as genes propagate themselves in the gene pool by leaving from body to body via sperm or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation. If a scientist hears, or reads about, a good idea, he passes it on to his colleagues and students. He mentions it in his articles and his lectures. If the idea catches on, it can be said to propagate itself, spreading from brain to brain.” (Dawkins 1976, p. 206).

Durham describes the meme as follows:

“I take it [the meme] to represent actual units of socially transmitted information, regardless of their form, size, and internal organization. The point is that whenever culture changes, *some* ideational unit is adopted and one or more homologous alternatives are not. That unit I will call a “meme”; its alternative forms or manifestations I will further subdivide into two categories.

The first and more inclusive group consists of *all* variants of a given meme—its “holomemes”—whether they are actually acted upon or not. Holomemes, in other words, represent the entire cultural repertory of variation for a given meme, including any latent or unexpressed forms. The second and more important groups for our purposes, “allomemes” (a deliberate parallel to the term “allele” in genetic theory), refers to the subset of holomemes that are actually used as guides to behavior by at least some members of a population in at least some circumstances. Examples of allomemes would include alternative marriage principles...” (Durham 1991, p.189)

For Dennett (1991, p. 201), memes are the “smallest units that replicate themselves with reliability and fecundity.” Wilson (1997, p. 136) defines the meme as a “node of semantic memory and its correlates in brain activity. The level of the node, whether concept (the simplest recognizable unit), proposition, or schema, determines the complexity of the idea, behavior, or artifact that it helps to sustain in the culture at large.” In a similar definition, Delius (1989, p. 54) defined memes as “constellations of activated and non-activated synapses within neural memory networks.” For Lynch (1996, p. 2), memes are “actively contagious ideas” while Grant (1990) defined memes as information patterns infecting human minds. Dan Sperber, one of the few cultural anthropologists to actively consider memes as units of culture, describes them as “self-replicating [cultural] representations’ (1996, p. 100).

Blackmore, in what may be the most thoughtful book-length exposition of the meme, meme theory, and “mimetics,” defines the meme as “instructions for carrying out behavior, stored in brains (or other objects) and passed on by imitation” (1999, p. 43). She also provides the definition given in the new *Oxford English Dictionary* as “**meme** (mi:m), *n.* *Biol.* (shortened from *mimeme* ... that which is imitated, after GENE *n.*) An element of culture that may be considered to be passed on by non-genetic means, esp. imitation” (Blackmore 1999, p. 43). Elsewhere, Blackmore describes the meme as “whatever it is that is passed on by imitation” (Blackmore 1999, p. 56). Blackmore also makes two distinctions that she believes to be critical between her (and Dawkins’) thinking on cultural evolution and that of other, more biologically oriented theorists. First, she claims that “most do not distinguish general evolutionary theory from the specifics of biological evolution” (p. 30). This claim is based on her support for what she and others (such as Dawkins [1976], Cziko [1995]) call “Universal Darwinism,” or the belief that “all life evolves by the differential survival of replicating entities” (Dawkins 1989, p. 192). Here

lies the second distinction made by Blackmore (and Dawkins), that other theorists do not “introduce the idea of a second replicator such as the meme” (Blackmore 1999, p. 30). That is to say, Blackmore and Dawkins (and Czikó and many other meme theorists) regard the meme to be a replicator that is both distinct from, and not subservient to, the gene. The other theorists, Blackmore (1999) contends, fail to see that cultural evolution operates in the interest of a “selfish replicator,” namely the meme, just as biological evolution proceeds in the interest of the “selfish gene,” the concept introduced by Dawkins in 1976. Cultural evolution does not necessarily operate in the interest of genes, as she claims that theorists such as Wilson (1997), Cavalli-Sforza and Feldman (1981), and Durham (1991) would maintain, but for the selfish interests of memes. This perspective has led some (including Brodie [1996], Lynch [1996], and Sperber [1996]) to describe the spread of memes in epidemiological terms, similar to how a virus multiplies among humans or a computer virus spreads among computers.

Problems with Memes. Blackmore (1999) indicates that there are three principal objections to the meme concept. First, she indicates that the exact size, construction, and nature of the meme cannot be specified. She then dismisses this problem since replicators do not need to be neatly divided up and, moreover, some of the same objections directed at memes are just as relevant for genes. The second problem is that the mechanism for copying and storing memes is not known. Blackmore compares this issue with that of DNA, the structure of which was not known until well after the Darwin’s theory of evolution by natural selection had been synthesized with genetics in the 1930s. Blackmore, Dawkins, Dennett, Wilson, and others who support the meme as a unit of culture also believe that it will be found to have a physical (neuronal) representation in the brain. An issue related to these two objections, but not discussed by Blackmore, relates to the ontological status of memes. They have been variously defined in both material and non-material terms; as nodes or synapses in the brain or as information that is passed from brain to brain (with the method of storage not indicated). While neuroscience may soon explain how information is assimilated and stored in the brain, until that happens, meme theorists must address the traditional mind-body problem. That is, how can something that is non-material (such as beliefs, ideas, or memes, when they are defined as non-material) influence something that is material, including the brain itself but also its products in terms of behavior and artifacts?

Third, Blackmore indicates that cultural evolution (and, therefore, “mimetic evolution”) is held by many to be Lamarckian, that is, based on the inheritance of acquired characteristics,

rather than Darwinian. Weingart, Mitchell, Richerson, and Maasen (1998, p. 292), for example, indicate that “It is clear that *Lamarckian evolution* may prove to be more adequate and promising for modeling cultural evolution than models of conventional neo-Darwinian evolution.” Acquired characteristics, such as new ideas and new inventions, obviously are passed along culturally. Universal Darwinists, such as Blackmore (1999), Dennett (1991, 1995), Cziko (1995) and Dawkins (1976, 1982, 1989), explicitly reject this position. Blackmore (1999) argues that it is irrelevant to consider cultural evolutionary processes as Lamarckian so long as the meme is accepted as a second replicator. She also dismisses this objection on the grounds that a close analogy between genes and memes may not exist when one does not need to exist. This is very curious logic. Basically, Blackmore is saying that a close analogy between genes and memes is fine so long as it supports the meme concept but is irrelevant when it does not. Further, she conceptually distinguishes evolution through “copying the instructions,” as occurs in DNA-based reproduction, and “copying the product,” as would occur in Lamarckian evolution. This is fine but seems to result in a problem so long as memes must be transmitted by imitation (as she indicates that they are) since it is products that are typically imitated, not instructions on how to make products. However, meme theorist John A. Ball (1984, p. 153) indicates that “a meme that cannot be expressed in words or symbols, that is written or taught and learned, has a considerable disadvantage, for then it can only propagate inefficiently by imitation.” Yet, for Blackmore (1999, p. 51), in order for something to be defined as a meme, it must be transmitted by imitation. This seems to be an extraordinarily restrictive condition for many, if not most, cultural things are not transmitted by imitation.

This point, then, raises the issue of whether all of culture is composed of memes. If not, then the meme still may be a useful concept, though its use would then clearly be limited: it would not be *the* unit of culture but perhaps only *a* unit of culture. It would then be necessary to look for other units, perhaps for culture that is not transmitted by imitation. Ball (1984), for example, asks whether we should think of “*all* the information in the brain as comprising memes, or is there another category of such information—data?” If the meme is to be considered as a unit of all cultural things, then the restriction that memes can only be transmitted by imitation seems unwarranted. But, if memes can be transmitted by means other than imitation or if there is another category of cultural information then much, if not all, of Blackmore’s (1999) theorizing is either incomplete or defective.

There are other serious problems with the meme concept (and other proposed units, as well). One relates to the first point above made by Blackmore but is one she does not

address. It is the problem of infinite regression. For example, if there is a meme for religion, is there also one for specific religions, such as Christianity? If so, is there then a meme for the Eastern Orthodox Church, and then memes for specific liturgical practices and beliefs? In other words, which is the level of the replicator? Can a religion replicate independent of its liturgy? Or, can the liturgy replicate independently of the religion? Or, does replication (possibly with error) of liturgical practices constitute replication of the religion. If that is so, then religion is not a replicator. Blackmore is not specific on this, although, as noted above, Dennett (1991, 1995) considers memes to be the smallest units that reliably replicate. But, is there a way to empirically operationalize such minimal units?

Second, it is reasonable to ask whether the meme represents a substantial advance over traditional cognitive units of culture, such as beliefs, shared understandings, values, or attitudes. In Blackmore's (1999) book, for example, it is not obvious that much would be lost if "belief" was substituted for "meme" everywhere it appears. In this regard, it seems that the assertion that the meme is a second replicator is important. For if it is not, then the concept itself does not seem to contribute much to understanding cultural change and evolution. If the meme could somehow be established as a genuine second replicator, its value would be undeniable. Meme theorists have attempted to explain numerous human biological and cultural features, from the evolution of the human brain, human language, consciousness, and mating patterns to religion, near death experiences, and the potlatch among Native Americans. The problem is that their explanations are basically examples of after-the-fact story telling. Until predictions based on meme theory result in empirical research and the results of the research are shown to be different from what would be expected if memes do not exist, the meme enterprise will involve much more smoke than fire.

Third, meme theorists, following from Dawkins (1976) accept the *selfish gene* theory without question because memes as selfish replicators would not make much sense otherwise. Yet, the selfish gene theory is by no means universally accepted. Conway Morris (1998, p. 8), for example, refers to it as "seriously incomplete" inasmuch as "we have almost no idea how form actually emerges from the genetic code." He further indicates that "It is certainly difficult to see how the severely reductionistic approach of Dawkins will continue to provide the most satisfactory strategy" (Conway Morris 1998, p. 9). Similarly, in social science, we have little understanding of how behavior results from beliefs, attitudes, or values. Indeed, most research indicates that the link between belief

and behavior or attitude and behavior is extremely weak. Since memes appear, from most definitions, to be very similar to beliefs, it is difficult to see how they translate to behavior.

Finally, at an even higher philosophical level, meme theory is another instance in a long line of efforts to validate the traditional Judeo-Christian belief that humans are completely different and distinct from the rest of nature. In the past, anthropologists and others attempted to preserve humanity's unique status by referring to "man, the tool-user," then "man, the tool-maker," and most recently as "man, the language-user." Yet, each of these distinctions has faded as other animals have been found to use tools, make tools, and, though the debate is by no means settled, possibly be able to use language in a rudimentary form. The meme presumably came into being only when hominids had evolved to the point where they were able to transmit information by imitation (Blackmore 1999). For Blackmore (1999), human evolution is distinct and fundamentally different from the evolution of other organisms.

Summary and Conclusions

Reductionism has been an extraordinarily successful scientific strategy, but it is not the basis for all-important insights. The qualities of water cannot be predicted from the qualities of hydrogen and oxygen. So properties emerge at higher levels of organization that cannot, in principle, be predicted from the understanding of lower level properties. Nevertheless, the alternative question is whether a phenomenon, such as cultural evolution, can be understood without considering the possibility that culture is composed of discrete units of some kind. While the properties of water can be very well described without considering the fact that it is composed of hydrogen and oxygen, full knowledge of water is impossible without that information.

In order to apply a Darwinian framework to culture change and evolution, it is necessary to operationalize how the selection process works for culture. That is, what are the units of variation, the units of selection, and what is meant by cultural fitness? An important question raised by Blackmore (1999) is whether it is reasonable to encompass culture change and evolution within organic evolution. Her position is that it is not, although other theorists (such as Durham [1981] and Wilson [1998]) who have embraced the meme concept appear to regard cultural evolution as subservient to biological evolution.

This means that two varieties of meme theory exist. The first, supported by Cavalli-Sforza and Feldman (1980), Durham (1991), and Wilson (1998), places memes subservient to genes while in the second, preferred by Blackmore (1999), Dennett (1991, 1995), Lynch (1996), and Dawkins (1976), genes and memes are seen as co-equals, possibly with memes now more important in human evolution than genes. There is one replicator, the gene, for the first group of theorists and two, the gene and the meme, for the second set. If there are two replicators, then the unit of cultural variation is the meme. It may also be the unit of selection, although individuals, as meme-carriers, might also be. Meme-theorists are neither clear nor consistent on this point. Finally, if memes are selfish replicators, then their effects do not necessarily have to produce behavior that is biologically adaptive. It need only be “mimetically adaptive” (Blackmore 1999, p. 35).

Even if the meme concept specifically is found to lack merit, either because it is empirically unusable or because it requires assumptions that cannot be sustained, it is still possible to regard the idea of units of culture with favor. For example, in the 1970s and 1980s, Roberts and Chick (1979, 1980, 1981, 1986) developed what they termed “high concordance codes.” These codes involved minimal behavioral and cognitive units that made up larger culture patterns. Examples came from games, including billiards and tennis, aircraft piloting, and machine-tool work. Each of these activities was broken down into a sample of discrete pieces of information that would be immediately recognized and understood by individuals who were familiar with the activities. The pieces of information were encoded either in words or in artifacts. The major difference between high concordance codes and memes, as they are presently conceptualized, is that Roberts and Chick were able to use the former in empirical research. Cognitive maps of cultural activities (the games or other activities) were constructed and differences between experts and non-experts in them were evaluated (Roberts and Chick 1979). It was possible to construct decision trees that showed how experts and non-experts arrived at their understandings of the activities (Chick and Roberts 1986). In other words, high concordance codes proved to be empirically useful, something that is yet to be demonstrated with memes.

Dawkins (1976), though he originated the concept, has not been the most vigorous advocate of the meme, while some of the most ardent supporters of the concept have descended into sheer silliness. For example, sites on the World Wide Web include “Meme of the Week,” the “Meme Gardening Page,” and even a new religion, the “Church of the Virus.” Others, such as Susan Blackmore (1999), have been much more cautious and

thoughtful. They may yet make a convincing case for the meme as a unit of culture. But, for that to happen, the concept must be operationally defined so that it is empirically useful. And, it must be shown to be a genuine second replicator. Otherwise, the meme offers no clear advantage over beliefs, ideas, traits, or other more traditional descriptors of the components of culture.

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