

HOW TO CATCH A MEME.

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1. Introduction:

As Robert Aunger rightly asserted in *The Electric Meme*, “No one knows what a meme is” (2002:21). This assertion is still valid four years later. However, the word “meme” itself is encountered with increasing frequency in the specialized literature, and it has even gained currency status in some anthropological and philosophical popularization works that take its meaning for granted. In view of this, it is both timely and legitimate to raise the question of whether memetics is an intellectual fad that claims to know what fads are and how they work their way through populations, or whether it is based on a genuine scientific insight that opens up novel perspectives on some fundamental aspects of the human psyche and social life, and deserves further serious scrutiny. But before taking steps toward this goal a few tentative clarifications are in order.

“Meme” could be characterized as a notion by default in the sense that, to some, it is because there is no better way of explaining a certain range of observable phenomena (such as arbitrary cultural changes or maladaptive beliefs and behaviors) that we have to assume the existence of virtual agencies able to account for these phenomena. Memes are not the first virtual agencies imagined by *Homo sapiens (sapiens?)*. The ancient gods or spirits and the modern signs (or *semiosis*) can be called upon to perform similar functions. As far as archaeology and philology allow us to peek toward the past, there has been for a very long time a pervasive, intuitive assumption that some forces alien to purely human agencies interfere with the business of everyday life in a manner that is intimately woven with the human psyche, albeit somewhat alien to it [Note 1].

The discovery of the genome and its role on determining adaptive behaviors has answered a host of questions in this respect but there is a considerable left-over, notably the diversity of cultural traditions, that appears to require a different explanation. Hence the emergence of a notion by default, symptomatically coined with explicit reference to the gene. Hence also, the diversity of phenomena that purport to populate this new “memetic” category and the variety of metaphors that attempt to capture its nature (that is, to categorize this new category through analogies with parasites, viral infection, symbiosis, noise, etc.).

But as long as the ontological status of the hypothetical memes is not specified, at least heuristically, it is impossible to demonstrate that they do not exist, not even that they are the only possible explanation of the phenomena for which they are claimed to account. However, the fact that there is no direct evidence of what exactly a meme is, and that it is a purely virtual construction, is not a sufficient ground for dismissing it entirely.

Many important advances in scientific knowledge have started with such constructions. An often cited example is the idea of an atom first conceived at least twenty-five hundred years ago as the ultimate component of everything, which cannot be further divided (as the etymology of the name indicates). These little virtual spheres were later

endowed with a variety of hooks in order to explain why they combine and hold together to form individual bodies. Then, when it became obvious that they were not ultimate components, they were conceived as miniature planetary systems until this metaphor collapsed in view of new experiments and models. From the vantage point of current scientific knowledge, one may find the earlier images of the atom naïve and misplaced. Nevertheless, they were positive steps in creating the cognitive dynamic that led to contemporary nuclear physics [Note 2]. On the other hand, notions such as the *ether* or the *phlogiston*, possibly the Saussurean *langue* and the Chomskyan *universal grammar*, which were also constructed by default, did not stand the test of scientific experimentations [Note 3]. But, in order to achieve such results, notions by default must first be expressed in the form of falsifiable hypotheses. This paper attempts to consider the conditions under which memes could be taken out of the realm of metaphors and philosophy, and submitted to rigorous testing. This will require some further heuristic clarifications and, possibly, simplifications. It is meant to feed and, perhaps, advance the debate on memes rather than propose definitive solutions.

2. Conceptual clarifications:

- (a) There are two forms of the meme hypothesis that are not always distinguished in the memetic literature: the weak hypothesis, which broadly defines memes as units of imitation (that is, whatever can be imitated and consequently can spread both vertically and horizontally to form cultural assemblages endowed with various degrees of inclusive fitness for the individuals and cultures that foster these particular memes), and the strong hypothesis that claims for memes the status of autonomous agencies who replicate on their own in brains (in the form of algorithms or cellular automata who take over the resources of the brains they invade and manipulate these resources for the sake of their own reproduction through replication irrespectively of the well being of their hosts). The two hypotheses, which are implicit in the seminal paragraph by Dawkins (1976:), are usually mixed and create confusion because of the ambiguities attached to terms such as “variation” and “selection” which are both open to anthropocentric interpretations that bias their Darwinian sense. Natural selection and adaptation do not mean deliberate choice among more or less functional alternatives. Semantic slippage occurs between the technical terminology of evolutionism and the language of folk-psychology.

The weak hypothesis has spread mostly among cultural anthropologists (and to a much lesser extent among sociologists) probably because it provided them with an evolutionary metalanguage that could describe cultural changes at a time when the discipline was in crisis with the rise of sociobiology. The notion of cultural units of transmission with variations selected by their environment (cultural niches) offer a way out of genomic determinism as the universal explanation of social behavior. Note also that the weak hypothesis meets earlier efforts to foreground imitation (Tarde) or

epidemiology (Cavalli-Sforza & Fieldman) for interpreting the dynamic of cultures.

The strong hypothesis has captured the imagination of philosophers (viz. the immediate, incautious endorsement of Dawkins's tentative idea by Nicholas Humphrey reported by Dawkins in *The Selfish Gene*). It provided a discipline struggling to maintain the relevance of its historical traditions with a chance to gain widespread media visibility through provocative books. But whatever the skill of the arguments, the strength of the metaphors and the effectiveness of the slogans, philosophical sensationalism is hardly sustainable for a long period of time. Self-proclaimed revolutions in the way of thinking are short-lived if they do not lead to actual historical or technological changes. This is not meant to dismiss the strong hypothesis but to underline that it has not been yet the object of a serious scientific inquiry.

The infection metaphor carries an implicit opposition between exogenic and endogenic. Memes are supposed to come from the outside into the brain of individuals. But most of the time the origin is another brain, and even if some memes can be shown to originate in natural patterns of sounds (often produced in animal's brains), most memes have to originate in a human brain. Therefore, we should look into the conditions under which such algorithms could emerge from brain activity.

Meme versus gene control. If we accept that the genome of an organism controls its behavior, it is obvious that this control takes place outside of the conscious awareness of the behaving individuals (mate choice, maximization of reproductive fitness, etc.). Intentionality is a first legal and religious concept, then it became a philosophical construct. The centrality of intentionality in social life should not blind us to the fact that most justifications for an action are ex-post-facto reconstructions.

There is some ambiguity as to what kind of unit is a meme. What is meant by "Information unit"? A bit? A sequence of bits? Some have spoken of "Memplex". A thought (but what is that?), a discourse, a recipe, a narrative?

A roadmap toward memetics or not.

It seems obvious that addressing the problem of finding some entity that would correspond to what has been variously characterized as a meme in the philosophical literature is unrealistic. It is indeed very unlikely that any philosopher (or anthropologist) has a sufficient competence in the array of specialties from neurochemistry to brain physiology to tackle empirically the complex problem of if, what, where and how of memes. On the other hand, it is equally unlikely that any experienced and reputable researcher in any

domain of the brain sciences would be prepared to engage his/her reputation and commit research funds to chasing through the neuronal jungle a rather ill-defined philosophical notion. For those who think that this goal is nevertheless worthy of attention and efforts, it is more practical to take a different approach. The purpose of this paper is to outline a possible roadmap toward a better understanding of what a meme might look like if its virtual definition and function actually correspond to any embodied structure and process.

In a nutshell, the proposed heuristics first makes the assumption that all the knowledge resources needed to better define and possibly solve the meme conundrum are already available but are distributed among a large number of disciplines, sub-disciplines and specialties which are quite often mutually impenetrable in spite of some productive, but very limited interfaces. If this is the case, finding a way to connect and pool these resources could be the goal of memetics, providing that this goal is ultimately to formulate the meme theory as a set of falsifiable hypotheses. The method would then consist of mining these resources according to a scientifically sound protocol and to engage in the meta-analysis of the relevant data. But before undertaking this, the scope of the inquiry must be tentatively specified by identifying some potential targets. The following is a heuristic list of such possible targets that is open and that could be refined with the collaboration of some willing neuroscientists and psychologists.

First, if there is a general agreement that for the notion of meme to be operational memes must be described in terms of brain architecture and processes,

A good research strategy seems to be first to identify the functional areas of the brain which a hypothetical meme would likely involve, then to find out whether pathological or experimental disruptions of these functional areas have consequences on behaviors that can be assigned to memes. But before engaging the problem experimentally, a meta-analysis of the clinical literature should be undertaken.

Birdsongs.

Research on the neurological basis of birdsongs and their transmission is a domain of scientific inquiry in which the notion of meme has acquired an operational status. Even if most of this research antedates by several decades the reformulation of the memetic hypothesis in this particular context, the fact that a sufficient body of research since the early 1990s has used the general concept of meme to articulate both its research program and its theoretical interpretations provides a ground for re-analyzing in these terms past studies as well as new studies that use other models than those offered by memetics. Undertaking a meta-analysis of the results obtained in the domain of birdsongs makes all the more sense since there are many parallels between the ways in which birdsongs and human languages are acquired: vertical and horizontal transmission, specialized brain areas, and periods of receptivity due to neuronal maturation or hormonal influence. In addition, both birdsongs and human languages demonstrate similar brain capacities of storing exogenous algorithms in memory, translating these algorithms into motor programs, creatively recombining their elements, and integrating their performance into adaptive social behaviors. Whether such homologies are due to evolutionary convergence or have been conserved from a common ancestor is a moot point as far as memetics is concerned.

Another advantage of scrutinizing the results of research done on birdsongs is that experimentations with live populations with a fairly fast generational turnover as well as the possibility of examining the microanatomy and neurochemistry of the brain at various stages of development have provided an impressive wealth of data that cannot be matched by research on primates, and, naturally, humans. [Australian cell phone rings] [Himalaya speciation]

Languages

A domain of inquiry that should be of prime interest to memetics is language not only because it is the best example of the synergy of a dual inheritance (genetic and cultural) but also because most memes use language as a vehicle to access human brains.

However, this issue has surprisingly been addressed only timidly by mainstream memeticists probably because the epistemological space is occupied by a major linguistic paradigm which has become increasingly insecure in its search for evidence that language is essentially the result of a genetic mutation (the hopeful monster theory). The proponents of universal grammar in its many avatars are excessively territorial and well trained in the rhetoric of sarcasm or contempt. Other linguistic paradigms such as functionalism and the theory of linguistic iconicity are equally threatened by an approach that would raise the possibility that languages are explainable by memetic principles. Symptomatically, the first reaction to Terrence Deacon's *The Symbolic Species* (1997), in which a memetic theory of language is highlighted (p. 110-115), was a brief, dismissive review by a Chomskyan (Poeppel 1997).

The idea of language as an organism predates the development of memetics and has its roots in Darwin's work itself (McMahon 1994). This approach has given rise to a theory of language origin according to which languages are construed as memetic parasites that have adapted to human brains with which they have co-evolved. Deacon (1997:112) mentions as his source the work of Morten Christiansen, a connectionist psycholinguist from Cornell University who currently pursues this line of inquiry (e.g., Christiansen et al. 2002). Another focus of linguistic research based on memetic assumptions is located at the University of Leiden in the department of descriptive and comparative linguistics. Indo-Europeanist Frederik Kortlandt is the author of a seminal, albeit somewhat cryptic paper that is often quoted by the school: "A parasitological view of non-constructible sets" (1985). His approach is being developed by George van Driem, a specialist of Himalayan languages (2001). It should be noted that all this applies to oral languages, not to the derived written forms which are extremely recent in cultural evolution and raise their own specific memetic issues.

All exponents of this stream construe the language parasite as a symbiont that has proved to be adaptive for the humans whose brain resources it exploits. However, Kortlandt interestingly claims that this symbiont, because of its high rate of variations, can be truly adaptive only for relatively small groups of humans who can keep up, and adjust to its constant changes, an essential feature of language to which descriptive and comparative

linguists are very sensitive. It may be worth noting, in this respect, that the Swiss Indo-Europeanist Ferdinand de Saussure (), who is credited for having initiated the structuralist paradigm, actually expressed repeatedly his puzzlement at languages, going as far in his unpublished notes as characterizing language as being “like a duck hatched by a hen”, thus emphasizing the kind of alien biology that the strong memetic hypothesis suggests.

Narratives

Many memes (beliefs, recipes, theories, etc.) come in the form of narratives that may be verbal, visual, or multimodal like in performances. All narrative can be expressed in a condensed form that reduces it to its main agents and their functions. All narrative can be shown to implement a rather simple algorithm. [Note]. Furthermore, it has been suggested that the universality of this algorithm is cognitively grounded in the primal schema of predation according to which a lack, a loss or a need is resolved by an agent who has to overcome obstacles in order to achieve its goal [Note]. If this could be demonstrated to be the case, it would provide a sound basis for the relative facility with which the most ill-adaptive narratives (possibly generated by a random process of variations) can plug themselves into the motivational and motor resources of the human brain to the point of molding behavior.

Memes and brains

Given the state of knowledge in the cognitive neurosciences (e.g., Gazzaniga 2000, Hyman et al. 2005, Pfaff 2006), and assuming that a meme is a non-genomic algorithm embodied in a physical (neuronal) substrate able to influence human behavior, it seems possible to assert the following:

- A meme cannot be associated with a single neuron.
- A meme cannot be a mere transient, random pattern of firing.
- A meme must be constrained by the functional architecture and circuitry of the brain.
- A meme must effectively hijack the resources of a complex neuronal substrate able to sustain a complex behavior that can repeat itself.
- A meme must exploit, as a point of entry, both a sensorial pathway and the plasticity of the cortex.
- A meme must somewhat overcome the frontal control that restrains compulsive imitation.
- A meme must be stored in the neuronal substrates of semantic memory, long-term memory and procedural memory.
- A meme must involve some control over the motivational and motor functions of the brain.

As a consequence of the above features, which undoubtedly could be expanded, a meme must be selectively impaired by specific dysfunctions of functional areas and circuitry of the brain. This offers an opportunity to determine whether there are some memetic properties exclusively associated with some particular brain functions and to provide some

tentative targets for investigating the hypothetical modes of penetration and exploitation of brain resources by exogenous algorithms.

The clinical literature concerning apraxia, for instance, suggests that some categories of gestures can be selectively impaired by a brain injury while others are not affected. The usually acknowledged categories of gestures include deictic gestures (e.g., showing, indicating), wired-in behavior (e.g., withdrawing, catching), culturally learned gestures (e.g., etiquette, insult, sign languages, intonations). The latter can probably be confidently construed as memes since they are culture-dependent and show constant innovations. A similar range of selective impairments is observed in the various forms of aphasia and bear upon semantic, articulatory, lexical, semantic, and narrative competencies. The re-analysis of symptoms associated with degenerative diseases, Alzheimer, and diverse forms of dementia *might* suggest what it takes for a culturally learned behavior to survive in the brain environment in which it has settled. The problem is, of course, to find a way to disentangle wired-in behavior from their memetic modifications and to distinguish the latter from variations due to adaptations to environmental constraints.

Only a meta-analysis of the existing clinical and experimental literature on the one hand, and of the abundant research concerning the functional anatomy and physiology of the human brain, on the other, can provide a ground for formulating some falsifiable hypotheses regarding the neurological status of memes. In other words, short of devising grossly unethical experiments, it is the only way to decide whether there are indeed some behaviors that cannot be explained otherwise than by the exploitation of neuronal resources by exogenic agencies and to understand how this is possible and to which extent such a symbiosis with parasitic algorithms can be considered neutral or adaptive, or is simply a maladaptive cost carried by the evolved adaptive plasticity of the human cortex. But before undertaking a meta-analysis, it is necessary to define some heuristic targets both among pathological symptoms and neuronal systems that are plausible loci of memetic exploitation. Whether or not such a strategy will allow the “capture” of the elusive meme *in vivo*, or will demonstrate its cognitive illusory nature in the realm of fallacious arguments, only trying can tell.

Conclusion:

Memetics introduced a tantalizing, flickering epistemological vision, a conceptual equivalent of the Necker cube in visual perception. Now you see memes everywhere, now you do not see them anymore. Some concluded early that memes are a cognitive illusion. But the flickering is not. Is it because it is difficult to contemplate a counter-intuitive theory that our cognitive apparatus tends to flip back to a more familiar set of assumptions after being momentarily taken by the restructuring force of a powerful metaphor? Is it because memetics, in its strong hypothesis version, is so informative that the brain recoils after having been aroused by the first assault of information but cannot assimilate the flood that threatens to carry away well trodden neuronal tracks? Of course counter-intuitiveness is not a sufficient criterion for the truth of a theory, but neither is intuitiveness. The former is high on information, the latter is relatively low. Not so long ago, poltergeists, ether, phlogistons and the planetary model of the atom were put out of business through compelling

experiments. The stakes are much higher in matters concerning memes because demonstrating the operational reality of memes would force upon us a truly Copernican revolution, and open the way to manipulations as promising and as ethically ambiguous as the unlocking of nuclear energy and the breaking of the genetic code.

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