

## **EXPELLING THE MEME-GHOST FROM THE MACHINE: AN EVOLUTIONARY EXPLANATION FOR THE SPREAD OF CULTURAL PRACTICES**

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**ABSTRACT:** *Memes*, defined in terms of *ideas, mental representations or information*, are used in an attempt to explain the spread of cultural practices. We argue that such reference to hidden replicators, which are said to have causal effects on a person's actions, *appears* to explain human behavioral patterns, but only results in restating the observed behavior. This approach, based on a memotype–phenotype distinction, falls prey to the unsolvable problems of mind–body dualism.

*Key words:* agency, behavior, category mistakes, cultural evolution, cultural practices, cultural replicator, dualism, memes, mentalism, selection

Some attempts to define *memes* in concrete terms have regarded neurological synapse activation patterns as the units of transmission. Due to the lack of structural similarities, neuronal patterns in different people can only be said to correspond to *one* meme when they are correlated with behavior that is grouped as equivalent. Regarding *memes* as merely theoretical entities would potentially result in a sound scientific theory, but only if it allowed for better predictions than analyzing behavior alone.

The direct relation between behavior and environment, from which the meme is derived, serves equally well as a source for prediction. Consequently, a more coherent evolutionary explanation for the spread of cultural practices regards behavioral units, instead of unobservable entities underlying them, as the units of selection. Behavior can be understood as directly selected by its consequences.

In 1976, Richard Dawkins proposed the possibility of a naturally selected replicator of cultural transmission, which he called the *meme*, analogous to the gene in biological evolution. Even if not intended by Dawkins, *memetics* became a popular theory, purporting to offer *causal* accounts for the spread of cultural practices by reference to hidden replicators.

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Ever since its introduction, the concept of *meme* has always had scores of detractors who criticized it from a variety of perspectives, such as that units of culture are not discrete, do not replicate faithfully (Boyd & Richerson, 2005), or lack empirical support (Gatherer, 1998). It turns out that many of the criticisms can be attributed to problems resulting from tautological reference to hidden entities. These problems will be spelled out in the course of this paper. Dawkins's *memes* were posited as replicators in cultural evolution, analogous to genes in biological evolution. Ever since the proposal of the concept in 1976, authors have disagreed about the nature of memes as "units of selection." The definitions of most authors can be grouped into the following categories: (a) memes as abstractions such as mental representations, information, or ideas; (b) memes as neurological patterns; or (c) memes as behavioral units.

In this paper we provide reasons for rejecting the first two definitions and argue for explanation of cultural evolution in terms of the replication of behavioral units.

### **Memes as Mental Representations, Information, or Ideas**

#### ***Dualism and Realism***

Congruent with the common definition of culture as *information stored in human brains* (Boyd & Richerson, 2000; Henrich et. al., 2008), the replicators of cultural evolution are most often defined in terms of information (e.g., Dawkins, 1982b; Dennett, 1996a). Other popular definitions view memes as *the essence of something, ideas, mental states* such as *representations, socio-cultural information, beliefs, concepts, semantic structures, values, theories, convictions* and so forth (e.g., Blackmore, 1999; Dawkins, 1982b; Gabora, 1997; Pulliam, 1983; Ridley, 1997; and Wilkins, 1998). However, definitions of memes in such terms are problematic when aiming at a scientific account of cultural practices. The core of the problem originates in their implication of a dualistic worldview, holding that two fundamental types of substances—mental and material—exist, each in a separate sphere (Descartes, 1641/1992). In a dualistic worldview, the body is considered to have an extension in the physical world, whereas the mind or soul, which produces feelings and thoughts, resides in a realm separate from that physical world. This substance dualism gives rise to the mind–body problem, which also arises when *memes* are taken as real: The memes, consisting of information, mental representations, and ideas are said to *cause* our behavior. They are regarded as separate from behavior, as parts of a separate mental world.

To be sure, most authors may claim that they are not dualists. Instead, some might declare they adhere to a functionalist's or identity theorist's point of view, but as will become apparent in the course of this paper, often any ordinary English speaker would conclude from their choice of words that they view memes as hidden entities residing in a mental world but affecting an individual's behavior in a separate, material world.

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Not merely in folk psychology is the dualist's view tightly interwoven with a realist's stance. Because vague verbal theory terms like *ideas* and *mental representations* do not fulfill a practical function (i.e., they do not allow for effective action such as control and prediction), it seems implausible to assume that they are merely introduced as labels for functions that serve to describe relations between events. Then, if not reasoning in this ontologically agnostic paradigm of pragmatism, for what purpose is the term *meme* introduced? Is this reasoning part of a belief in an object-like existence of a causally effective entity in some kind of real world? Such explanations are likely to presume dualism.

A realist, truly non-dualistic interpretation of *information*, *ideas*, and *mental representations* is possible, however, and does not result in the problems that we will spell out here. For example, none of the problems of dualism occur if *mental representations* are realistically interpreted as terms referring to (i.e., occasioned by) behavioral regularities. Saying, for example, that our beliefs *are* named patterns of behavior means adopting a non-dualist realist stance because it amounts to repudiating inner states (as dualistic realists define *beliefs*). For example, to believe that incest is wrong is to avoid incest, to speak against it, and to punish it when it occurs. In such a view, the behavioral patterns we name are real. Beliefs, when non-dualistically defined as patterns of (verbal and nonverbal) behavior, can be used to predict behavior and, thus, are valuable to scientific theories. It seems inadvisable, however, to use the same term as those meme proponents whose arguments cause confusion with their official non-dualistic stance expressed in wording highly reminiscent of dualistic views.

Hence, the problems detailed below do not originate from a realist interpretation of mental terms but rather from an inclination to implicitly rely on a distinction between a mental (or imagined neural world) and a real world when arguing in mental terms. For instance, Dennett (1991), an otherwise outstanding opponent of dualist argumentation (e.g., 1996b), writes that a "mind is. . .created when memes restructure a human brain" (p. 207). From a non-dualist's stance, what does it mean for a meme to restructure a brain? If all Dennett aims to say is that the individual's behavior goes along with changes in the brain, it is unclear what the introduction of the term *meme* contributes to that explication. Blackmore's (1999) and Dawkins's (1982b) way to put their argument that memes can cause behavior also points to a (most likely unintended) implication of dualistic thinking. Given that Blackmore (1997) objects to a dualistic worldview and identifies mental states with brain states, how should we understand the following statement?: "our brains and minds have been the product of two replicators. . .but as memetic evolution proceeds faster and faster, our minds are increasingly the product of memes, not genes" (p. 44). In the following paragraphs we explain what is troublesome about a scientific account of cultural practices that does not relinquish intuitively appealing dualistic explanations.

*Problems with Mentalistic Meme Definitions*

**Inhibition of scientific inquiry.** B. F. Skinner adopted the term *mentalism* to talk about the kind of dualism that separates mental from behavioral events. Although Dawkins originally (1976) did not use the term *meme* to explain the occurrence of practices, the underlying assumption of dualism became apparent later when he argued—without specifying mechanisms or environmental events—that memes can *cause* facial or hand gestures, words, and so on, in individuals (Dawkins, 1982b).

The major trouble with mentalistic accounts is that they lead to pseudo-explanations. Superficially, the occurrence of behavior appears to have been elucidated because we can name an entity that seems to have caused the behavior. The “explanation,” however, is only apparent because the entity (e.g., belief) is inferred to exist from the behavior it is supposed to explain; the “explanation” is circular. Suppose Ted is seen to sing “Yellow submarine.” He is said to have a song meme, and then to sing the song *because* of the song meme. An acceptable explanation would point to a combination of preceding events like hearing the song while Lisa sings it and receiving appreciation for singing other songs, rather than to an inner entity. To be sure, in many sciences, especially in physics, the first proposal of an entity is often inferred from the phenomena it is supposed to explain. However, further evidence for the effect of the entity needs to be collected, and a phenomenon at hand cannot be explained by the supposed momentary effect of an unobserved entity whose existence lacks any confirmation apart from the phenomenon to be explained.

Because it appears to explain, such a mentalistic semblance of an explanation obstructs further scientific inquiry. Claiming that memes, as ideas, make us behave is an example of *mentalism*. Neither borrowing a term like *idea* from folk psychology nor inventing a term like *meme* provides an explanation. The inclusion of either term results neither in a proximate explanation shedding light on the mechanisms at work nor in an ultimate, historical account (see next section).

The claim that a meme is involved in the mechanisms underlying our behavior makes us wonder what this meme consists of. Where is it stored? How is it retrieved? How does the idea of wearing a skirt make me wear a skirt? How an idea is supposed to cause behavior is a complicated, if not unanswerable, question. It keeps us from studying what could actually result in an explanation: the replication and selection of behavior. Instead, mentalistic concepts (like *memes*, if memes are equated with ideas) support theories containing other mentalistic notions such as the *mind*. The expansion of mentalistic vocabulary by neologisms like *meme* supports the development of misleading mentalistic theories.

**Redundancy.** Using the presence of a meme as an explanation of a practice is objectionable because the (mental) meme is superfluous in the sense that it restates the behavior. *Everything* that is needed to explain the occurrence of the meme—the outline of past context and consequences—is sufficient to explain the behavior directly.

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In the memetic stance, for example, as proposed by Blackmore (e.g., 1999) and Dennett (e.g., 1996a), something additional is invented, something that is said to have replicated an idea or representation. Taking this point of view, two phenomena—the representation as well as what is said to be its consequence, the singing—need to be explained. The theory also fails to explain why singing is selective. Ted does not start singing all songs that are sung in his presence.

One might argue that an analysis of an activity's past context and consequences is not sufficient, and that we have to discuss brain activity in order to fully explain the occurrence of practices. Yes, a *complete* explanation is one giving the proximate as well as the ultimate reasons leading to behavior. An explanation including only the immediately responsible mechanisms in the body—the proximate causes—or one only giving the historical, ultimate, origins of behavior, would each be incomplete in its own way. If neurologists and physiologists explained all mechanisms of the nervous system (involving, for instance, accounts of certain synaptic activations) producing behavior, we still would not know why this activation takes place. Mechanisms are a cause of behavior in the sense that the activity of an individual changes or stops when the mechanisms' processes are interrupted. However, why does certain activity in the nervous system lead to behavior at one moment but not at another? Even if we were able to predict the behavior of an organism by measuring the activity in certain parts of its nervous system, we cannot claim to have understood its behavior because we neither know what it originates from nor what function it fulfills for the organism. Thus, reduction to mechanisms is not the only mode of explanation needed in science. If that were the case, mechanics would have to wait for discoveries in atomic physics to advance and evolutionary accounts of species would be replaced by a better understanding of the workings of DNA (Baum & Heath, 1992).

A science of behavior is possible, just as a science of physiological mechanisms in bodies is possible. A science of behavior gives ultimate (historical) explanations dealing with both the individual's phylogeny and ontogeny. In this way, it answers the question why certain behavior is momentarily exhibited by discovering what induces it, what function it fulfills, and why it might have developed in evolutionary history. Optimally, we would be able to give an account of behavior relying on both ultimate and proximate explanations.

A science of behavior aiming at explaining behavior without debating neuronal activity is possible in the same way that physiology did not have to wait for biochemical accounts to explain cell functions. Similarly, proximate neurological explanations are an addition to, not a substitute for, the ultimate explanation of behavior by present and past events in the environment. As Skinner (1974) pointed out, only from the science of behavior can neuroscientists know which phenomena need to be explained. The mode of explanation behavior analysis offers resembles the one offered by Darwin's theory of natural selection (Darwin, 1859/2007). Adding a vague, purely verbal notion of mental representations to our explanations of behavior occasioned by environmental contingencies (or even replacing the latter by the former) does more harm than good. Giving historical explanations avoids unscientific concepts such as hidden

agents (e.g., Creator, Intelligence, or Will). Our interpretation of “memes” as behavioral patterns (which is explicated in the section *Practices—The Units of Selection in Cultural Evolution*) is an example of such an historical account, based on an organism’s phylogeny as well as ontogeny.

**The problem of agency.** To claim that a meme, as an entity inside us that steers our behavior, acts *selfishly* and purposively is to relocate and aggravate the problems of mentalism. One would still need to explain how the meme can influence our actions, why it does so in particular ways, what it consists of, and so forth. To assert that our actions—and “we,” Blackmore (1999) writes—are the products of memes means to reinvent a type of Creationism in which the purposive supernatural being with creational powers is located inside the organism.

To Jahoda (2002), Blackmore “appears to deny the reality of individual contributions [when she writes] ‘*I would say that the book was a combined product of genes and memes playing out their competition in [the author’s] life*’ (Blackmore, 1999: 239)” (p. 66). Disagreeing with the notion of intentionality in memes, Jahoda seeks to explain people’s actions by referring to *their* ability to act purposively. Apparently he overlooks the more general drawbacks of explanations including intentionality—no matter if applied to the individual or a meme. The complex and novel behavior of writing a book can be explained by shedding light on several converging histories of reinforcement in the author’s ontogeny and events in the species’ phylogeny. Such historical explanation would seem complex compared to an intentional one. When asked to explain scientifically where the intention to write a book came from in the first place, however, one would have to refer to the very same history.

Blackmore (1999) even suggests possible histories of reinforcement that can lead to writing a book, but she denies that the author herself—that is, as a whole individual—is influenced by them. Instead, she claims that the author’s past led to a combination of memes in the author’s brain, which made her write the book. At first, she explicitly rejects the dualistic notion of an agent inside us: “There is no one inside there to do the doing” (p. 240), but then she adds “other than a bunch of memes” (p. 240). She is right to disclaim “a magical, out-of-nowhere power such as consciousness” (p. 240) but mistakenly maintains the necessity of a “generative power” (p. 240). Instead of questioning that need, she tries to satisfy it by replacing an unspecified agent (*consciousness*) with the notion of meme. Memes, however, are as blurry a concept as any other agent inside us. To shift intentionality from the individual to a meme (even when thought to be natural) means to replace one imaginary agent by another in the hope of naming an immediate cause. Not the behavior of parts *of* or things *inside* individuals, but only historical accounts can offer a coherent explanation of behavior excluding imaginary agents.

Dennett (1991) writes that “memes *restructure* [emphasis added] a human brain *in order to* [emphasis added] make it a better habitat” (p. 365), which means that they act in certain ways because they want to achieve a goal. Talking about people, Dennett (1997) advocated “taking the intentional stance” to explain and predict their behavior, which means, for example, to attribute beliefs and intentions to individuals. Dennett (1997) regards his intentional stance to be useful to make

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predictions and argues that intentional idioms are justifiable because they are provisional and can be “cashed out” in principle. This might be correct in theory; however, mentalistic accounts of an organism’s behavior are most frequently not cashed out in practice because people rarely see the need to do so. They perceive the explanation containing intentional idioms to be complete. Therefore, scientists who try to be precise avoid them due to their tendency to lead to confusion (Baum & Heath, 1992).

Talk of selfishness or intentionality in regard to memes might be even more misleading than in regard to humans. It is common to talk about *intentionality* in people. It serves as a shortcut in everyday speech and holds the possibility of being interpreted in a non-dualist way by identifying it with behavior from which a dualist would derive it. A non-dualist interpretation excludes calling *intention* the cause of an action. Even if rarely done, the possibility of a non-dualist interpretation exists when talking about people’s intentions. Thus, the notion of *intentionality* in humans runs the *risk* of not being “cashed out.” *Intentionality* in memes, however, does not even hold the *option* of being identified with or translated into behavioral terms. If we cannot observe a meme, we cannot derive intentions or selfishness from its behavior. Therefore, back translation or “cashing out” is impossible.

In sum, Dawkins (1976) makes clear what the *selfishness* of genes translates to. Attributing intentions to *memes*, however, does not work analogously because *selfishness* cannot be cashed out by translating it into the behavior of an entity when we do not even know what the entity is. Moreover, it is impossible to derive predictions by abstracting behavior of an unobservable entity to patterns, which is one of Dennett’s motivations to “take the intentional stance.” The problem with intentionality is that, if not cashed out, it implies hidden agents whose behavior also needs to be explained. Since folk psychology and our language build upon abstract concepts like *intentionality*, we are accustomed to applying them when deriving *predictions* that can then be reformulated in observable terms. Those abstractions can, however, in no way *explain* the occurrence of behavior.

**Homunculi.** If memes made us behave, the big question would be: What determines their behavior? Do memes have memes inside them that determine how they have to control an individual’s behavior? If so, should we expect memes inside memes inside memes inside memes. . .? Have we started an infinite regress? Or else, if memes are used to explain our actions by stating that they control our behavior, do we have to grant that they are guided by their own free will? That people, memes, or homunculi act by free will can never be confirmed because in order to empirically prove free will one would have to observe an act go counter to prediction when all possible contributing factors were firmly known, which is impossible. Furthermore, the connection between the non-natural force of free will and the natural event of action will always remain a mystery and therefore is not subject to science. These problems arise when behavior is assigned to parts, especially hidden parts, of or inside organisms instead of to whole organisms (Baum, 2005; Bennett & Hacker, 2007).

**Natural selection on unnatural forces.** Another unanswerable question is where non-natural forces—those that are not localizable in time and space, such as memes and free will—originate. How can natural mechanisms select a non-natural entity? Moreover, as Darwin (1859/2007) puts it: “*natura non facit saltus*” (p. 416)—nature does not make jumps. If jumps occur, like those evident in mutations, they are usually small. A sudden appearance of memes and free will in certain advanced animals or humans raises the problem of discontinuity of species and is therefore difficult to reconcile with evolutionary theory.

Blackmore (1997) writes that “without memetics you cannot answer questions like. . . ‘Why did I decide to write this article and not that one? . . .’ Without memetics you can only fall back on appeals to an imaginary conscious agent” (p. 43). The trouble is, however, that when writing that unobservable memes make us behave, memeticists do not clarify what distinguishes memes from imaginary agents. At present, no method exists to observe internal memes, and the invention of methods to observe them is doubtful.

Memes in causal explanations of behavior may wear the mask of a proximate explanatory addition to an ultimate account of behavior because they fill the temporal gap between environmental events inducing behavior and the occurrence of the action itself, but that does not make such explanatory fictions valuable parts of scientific theories. Apart from the conceived problem of action at a distance within behavioral explanations, what else can lead to mentalistic explanations?

### ***Why Are Mentalistic Meme Interpretations Rampant?***

**Metaphorical speech.** As others have noted (e.g., Jahoda, 2002), memetic pseudo-explanations seem to result partly from the confusion of literal and metaphorical speech. Even when memes are explicitly defined as abstractions or neuronal patterns, it seems tempting to regard them as autonomous agents when writing about them with terms that are intended to be metaphorical. Blackmore’s (1999) meme theory, for instance, seems to build on an entanglement of metaphorical and literal speech. On the one hand, she writes: “I shall find myself saying that memes. . . ‘try to do’ something. But we must remember that this is only short-hand for saying that the ‘something’ will improve the chances of the meme’s being copied” (pp. 162-163). On the other hand, she *literally* means that “memes make us work for their propagation” (personal communication, April 17, 2011). She maintains that her use of metaphors is only supposed to be a convenient shortcut, but it appears to be more like a blind alley. This happens when metaphorically meant sentences cannot be translated back into literal expressions. As Bennett and Hacker (2007) point out regarding brain parts, it is not enough to assert that one uses a notion in a new, metaphorical sense. When doing so, one must not assign all implications of the literal meaning to the metaphorical use. If one means a meme is *metaphorically selfish*, one cannot argue as if it were *literally selfish*. Not the explicit definition, but the *use* of terms tips the scales. For example, what would be the literal translation of the following two statements if one aimed at omitting the figurative elements that refer to memes as agents on their own?

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- 1) A meme “encourages its host to keep on mentally rehearsing it” (Blackmore, 1997, p. 46); and
- 2) “. . . attention is dragged away by sounds, movements, and most of all thoughts that seem to come from nowhere. These are the memes fighting it out to grab the information processing resources of the brain they might use for their propagation. You never did control the attention; it controlled—and created—you.” (Blackmore, 1999, p. 243)

It is clear what it means for Lisa to encourage Ted, but what does it mean for something inside Lisa, a meme, to encourage her? An individual can be said to encourage another, but it is unclear what the term means in reference to parts of an individual, even if the parts exist. The problem is that, despite all attempts at clarification, it remains unclear what is meant metaphorically and what is meant literally.

**Category mistakes.** Mentalistic explanations such as calling a belief or a meme the cause of an action can result from committing *category mistakes*. A category error is committed if the category label is confused with one of its instances (Ryle, 1949). Mentalistic explanations mistakenly identify a *whole*, for instance “having a God meme,” as the (efficient) cause of one of its *parts*, such as going to church.

The custom of saying that someone *has* a belief, intelligence, personality, or a meme is partly responsible for confusion about different implications of the word *exist*, because if someone has something, a possible inference is that the something exists as an object. Memes, free will, attention, personality, intelligence, beliefs, and the like *exist* as words, as abstractions used to summarize certain incidents. They fulfill a shortcut function in scientific descriptions as well as in a variety of folk psychological accounts. For instance, since talk about Ted’s *personality characteristics* or *intelligence* is occasioned by his past actions, it indicates the likelihood for him to exhibit certain behavior in the future. Similarly, to speak of *free will* can also be seen as a language convention that is a shortcut for “no determinants of behavior are recognizable.” The narrow difference that determines whether the use of mental terms is justifiable is whether they are used as translatable shortcuts aiding the actual point or if they are offered as supposedly real causes which, however, lack empirical content. Hearing about someone’s beliefs (a shortcut, translatable into a behavior pattern) can influence our behavior. The term *meme*, on the contrary, cannot fulfill that function because few laypeople call “because I possess meme A” a satisfying answer or could react in accordance to it. This difference appears to be decreasing steadily as the term *meme* becomes more common among laypeople, especially in the context of events on the internet.

It seems, however, that the meaning of the increasingly popular term (*internet*) *meme* in everyday discourse differs from the definitions disputed in academia. *Internet memes* are usually concrete; they are mostly links, pictures, audio, or video files.

### Memes as Neuronal Patterns

Some authors (e.g., Dawkins, 1982b) who define memes abstractly as information maintain that memes have a physical realization in the brain. Others, such as Auger (2002), *identify* memes with neuronal activity: “Most definitions of memes are abstract, couched in terms of information or the mental representation that results from imitation. But replicators exist as specific substrates, as physical complexes. So too must memes be if they are replicators” (p. 193). In Auger’s line of reasoning, “[memes] are not only ‘carried’ or realized in physical substrates—they are these specific substrates” (Kronfeldner, 2005, p. 114). Not all authors, however, pursue such a clear ontological separation. Delius (1989), for example, states on the one hand that “memes are material structures (arrays of modified synapses)” (p. 54). In contrast, he mentions in the same essay that “memes still are largely abstract inferential entities, though we know that they are information coded in neural structures” (p. 47).

Proponents like Delius (1989) define memes as constellations of activated and non-activated synapses in an individual’s brain—or, in other words, memes constitute “the material configurations in neural memory that code behavioral cultural traits” (p. 46). Moreover, Delius concludes that “any cultural trait taken over by a given individual from another individual must accordingly be thought of as the transfer of a particular pattern of activated/inactivated synapses from the associative networks of one brain to another brain” (p. 46). What does it mean to *transfer* a *particular* pattern of activated synapses from one brain to another?

Delius (1989) acknowledges that “obviously (there) is not a bodily replication of the structures but there is nonetheless a multiple transfer of equivalent structures” (p. 45). In other words, a particular pattern is replicated but the replication does not match the original in all aspects. After replication, we have two patterns in two brains. If they are not alike in all aspects, some criteria must exist upon which we decide to call one pattern a replication of the other. In order to say that two people have *one*—or the *same*—meme, their neurological activity would either have to display structural or functional similarities (or both).

According to many authors (e.g., Dawkins, 1982b; Dennett, 1996a) the commonalities are not (primarily) structural ones. For example, Delius (1989) writes that

. . . naturally the hotspot pattern that a trait has in one brain will not be geometrically arranged in exactly the same way as the pattern that the same trait has in another brain. For that, the brains of different individuals are likely to be too different. (pp. 44-45)

Likewise, Dennett (1996a) points out “. . . that it is very unlikely—but not quite impossible—that there is a uniform ‘brain language’ in which information is stored in different human brains, and this makes brains very different from chromosomes” (p. 353). This leads him to regard “the meme [as] primarily a semantic classification, not a syntactic classification that might be directly observed in ‘brain language’ or natural language” (pp. 353-354). He writes that it

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would be flabbergasting to find that the brain-cell complex that stores an idea in one person is the same as or very similar to the brain-cell complex that stores the idea in everyone who has that idea. Due to the lack of observable structural similarities, Dennett dismisses the definition of memes as neurological patterns and instead defines memes abstractly as *information*.

No structural similarities of neuronal activity patterns that qualify for defining an equivalence class have yet been named. To confirm that “nonetheless a multiple transfer of equivalent structures” (Delius, 1989, p. 45) occurs, one would have to observe functional resemblance of dissimilar-looking synapse patterns in order to give evidence for meme transmission. Here, the question arises of how we decide on the functional equivalence of two neuronal patterns. Naturally, we observe how two people behave, and if their actions are similar enough we call their neurological activity *functionally equivalent*.

However, if the behavioral pattern is first seen in one person, then in the other, how can we claim that a neurological pattern has replicated from one person to the other, if all we can observe to be similar is behavior in these two people? What value accrues from explaining the similar behavior patterns by reference to dissimilar neurological activity? Only the people’s actions can be said to be equivalent. Consequently, as long as no structural similarities are observed we have no reason to argue that the unit of replication is a synaptic hotspot pattern.

### **Practices: The Units of Selection in Cultural Evolution**

The goal of this paper is not to define what *memes* really are; rather, it is to detail what approach to them can prove useful. As became apparent in the first two sections, defining the *meme* as a neurological pattern or a vague, abstract entity faces serious problems. This section presents an alternative approach based on a definition of units of cultural transmission that makes them directly available to scientific study.

#### ***Endeavors to Read Memes as Behavior***

When Dawkins (1976) coined the term, he originally defined a *meme* as “a new kind of replicator” (p. 206), “a unit of cultural transmission, or a unit of imitation” (p. 206). Dawkins (1982a) defined a replicator “as any entity in the universe of which copies are made” (p. 46). The central question of memetics became what to regard as “a unit of cultural transmission” (Dawkins, 1976, p. 206). This initial broad definition holds, among other things, the possibility to either define memes as hidden entities that are selected and make people behave in certain ways or to regard the units of selection as concrete, directly transmitted cultural practices.

The latter possibility, however, was excluded when Dawkins (1982b) aimed to be more specific and changed his original definition. He redefined a *meme* as “a unit of information residing in a brain [that] has a definite structure, realized in whatever physical medium the brain uses for storing information” (p. 109). He

“regard[s] it as physically residing in the brain” (p. 109). Further, he explains that “the phenotypic effects of a meme may be in the form of words, music, visual images, styles of clothes, facial or hand gestures” (p. 109).

In addition, Dawkins (1982b) explicitly distinguished between the replicator (which is said to be information), its vehicle (being neuronal activity), and its phenotypic effects (which can be observed as the examples given above). He differentiates between the meme, which is a kind of essence or basic idea, and its manifestations. Thus, he argues that something *essential*, a meme, must be present whenever instances of a certain class of behaviors occur. The abstract core idea of a scientific theory, for example, is replicated and thereby identical in every individual who understands the theory. Since several individuals usually do not have exactly the same understanding of a theory, there are different meme interpretations. As an example, Dawkins uses Darwinism:

The meme of Darwin’s theory is therefore that essential basis of the idea, which is held in common by all brains that understand the theory. The differences in the ways that people represent the theory are then, by definition, not part of the meme. (pp. 195-196)

Dawkins’s broad first definition *also* classified unobservable mental entities as memes. His 1982 definition, however, turns the unobservable mental entities into the main objects of study (cf. Gatherer, 1998). The later definition puts more emphasis on the gene–meme analogy by distinguishing between an entity subject to selection and another one that we observe: activities of individuals caused by that entity. Natural selection cannot directly affect private events such as thoughts or feelings and even less abstractions such as beliefs or memes. Only behavior that affects the environment can be selected by consequences; by definition, that is public behavior. Selection can favor advantageous behavioral tendencies and patterns, as long as they are influenced to some extent by genes (Baum, 2011).

Culture may be considered to consist of behavior. Cultural practices may be regarded as its units. These are transmitted directly. Approaches to define memes in observable, concrete terms have, for example, been put forward by Benzon (1996) and Gatherer (1998). Benzon proposes “that we think of . . . mental objects and processes as being analogous to the biologist’s phenotype just as the physical objects and processes are analogous to the genotype” (p. 24). He defines the whole of physical culture (such as pots, statues, dances, songs, and knives) as memes because they are what people exchange and the means by which they interact. Benzon also asks “What then of the ideas, desires, emotions, and attitudes behind these things?” (p. 24) and finds the answer in equating them to the biological phenotype. He considers these events to result from “physical culture.” His division resembles Dawkins’s, except that Benzon (1996) places memotypes in the environment and defines phenotypes as abstractions encoded in neuronal activities, whereas Dawkins does the opposite.<sup>1</sup> Benzon’s motivation to define memes as

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<sup>1</sup> Note that the terms *memotype* and *phenotype* are supposed to be analogies to *genotype* and *phenotype* in genetics. No general agreement exists on their definitions. Grant (1990),

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observables is that he wants them to be “counted and classified and variously studied” (p. 24). He overlooks, however, that in the framework of his suggestion phenotypes have as little potential to become subject to observation as Dawkins’s memes (in the 1982 definition).

**An Outline of Cultural Evolution in Concrete Terms**

Given that evolution takes place in culture as it does in biology, an evolutionary process needs to be defined of which genetic and cultural evolution are examples. Such a process can be composed of variation within a pool of replicators, transmission by copying, and selection due to differential copying (Baum, 2000). In the following paragraphs these components are defined for cultural evolution.

**The replicators.** We regard units of cultural transmission as concrete and observable behavioral units. The replicators are practices consisting of units of operant behavior (i.e., behavior under control of consequences and context). Practices are shared by members of a group and acquired as a result of group membership. Calling behavioral units practices helps to distinguish them from an individual’s idiosyncratic behavioral patterns that are not passed along or replicated within a culture. Like any operant unit, a cultural practice consists of a context, the effective behavior, and its consequences. Since no context, action, or consequence can occur twice in exactly the same manner, they are defined as populations. To be precise, a unit of operant behavior consists of (a) a population of functionally equivalent events that constitute the context or discriminative stimulus, (b) the population of behavioral variants that accomplish the particular environmental effect, and (c) a population of outcomes produced by the behavior in that context (Skinner, 1981). Hence, a practice is defined by its function, by “the job it gets done” (Baum, 2000; Guerin, 1997).

An example of a culturally transmitted practice is the washing of produce before consumption. When Lisa was a child, her father taught her to wash fruits and vegetables before eating them by providing a context (e.g., by handing an apple to her and uttering “Please wash it before eating”). Her father could have provided the discriminative stimulus in a variety of ways. For example, he might have pointed to the sink or formulated his request in different ways. All instances that led to Lisa’s washing of the apple belong to the population of events called *context*. The effective behavior—her washing of the apple—can also be exhibited in a variety of ways that achieve the same result, that is, a clean apple. She could, for example, move her hands in one way or another, or wash it in the kitchen or the bathroom. All behavioral instances leading to a clean apple count into the population of effective behavior, no matter what exact physical motions might take place. The population of outcomes produced by Lisa’s apple-washing after having

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for example, defines the *memotype* as the actual information content of a meme and distinguishes it from its realization, its *phenotype*.

been told to do so might include her father's approval by saying, "Well done!" his smiling at her, or cutting the apple into pieces and handing them to her.

Frequently, the context of a practice is a rule ("Wash fruits before consumption!"), and reinforcement is socially mediated (e.g., by approval). Eventually, long-term contingencies may take over when the context becomes a non-social discriminative stimulus (such as an apple), and the reinforcers are environmentally based as well as more directly related to reproductive success. Some psychologists might claim that Lisa has "internalized" the rule once she washes her apples even when no one tells her to or praises her afterwards. Control remains in the environment; however, it has been transferred from an obvious proximate contingency to an ultimate, more extended contingency (Baum, 2000, 2005).

Dawkins developed the concept of *meme* based on the conviction that Darwinism is too big a theory to be tied to genes alone (Dawkins & Miele, 1995). He aimed at providing an example of another replicator, one more instance of varied information that is transmitted selectively. To what extent do the replicators of cultural evolution, defined in behavioral terms, resemble genes?

Looking at possible analogies to genetic evolution might prove useful for deriving hypotheses on how Darwinism is applicable to culture. For example, the pool of replicators, consisting of practices that occur in a group, can be considered analogous to a gene pool. Various ways to behave that achieve a common result are comparable to diverse alleles. For instance, different manners of dressing resulting in attracting a partner can be seen as competing practices comparable to alleles coding for different colors in flowers (Baum, 2000).

Furthermore, practices, like genes, are interdependent and might therefore be compared to the genome. As Dawkins (1982b) points out, selection may operate on clusters of genes or even on the entire genome. All the practices that occur in an individual's repertoire in a period long enough to be sampled but short enough to be considered stable could be thought of as corresponding to the genome in genetic evolution (Baum, 2000).

Even if Dawkins' gene-meme analogy is far from being the central point of his theory, his proposal of a second replicator was originally built upon and derived from what is known about genes. As becomes obvious in the scope of this paper, numerous different comparisons to phenotype and genotype have been put forward (e.g., Blackmore, 1999; Dawkins, 1982b; Delius, 1989). Many of the proposed analogies do not hold up in all aspects. The flaws of the comparison, however, do little harm to the overall idea of evolutionary mechanisms acting on the spread of practices; cultural replicators need not resemble genetic ones in all or even many aspects. The analogy might guide us; suggestions of what to search for can be derived from it. A failure of the analogy, however, has few implications for the value of a theory of cultural evolution.

**Selection.** Transmission of cultural practices occurs selectively because some function better than others in achieving a certain goal. Of several rival practices fulfilling the same function, those that correlate most closely with positive consequences increase in frequency. Thus, competing practices are selected by

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their differential consequences. Those consequential events have gained their power to reinforce or punish from phylogeny (Baum, 2012; see also this paper's section on imitation). They are effective in a short-term context because they are connected to survival and reproductive success in the long run. Due to their differential consequences, some behavioral patterns survive and become common practice in a cultural group whereas others disappear. Letting people know about events via Facebook has gradually become more popular than calling each other on telephones or mailing letters. The Facebook practice saves resources and time.

As mentioned above, single practices (e.g., taking photos on vacations), as well as practice-complexes (a term chosen analogously to the concept of *memeplexes* argued for by, for example, Blackmore (1999)), are selected by consequences. An example of such a complex of practices that might be selected for is the Tibetan tradition of fraternal polyandry (i.e., one woman marrying several husbands who are brothers). This lifestyle usually involves all brothers raising each other's children and giving none preferential treatment. Biological fatherhood often remains unclear. This practice occurs in rural areas where families (mostly belonging to the *tre-ba* class) own small plots of mountainous land that can support the family but are useless when split into small pieces. Moreover, a plot requires the physical strength of several men to be farmed. The practices of polyandry, conjoint farming, and conjoint child rearing independent of biological fatherhood, as well as living on small pieces of land in rural mountainous areas, were selected together. Keeping in mind that brothers genetically resemble each other, this combination of practices can be considered to be a way to maximize genetic fitness given the challenging circumstances.

**Mechanism(s) of transmission.** Contrary to most meme proponents (e.g., Blackmore and Dawkins), we suggest *two* possible mechanisms by which cultural practices can be transmitted. *Meme* is a shortening of *mimeme*, which originates from Ancient Greek *μίμημα*, meaning *something imitated* (Pickett, 2006). In the dispute about the appropriate definition of the term, Blackmore (2003) chooses to stick with Dawkins's (1976) original etymologically-based definition of memes being literally *that which is imitated* or *that which is copied*. Thus, Blackmore (1999) emphasizes strongly that memes can, by definition, *only* be transmitted through imitation. We propose that cultural practices (no matter what we call them) are not merely transmitted by imitation, but also by instruction (cf. Baum, 2000).

**Imitation.** Imitation occurs when a model provided by one group member induces similar behavior in another person. Imitation itself does not transmit behavior. The induced behavior persists only if it is what is traditionally called "reinforced," that is, if it leads to consequences that will induce it in the future (Baum, 2000, 2012). Those consequences are either themselves phylogenetically important events (Baum, 2012) such as food, shelter, or mating opportunities, or they are connected to such an event. If imitated behavior correlates with phylogenetically disadvantageous events such as exposure to parasites, severe weather, or predators, or if there is no relation to consequences, the imitated actions will not persist. In imitation learning, consequences are not socially mediated and occur apart from the model's actions.

For example, when Ted approaches a bus stop where his bus is already standing, he might notice how someone, who is heading toward the bus, starts running. This induces Ted to run, too. If he catches the bus, his running is reinforced because it correlates with getting to his appointment on time and avoiding the punishment of being late, independent of the runner model with whom he has no interaction. Those positive consequences will induce his running next time he sees the bus at approximately the same distance standing at the bus stop. After having run for a bus at a certain distance several times without ever catching it, Ted would eventually stop running because his sprinting will correlate with being physically exhausted and sweaty without receiving the benefits of being on time. Eventually, his running will start to discriminate between a bus close enough to catch and one too far away to catch.

**Instruction.** In contrast to transmission of cultural practices through imitation, when behavior is passed on through instruction, an instructor providing a positive consequence is involved. The apple washing example above illustrates how a cultural practice can be passed on by instruction. The father, the instructor, sets the context (e.g., by handing Lisa an apple and turning on the faucet) and supplies relatively immediate reinforcement (e.g., by petting Lisa's head and uttering "Good job!"). Eventually there will be long-term benefits that are more directly related to reproductive success, such as Lisa's maintenance of good health due to avoidance of fertilizer consumption. Over time, the father's instructing correlates with its positive consequences, namely Lisa's appropriate behavior. If Lisa never complied, he would eventually stop manipulating (i.e., instructing) her behavior. In human culture, instruction, being tightly interwoven with practices of rule-giving, can be considered the more important one of the two mechanisms involved in the transmission of cultural practices.

## Conclusions

Dawkins introduced the concept of meme to point out "that Darwinism doesn't have to be tied to genes" (Dawkins & Miele, 1995, p. 85). Most scholars would agree that variation, transmission, and selection do not occur only in biological evolution. Aiming to offer a naturalistic explanation of cultural phenomena (i.e., an account based on natural laws and forces, as opposed to supernatural ones), memetics emphasizes an important point by shifting the focus away from individuals who *decide* to behave one way or another to regarding our activities as resulting from the mechanisms of natural selection, comparable to our physical properties. Mistaken, however, is the way the analogy to the genotype-phenotype distinction is formulated, which implies a mentalistic approach to behavior and its causes, highly reminiscent of Cartesian dualism. The existence of an unobservable entity that is supposed to be selected by its phenotypic behavioral effects is merely inferred from observing people's activities. Selection acts directly upon behavioral patterns. The concepts of behavioral selection (learning) by consequences and context eliminate the need to consider hidden causes to explain the spread of cultural practices such as singing songs, building arches, and wearing

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stiletto heels (which are examples of memes [or “phenotypes”] given by Dawkins (1976)). The answer to the question of why some practices increase in frequency while others disappear is to be found in their differential effects on the environment. Claims about arbitrary, hidden causes are superfluous and hamper scientific inquiry.

Many questions are still to be answered regarding the evolution and spread of cultural practices, but the concept of *meme* is unlikely to be helpful in arriving at answers. Calling the units of cultural transmission, consisting of practices, *memes* carries the danger of their being confused with definitions as neurological patterns or definitions in vague, abstract terms. A theory of cultural evolution excluding inscrutably operating terms is needed to understand the spread of cultural practices.

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