

## MEMES

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## LSHTM

'Meme' is a recently coined name (Dawkins 1976) for an old idea: that culture evolves through a process of inheritance involving bits of information (e.g., Tarde 1903). A meme is thus considered to be analogous to a gene as the unit of cultural, as opposed to genetic, evolution. Dawkins' (1976) original definition of memes as "tunes, catch-phrases, clothes fashions, ways of making pots or of building arches" has been seen as insufficiently precise, in particular concerning their physical nature – are memes beliefs, behaviour or artefacts? (Aunger 2002; Distin 2004) This lack of precision has not been rectified by the major contemporary proponents of memes (Blackmore 1999; Dennett 1995; Distin 2004): the definition remains vague.

**Comment:** Should it be 'clothes'?

Of course, memes could simply be defined as whatever underlies the process of cultural change, just as genes were at first defined by their functional role in biological change, prior to being found to be instantiated in DNA. Some memeticists have taken this route, being content to call whatever information is socially learned memetic (e.g., Gil-White 2004). However, while this appears to be a legitimate position to take, due to the analogy to biology, it is not particularly helpful because it is potentially vacuous: it could be the case that memes have nothing to explain. Some evolutionary psychologists, for instance, argue that transmission is not the important phenomenon behind culture; instead, environmental contingency, combined with genetic predispositions, serve to cause what appear to be cultural behaviours – behaviours in fact determined by information inherited through genes, thanks to a prior history of adaptive responses to similar conditions. (Tooby and Cosmides 1992) The gene analogy is not a good one in the end because genes and brains could be enough to explain culture, whereas biological phenomena could never have been explained without something like a gene (Aunger 2002).

Nevertheless, what makes memetics distinct from other formulations in the 'market' to explain cultural evolution (e.g., socio-biology/evolutionary ecology, evolutionary psychology, gene-culture coevolutionary theory) is the idea that cultural change is underpinned by the replication of particulate information packets, just like genes (Aunger 2002; Distin 2004). Most memeticists therefore would want to call memes replicators, if only to distinguish memetics from other evolutionary theories of cultural change (Aunger 2002), or because, for historiographic reasons, they feel it is necessary to keep to Dawkins' original definition of a meme as analogous to the biological replicator, genes (Blackmore 1999; Dennett 1995).

But what does replication mean? Some memeticists believe that inheritance is enough to define replication. For example, Blackmore (2000:25) argues that "as long as we accept that...information of some kind is passed on...then, by definition, memes exist." Following Dawkins, Blackmore also argues that imitation is the replication mechanism which memes use: "Dawkins said that memes jump from 'brain to brain via a process which, in the broad sense, can be called imitation' (1976:192). I will also use the term 'imitation' in the broad sense" (Blackmore 1999:6) – by which she means to include processes like reading. However, this is not a definition of imitation which social psychologists would accept (e.g., Plotkin 2000). For

most psychologists, imitation involves observation of a behavioural model – a figure conspicuously absent when reading a text.

Further, involving artefacts like books in social learning creates problems for the notion of inheritance. A typical story about meme replication through artefacts would be as follows (see e.g., Dennett 1991 or Blackmore 1999 for stories of this type): Ms. X creates a new innovation, a wadjet. Mr. Y comes along and, simply by observing the wadjet in operation, infers its function and recreates a copy of the device, even though Mr. Y has never met or spoken to Ms. X. The wadjet idea or meme has been recreated in the mind of Mr. Y from information contained solely in a sample wadjet. Mr. Y can even build a second wadjet through a process of reverse engineering, based on inferred knowledge from the sample wadjet.

This story implies an evolutionary lineage of events as follows: Ms. X → wadjet → Mr. Y → wadjet. Crucially, the story depends on memes passing from one person to the next through an artefact: in effect, memes must exist in artefacts. However, artefacts do not contain representations of themselves; instead, human minds construct such representations based on signals of the form and function of said artefacts (Distin 2004). Nothing in the form or action of an artefact expresses its function. The fact that a wheel rolls along (when pushed on its side) does not tell the world that its function is transportation. Artefacts, of themselves, belong to a dead physical world without meaning. Determining functionality is an act of interpretation by an appropriately prepared mind, depending on prior experience and knowledge about the general category to which an artefact belongs. But without knowledge of function, it is impossible to determine which features are crucial and which are incidental, when attempting to copy the artefact. For example, Mr. Y could make a wadjet out of wood, but it might not do the job for which wadjets were intended. If a copy of an artefact such as a wadjet *is* successfully made, it is thanks to the fact that Mr. Y has brought specialized knowledge to the situation (such as the fact that wadjets need to be made of materials with significant tensile strength like metal), rather than having acquired that knowledge from the object under study. The wadjet-making information does not derive from Ms. X, nor from instructions symbolically embedded in the wadjet; rather, it originates with Mr. Y, thus violating the principle quality of replication being discussed: information inheritance (Distin 2004). Reverse engineering owes more to the skill and knowledge of the engineer than to the information contained in the wadjet. Crucially, the information that makes one wadjet similar to another is based in the engineer's concept of what a wadjet is; the artefact itself has no sense of identity.

Of course a 'wadjet construction manual' could be written, but that would be a separate artefact, not a wadjet. In the case of other acknowledged replicators – genes, prions and computer viruses – the information that makes the copy similar to the source comes directly from the source: DNA uncoils to expose one strand so that its complement can be created; a protein unfolds to be reshaped into the form that makes it a prion (proteins that convert normal proteins into copies of themselves merely through contact); computer memory registers are flipped on the instructions of a computer virus. A similar model would have artefacts playing an equally active role in instructing people how to make them. But there is nothing intrinsic to an artefact that provides such knowledge. Instead, Mr. Y must bring this knowledge to the duplication process -- or infer it using background knowledge he already possesses about how the world works. Even a 'wadjet construction manual' would tell Mr. Y nothing about where to find the components, much less how to make them, nor which tools he might need, nor where to find *them*, nor in which manner to hit component A so that it fits into a slot on component B. Now imagine the manual is written in a language Mr. Y doesn't understand! All of this crucial information is implicit and must be supplied – in highly variant ways – by the wadjet-maker. So

even if we allow artefacts to contain symbolic information – if the manual could be inscribed on the surface of the wadjet itself -- the same story holds: the manual must still be interpreted by a device (like a human being) that understands those symbols.

Thus, artefacts can be the *phenotypic effects* of memes (i.e., a consequence of their action, typically in the environment), but cannot be considered memetic *interactors* (the equivalent of organisms, as the phenotypic product of genes) because they do not carry memes around inside them (Aunger 2002, in press; Distin 2004). Artefacts are thus incapable of housing memes.

This analysis demonstrates that replication must be something more than just the inheritance of information. Replication can be more precisely defined as a special relationship between a source and a copy such that four conditions hold:

- causation (the source must play some role in bringing about the conditions that lead to a copy being made);
- similarity (the source and copy must resemble each other in relevant respects);
- information transfer (what makes the copy similar to the source must be derived from the source); and
- duplication (the source and copy must coexist for some time). (Aunger 2002; Hull and Wilkins 2001; Sperber 2000; Godfrey-Smith 2000).

The question then is whether cultural reproduction of any type fulfils the criteria for replication. For example, the classic example of the face-to-face transmission of information, as in conversation, may work, as it avoids the complications of artefacts as cultural vectors. However, a further problem for the meme concept is that empirical studies of communication are not particularly sanguine about the likelihood of information replicating in the process. As the unit of inheritance, a meme should vary, so that evolution can occur, but not too much; it must be able to replicate reliably, and thus serve as the foundation for a chain or lineage of cultural inheritance. (Dawkins, 1976) But if results from laboratory-based studies of cultural transmission are to be believed, then cultural transmission is a weak replicator of information at best. The progenitor of this line of studies was Bartlett (1932), who invented a protocol much like the parlour game of Chinese whispers in which messages are passed from one person to the next to observe how message content changes along this social chain (see Mesoudi 2005 for review). A general result from these studies is that the content of social messages rapidly decays to a kind of lowest common denominator. For example, complex everyday narratives tend to be simplified by 'chunking' events into simple, stereotypical scripts (Mesoudi and Whiten 2004). What these studies suggest is that information is manipulated considerably during communication rather than being a mechanical process of replication.

From a theoretical perspective, it also seems unlikely that minds work like copying machines, given the constraints of the need to communicate information via messages (Sperber, 2000; Richerson and Boyd 2004) The message receiver may be able to reconstruct the information in the meme hosts' mind, but it is currently unknown whether there is sufficiently robust mental machinery to cause significant similarity of the reconstructed information based on the 'impoverished' signal that get transmitted.

The difficulties of thinking of communication as the duplication of mental representations leads others to a position in which the roles of phenotype and genotype are reversed: behaviours are considered replicators, and mental representations their phenotypes (Benzon 1996; Gatherer

1998). This appears to be sensible, because it is quite easy to observe behaviours which are duplicated: people are expert at mimicry. Further, the imitation of behaviour need *not* entail duplication of information in the brain: the behavioural phenotype can be duplicated through any number of mental processes. In fact, one might argue that brains are just very complex machines for replicating behaviours and artefacts: just think of people on the factory floor, repeating behaviour sequences over and over, thereby making copies of machines. In this view, there are no memes in minds, only out in the world. We are not cultural interactors, just the equivalent of RNA that enables behaviours and artefacts to reproduce time and again.

The difficulty with this position is that complex culture, and the kind of rapid cultural accumulation seen in humans simply can't be based on behaviour-copying; if it was enough to watch each other's behaviour and then mimic it, then chimpanzees and other species would have developed cumulative culture. {Tomasello et al. 1993} Presumably the design of complex technology also requires something more than fixing simple elements together in clever combinations. So technology itself counts against minds being merely the servants of machinery.

Memes thus appear to be in minds, if they exist anywhere. But what is their role in minds? Dawkins suggested that memes are 'mind viruses' in the sense that they invade minds to use them for their own purposes, regardless of whether they cause behaviour beneficial to the meme's 'host'. To the extent that a virus is defined as a (proto) life-form which appropriates existing machinery for its own purposes, then memes can only be called mind viruses if they appropriate machinery developed to replicate other kinds of information (Distin 2004: 76). That is, for memes to be mind viruses, there must be mind 'genes', the bits of information which the brain was *designed* to replicate. But the brain has not evolved primarily to replicate information; in fact, most organisms aren't social and can't learn from social interaction. Rather brains evolved to guide the production of adaptive, flexible behavioural responses to evolutionarily significant problems. (Tooby and Cosmides 1992; Llinas 1999).

Still, parts of the human brain *are* devoted to communication, a process in which one person attempts to infer what is in the mind of others. Arguably, then, in those species which can learn socially, something like words might be 'mind genes'. So either memes do more work than biological viruses to replicate themselves, because the mind was not designed to replicate bits of information like them, or memes piggy-back on the linguistic system. Either way, Distin (2004) points out that Blackmore (1999) and Dennett (1995) tend to conflate memes-as-thoughts with memes-as-things-to-think-with. She uses the philosophical notion of a propositional attitude to clarify the distinction: memes are just information like propositions, but thoughts can reflect on this information, such that we form attitudes toward that information, like beliefs or fears or desires. Blackmore and Dennett thus fail to distinguish between memes and attitudes towards memes, which leads them to believe that that there is nothing to the mind but a collection of memes (e.g., Dennett 1991:210). From this false proposition, Blackmore and Dennett draw the incorrect inference that all of culture is composed of memes, since memes are just socially communicated ideas. However, if memes are mind parasites, they must be thoughts that use independent psychological machinery to get themselves replicated; by definition, they cannot be all there is inside one's head. The epidemiological view of memes is thus inconsistent with the claim that the mind is a complex of memes and nothing more. In such a case, we can only think with memes, and not 'rise above' them, through meta-representational thought which represents our own thoughts to ourselves. There must be innate structure in the mind prior to social learning which influences which information will be

accepted through social learning; mental filters exist which are not made of memes that keep out 'mind viruses' (Aunger 2002).

This perspective limits the role of memes in culture. They cannot be all of culture, much less all thoughts (some of which must be internally created rather than socially learned). If memes must be parasitic on thinking, then memes are unlikely to be the fundamental explanation of cultural evolution. Further, if most forms of communication do not qualify as a replication process, then some other kind of process is responsible for most of what we commonly call cultural learning. Memetics must be buttressed by another kind of explanation for cultural change which accounts for the process which memes parasitize.

These difficulties have meant that memetics has not yet generated a distinctive body of research. Without a more precise definition of meme, it is difficult to develop claims which are specific enough to be contestable with alternative theories of social learning. Why can't the voluminous literature on public opinion, based on social surveys, qualify as memetics, for example? Just calling whatever we learn from others a 'meme' does not distinguish memetics from other brands of social psychology; indeed, calling what we learn a 'cultural trait' would have greater authority and cause less controversy because that term doesn't make a claim about exactly *how* social information was learned. If we knew that social learning typically involved information replication, a case could be made; however, even though a lot of work concerning how social learning occurs has been done, it is limited to showing how one mechanism of learning (e.g., imitation) differs from another in terms of the speed and accuracy with which new things can be learned from modelled behaviour in various contexts (e.g., Whiten and Byrne 1988; Heyes and Galef 1996; Hurley and Chater 2005; Laland and Bateson 2001). Similarly, the diffusion of innovations literature (e.g., Rogers 1995), or the investigations into information transmission through social networks (e.g., Marsden and Friedkin 1993; Rosnow et al. 1986; Strang and Soule 1998), or the relatively few field-based studies of cultural transmission (e.g., Hewlett and Cavalli-Sforza 1986; Aunger 2000), might be argued to qualify as examples of empirical memetics, even though none of them claims to be investigating memes per se. Cultural transmission studies have even been conducted using readily available databases documenting human communication patterns: electronic chat groups and email lists (e.g., Best and Pocklington 1999). While all of these literatures are interesting, they remain tangential in that they do not establish that their subject matter is information chunks replicated via transmission between people.

The primary difficulty with calling any of these literatures memetics is that no one has yet observed information replication happening directly, inside people's heads. What is needed to confirm that social learning involves information replication is information about brain mechanisms for information acquisition, storage and management. Only in this way can we determine whether any instance of imitation is an act of information replication, as defined above. Even brain scanning techniques are not currently able to achieve that goal. As a result, no study has been able to directly address the central question of whether information replicates in the process of cultural transmission. Meanwhile, the use of proxies – phenotypes of various kinds -- seems inevitable (although there is the possibility of testing meme-based hypotheses using computer simulation models of populations of artificial agents, which some have taken up with some enthusiasm, particularly to investigate the role of imitation and intentionality in communication -- e.g., Conte in press; Hales 2002).

The concept of a meme as a unit of cultural transmission has thus proven very popular. But despite considerable enthusiasm for the meme idea in a variety of fields, much of the literature

on memes continues to be given over to arguing about which particular theoretical conception of memes is most useful; the field of memetics is marked by a startling absence of empirical research. This is because, as we have seen, there are many difficulties with the meme concept. While it is likely that the term 'meme' will continue to be widely used, it may simply become an everyday term for socially learned ideas and values, rather than the foundation of a new social science -- a role the 'culture' concept served for anthropology or 'power' for political science.

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