

Draft - Please do not quote without author's permission

## **MEMES VERSUS SIGNS**

**On the use of meaning concepts about nature and culture**

**Erkki Kilpinen**

University of Helsinki

Helsinki

Finland

Address for ordinary mail:

**Dr. Erkki Kilpinen**

**Research Unit Sociology**

**P. O. Box 10**

**FIN-00014 UNIVERSITY OF HELSINKI**

**Helsinki**

**Finland**

**e-mail: [erkki.kilpinen@helsinki.fi](mailto:erkki.kilpinen@helsinki.fi)**

## **Memes versus signs:**

### **On the use of meaning concepts about nature and culture [\*]**

Repetition, for a god, is a sign of majesty,  
necessity's seal. [\*\*]

### **Introduction: Where is Tom Sebeok Now that We Need Him?**

The title's question is not in the least meant as jocular. I am not making light about Thomas A. Sebeok's passing away in 2001. My purpose is to remind semioticians about the void that his passing away left in the theoretical edifice of the discipline. He understood semiotics as a study that simultaneously and with a unified conceptual apparatus studies both nature and culture. An idea about unification of these domains of research is currently raising its head at some other quarters, and it seems to be gaining credence. The idea in question is the study of so-called 'memes', those elementary cultural phenomena that are taken to be analogous to genes in the study of biological nature. The thesis of this article is that this study, so-called 'memetics' only re-invents an old wheel, the subject matter of semiotics. Furthermore, in those respects where the new approach deviates from the old one, it turns out to be an inferior alternative to semiotics. Nevertheless, although apparently an inferior alternative, 'memetics' seems to be about to steal the show from semiotics in the study of nature, culture, and their possible mediation.

Sebeok's great achievement was in performing what might be called a modern synthesis in semiotics. This expression stems from the history of biology. Biologists mean by modern synthesis the accomplishment of R. A. Fisher and others in the early 1930s, when they discovered and demonstrated that Darwinian evolution and genetic evolution do not contradict each other, as had been the received view for a while. Quite to the contrary, those two bodies of thought actually give support to each other. Darwin's theory of natural selection holds good, because the genetic theory holds good, and vice versa. In a similar way, Thomas Sebeok demonstrated that the study of nature and the study of culture can give support to each other when semiotic concepts are used as their mediators. Not any old sign notion will do, however, what is needed is a triadic sign-concept that might be called 'prope-linguistic', to paraphrase an expression of C. S. Peirce's. This means that the concept of sign is not developed from language or linguistics (as is the case in Saussurean semiotics, also known as semiology), but rather vice versa. Sebeok (2001b, p. 180) saw in biosemiotics his 'principal contribution to general semiotics' and maintained throughout his

semiotic career that human language has not developed out of animal communication by signals, but has other evolutionary roots. Accordingly, his outstanding contribution is not merely in outlining a research programme for semiotics, but in bringing its general theory a long way toward systematization. I speak about ‘the’ general theory of semiotics in the singular, and do so advisedly. My opinion is that general semiotics, based on the triadic theory of meaning, adumbrated in the 17<sup>th</sup> century by Jōao Poinot, independently discovered and further developed by C. S. Peirce in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, and systematized by Sebeok during the latter half of the 20<sup>th</sup> century, is not one approach among many in semiotics. It is *the* general theory of semiotics. To say this is not to belittle other possible approaches or their importance. No genuine science can thrive by general theories only, it needs also particular theories. But my point is that the Peirce-Sebeok approach to semiotics is so comprehensive that it embraces all the others, because it recognizes no such thing as a non-sign (Fisch 1978; 1983). But if this is accepted, a corollary follows: There is no such thing as non-Peircean (or non-Sebeokian) semiotics, just as there are no non-Einsteinian physics or non-Darwinian biology. Your biology either is Darwinian, or it is not biology (Mayr 1997). Just so is your semiotics either compatible with the Peirce-Sebeok approach, or it falls outside the purview of semiotics in any proper sense of the term. This compatibility between approaches comes quite easily, however, because the frame of reference in general semiotics is just as comprehensive as the study of life itself (Peirce CP 6.322; Sebeok 2001a; 2001b).[1]

A first step toward a semi-official systematization of semiotics was taken in 1984, when Sebeok, together with some close collaborators, published ‘A semiotic perspective on the sciences,’ a sort of manifesto about how leading semioticians then saw the relations between the various sciences. They stated that they reject ‘the two-cultures view of scientist and scholar’ (Anderson et al. [1984] in Sebeok 1986, p. 26) and meant by this that the natural sciences and humanities do not constitute two separate intellectual spheres. They rather constitute ‘overlapping modalities,’ as the idea was stated in the above position paper (*ibid.*). This is most agreeable, but it seems that this suggestion for ‘a new paradigm’ for the study of nature and culture has remained an in-house affair in semiotics. The reason to say so was alluded to above. It is not semiotics but the rivalling approach memetics that has aroused awareness of such possible overlapping modalities, during the last ten years or so. This approach is also bringing the natural and cultural disciplines closer together, but in such terms that are either trivial or downright misleading, when considered from the viewpoint of semiotics. Instead of bridging the cleavage between nature and culture, memetics leaves it gaping. It also appears to have no cognizance about the existence of semiotics, but I am afraid that a part of the blame for this negligence is to be laid at semiotics’ own door.

### Enter the meme

Thirty years ago the British zoologist Richard Dawkins published a book for which he became famous, *The Selfish Gene* (1<sup>st</sup> edition 1976, 2<sup>nd</sup> 1989). That book belongs to the gene-centred turn that was taking place in biology about that time. It argued that the gene is the principal unit of selection, not the biological phenotype, as had been the opinion before the turn. What the natural selection selects are genes; phenotypic individuals, like human beings, are only carriers or ‘vehicles’ of genes. Genes, for their part, have only one purpose in life, to replicate themselves. As a by-product of this continuous replication, life produces also its multifarious individual phenotypes.

Dawkins was aware that his chosen title might invite misunderstandings. When a discussion about selfish genes is announced, it is all too easy – for hasty readers – to jump to the conclusion that *people* are asserted to be selfish, and that their genes make them so. Such a risk was increased by Dawkins’s favourite characterization of genes as ‘master programmers’ (p. 62 etc.), by which he meant that they program their own behaviour, but not ours. To stall suspicions about genetic determinism, Dawkins remarked, for example, that ‘we effortlessly defy [our genes] every time we use contraception’ (p. 271), and so on. Furthermore, I have the impression that his introduction of memes which occupies an entire chapter (ch. 11) in the book, was also, at least partly, meant to ward off misgivings of determinism. He introduced the new idea as follows:

I think that a new replicator has recently emerged on this very planet. (...) It is still in its infancy, still drifting clumsily about in its primeval soup, but already it is achieving evolutionary change at a rate that leaves the old gene panting far behind.

The new soup is the soup of human culture. We need a name for the new replicator, a noun that conveys the idea of a unit of cultural transmission, or a unit of *imitation*. ‘Mimeme’ comes from a suitable Greek root, but I want a monosyllable that sounds a bit like ‘gene’. I hope my classicist friends will forgive me if I abbreviate mimeme to *meme*. If it is any consolation, it could alternatively be thought of as being related to ‘memory’, or to the French word *même*.

(Dawkins 1989, p. 192; original italics).

Incidentally, since the time of Dawkins’s writing it has turned out that he was not the first man out in search for such a conceptual analogy between nature and culture. A curiously like-sounding German term, ‘*Die Mneme*’, had been coined a hundred years earlier by an Austrian

physiologist, Ewald Hering, and the term seems to have enjoyed some publicity for a while.[2] There have been also other suggestions for such overlapping terminological analogies, but Dawkins's term and its underlying idea have gained the widest hearing, when scientists and scholars recently have pondered the distinction between nature and culture, and what to do about it.

Dawkins rehearsed and extended his argument in his next major work, *The Extended Phenotype* (1982), the book that he has called his *chef d'oeuvre* thus far. In that work he maintained even more explicitly that the 'meme's-eye-viewpoint' is the right viewpoint for the study of culture, just like the 'gene's-eye-viewpoint' opens up the evolutionary secrets of nature. As for biological and cultural phenotypes, such as you and I, their role is to act as carriers for biological genes and cultural memes. Memes (just like genes) exist for their *own* benefit, but not for their carriers' benefit.

Dawkins gained an important convert to his idea in the eminent American philosopher of mind and cognitive scientist, Daniel C. Dennett, who has argued for it in various writings. Dennett joined the discussion with an article entitled 'Memes and the exploitation of imagination' (1990), which he published in *Journal of Aesthetics and Art Criticism*, to familiarize a humanist readership with the meme idea in a positive sense. Dennett asserted that 'Human minds are themselves to a great degree the creations of memes, [so that] infestations of memes [play] a major role in determining who or what we are' (1990, p. 133). Dennett has shown serious commitment to the idea, as he in the next year incorporated its principle as a part of his argument about the emergence of the human mind, in *Consciousness Explained* (1991, chapter 7, sections 6-7). In his next major work, *Darwin's Dangerous Idea*, he was the first to pose explicitly the question, 'Could there be a science of memetics?' (1995, p. 352),[3] and he has been a regular contributor to this discussion also later on (e.g., Dennett 2000; 2001).

Dennett's above question about the possibility of systematic memetics began to receive answers, explicit or implicit, in the late 1990s from authors such as Brodie (1996) and Lynch (1996). The most ambitious and influential contribution to this discussion is no doubt *The Meme Machine* (1999), by Susan Blackmore. The book's title is borrowed from Dawkins, Blackmore credits him and Dennett as her chief inspirers, and announces the volume to be a new opening to the study of human culture and social life. Most critics do not seem to agree that a paradigm change in social sciences is hereby imminent. One reason for their scepticism is that Blackmore's text shows considerable ignorance and nonchalance about what the social sciences are all about, and what has been going on in them (Jahoda 2002). Another weakness in her argument turns out to be even of a 'classic' kind. As Dawkins (1989, p. 192) originally introduced the meme, he explained that 'Just as genes propagate themselves in the gene pool by leaping from body to

body via sperms or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation.’ In a broad sense, yes, and it was all right to say so for original introductory purposes. Blackmore, however, gets carried away by the idea of meme movement as imitation, so that she joins those theorists (Gabriel Tarde etc.) who have seen in imitation the basic form of human action and social life. These trains of thought have always led to serious contradictions. Imitation simply cannot be a basic form of human action, it has to *presuppose* something to be imitated, a more basic kind of action. As George H. Mead (1934, p. 59) noted in his time and as Richerson and Boyd (2005, p.12) remind in our day, if human action were mere imitation, this would excise its connection to the surrounding environment. And that would be an unpardonable sin, from an evolutionary viewpoint at least, because environment precisely is the ‘harsh judge’ (Dawkins) that decides whether a being with its genes and memes is to survive or not. Indeed, the idea that a phenotype in and by its doings is ‘extended’ (and thereby intrinsically related) to its environment is the basic idea in *The Extended Phenotype* (1982) by Dawkins, Blackmore’s mentor and role model. Other authors, like Sterelny (2003), maintain even more outspokenly that thought takes place in a ‘hostile world’ – and this hostility precisely is the reason why we have thought in the first place. Accordingly, I am tempted to agree with the eminent psychologist Gustav Jahoda (2002) to the effect that what is convincing in *The Meme Machine* is not new, and what is new is speculative and questionable.

For better or worse, however, the meme concept appears to have established itself in contemporary discussion. The prestigious philosophical journal *The Monist* recently devoted a theme number (July 2001) to ‘The Epidemiology of Ideas’, and the seven contributions to this symposium all make some use of the concept. A good overview of the meme discussion up to 2000 is provided by a volume edited by Robert Aunger, *Darwinizing Culture* (2000), where there are arguments pro and contra about the usefulness of the concept, and today there is also in the Internet an electronic *Journal of Memetics* (<http://jomedit.cfpm.org>).

However, one does not have to be particularly well-versed in semiotics to receive the impression that we have been shown an old hat. The meme, whatever its eventual merits and demerits, is no new thing but the old semiotic idea of sign, in a somewhat new clothing, and re-introduced with some bombast. It is reason for amazement that in the literature just mentioned there is not a single reference to the sign-concept, let alone semiotics, not even in indexes of terms. The reason to say that this is amazing is the fact that it never has been any foreign idea in semiotics that signs (or memes, if you like), in a sense can lead an independent life of their own. One of C. S. Peirce’s early characterizations (EP 1:54; 1868) puts the matter as follows: ‘since man can think only by means of words or other external symbols, these might turn round and say: “You mean

nothing which we have not taught you, and then only so far as you address some word as the interpretant of your thought.” This speaks the very prose of memetics, only the crucial term excepted, but the anthropomorphic tendency included. One can go even better and remark that the notion of sign (meme) as a kind of invader to the human mind has also been part and parcel in semiotics:

You hear a new slang word: you never ask for a definition of it; and you never get one. You do not get even any simple example of its use; you only hear it in ironical, twisted humorous sentences whose meaning is turned inside out and tied in a hard knot; yet you know what the word means much better than any abstract definition could have informed you. (Peirce CP 7.447)

Thus, semiotics and memetics apparently talk much about the same thing, so that the subject is worth closer enquiry. As I set out to pursue it, my leading hypothesis is the following: Were Peirce around today to hear what the meme scholars have to say, he would not just answer that they are re-inventing his old wheel. He would add that the newfangled meme is an *underdeveloped special version* of his concept of sign.

Why so? Because memetics, with its notion of universal replication, recognizes only one of those dimensions that constitute signs, according to the general theory. It is aware of the *interpretive* dimension, but has little if anything to say about the *representative* dimension. Or, to make the point in Peirce’s terms, memetics recognizes the relation between sign and its interpretant(s), but keeps silent about sign and its object. This situation is thus curiously inverse to the one that prevails between Saussurean semiology and general semiotics. General semioticians have a hard time in convincing Saussureans that it does not suffice to treat the signifier-signified dimension only; the sign’s interpretant needs to be included. Some Saussureans answer that their classic does have an explicit concept of *articulation* (Heiskala 2003), but do not seem to realize that this precisely renders their doctrine but a special case of the general theory. Articulation depends on human initiative, whereas the general interpretive process takes place without asking our permission (Ransdell 1992). If Peirce is to be believed, ‘a sign which should make its interpreter [i.e., a human individual] its deputy to determine its signification at his pleasure would not signify anything, unless *nothing* be its significate.’ (EP 2: 394; original emphasis) Accordingly, meme theorists’ favourite term imitation is a sub-case *under* the interpretive phenomenon that in semiotics is expressed by the technical term ‘interpretant’, but it does not come close to exhausting the latter concept.

In order to demonstrate that these theses hold some water, I proceed as follows: I first give a comparative discussion about memes and signs, to show what exactly they have in common and where they differ. Then, toward the end of the article, I discuss whether a rapprochement between the approaches might be desirable and possible. I am not much persuaded by meme enthusiasts like Blackmore and others, but in the work of the term's original introducers, Dennett and Dawkins, I perceive a knowledge interest that is not far from that of semiotics. As the last point of this article I eventually have to conclude that a rapprochement is not imminent unless semiotics also recognizes its desirability and does something about it. In a sense it is pardonable that neighbouring theorists have passed by semiotics, in their reinvention of sign in terms of meme, because the theoretical house of semiotics apparently is not in a perfectly good order at the moment. I propose that it might be useful to reconsider the traditional manner of somewhat naïvely defining semiotics as 'the study of signs,' if we wish to establish contact with outsiders, such as the meme theorists. Such contact, furthermore, will be necessary if semiotics is not to remain a marginal pursuit but wishes to say something of general relevance.

### **Memes and signs as replicators**

Before a comparison is possible, it is useful to ask what kind of things memes *are*, after all? Genes are tiny structures of amino acids, invisible to the human eye, but what about memes? According to Dawkins's original definition, memes are much easier to perceive unaided, they are things like 'tunes, ideas, catch-phrases, clothes, fashions, ways of making pots or of building arches' (1989, p. 192). Again we discover a likeness in regard to signs, because Peirce mentions very similar examples in 'pictures, symptoms, words, sentences, books, libraries, signals, orders of command, microscopes, legislative representatives, musical concertos, performances of these, in short, whatever is adapted to making mental impressions.' (Peirce MS 634; as cited by Sebeok 2001b, pp. 8-9) The first point to be gathered thus is that the ontological status of signs and memes is quite similar, so that comparing them is not tantamount to adding apples and oranges.

The meme notion stems from the principle of universal replication. Genes, we recall, exist for one purpose only, for reproducing themselves. They do produce also the phenotypic individual to act as their vehicle or carrier, but they do not exist for its benefit, they exist for their own benefit. Dawkins drew a bold inference by analogy from this and proposed something similar to hold also for the basic cultural units. In so proposing he put forward an idea that is traditional in semiotics.

‘A symbol is something that has the power of reproducing itself,’ Peirce once says (NEM 4, 260), so that ‘It is only out of symbols that a new symbol can grow. *Omne symbolum de simbolo*. A symbol, once in being, spreads among the peoples. In use and in experience, its meaning grows.’ (CP 2.302.)<sup>[4]</sup> This agrees so much with memeticians’ parlance that the only slight difference between memes and signs so far seems to be that Peirce grants to the latter also the possibility of growth, not just dumb replication. But replication itself is an idea that semioticians take for granted. ‘To be a sign and to be a replicator – this is ultimately a statement of identity,’ wrote Sebeok, for his part (1989, p. xxix).

However, it is only for the sake of pedantry that one needs to quote these statements where the classics of semiotics express explicit familiarity with repeatability. That idea, in point of fact, is *built in* their basic sign definitions, according to which all signs necessarily have (one or usually more than one) *interpretants*, the principle that I briefly mentioned above. Colloquially speaking, to be a sign is to be able to produce another sign. The latter may be produced in some human individual’s thoughts or speech, but it can also mean a mere change in an animal’s behaviour, because animals do not possess articulated thought, so far as we know. Meme theorists often resort to anthropomorphic expression, so that we can do likewise and say that a sign is something that ‘begs to be interpreted’. Insofar as this wish comes true, the sign produces another sign, its interpretant (then another, and so on), to represent the same reality, or, in some cases, a closely related reality. Peirce’s triadic sign-concept unites two dimensions, the representative and the interpretive dimension, respectively. The puzzling term interpretant is meant to express that signs possess this interpretability *inherently*, not due to human initiative and intentionality (see above).

Even having said this, however, I still have but beat about the bush rather than gone to the gist of the matter. In general semiotics, the opinion namely is that sign is a pedagogically useful, perhaps necessary concept, but the study of signs does not actually constitute the subject matter of semiotics. In introductions to students we always say that semiotics is ‘the study of signs’ but actual semiotic research, in the general version at least, is not about signs, it is about *semiosis*. What is this semiosis, then? Recall what was noted above: a sign possesses inherently, not contingently, interpretability (i.e., brings about interpretants). Semiosis is this process of interpretation conceived *in toto*. ‘Semiotics is not *about* something, unless you want to say that it is about *semiosis*,’ was Sebeok’s position (1991a, p. 2; original emphasis). This sounds slightly cryptic at first hearing, but only at first. The reason why he stated semiosis to make the subject-matter of semiotics stems from the general principle noted at the beginning of this paper: There is no such thing as a non-sign. Anything and everything can (in principle at least) be interpreted, that is to say: be taken as a sign.

Accordingly, it would be tautological to say that semiotics is about signs or studies signs, because that would include everything and exclude nothing. To avoid this tautology, Sebeok, Peirce and other general theorists define semiosis, the universal interpretive process, as their object of research.[5] The final reason why semiosis rather than sign is the basic concept in such research is that the process of semiosis is not dependent on human intentionality (Short 1981; Fisch 1986). Rather, ‘living beings *undergo* semiosis,’ as Sebeok liked to put the matter (1991b, p. 13; 2001b, p. *xxi*; emphasis added). Living beings, we observe, not just human beings. It begins to dawn on us that semiosis, the subject matter of general semiotics, is a much more embracive field of study than the one that memeticians till. The object of their research, human culture, can without any difficulty be situated within the notion of semiosis, and this of course is where general semiotics has traditionally situated it. Of those two fields of study, semiotics accordingly is the wider one, because it *unites* the study of culture with the study of biological nature, instead of resorting to a double-entry book-keeping. In sum, we did not have to wait for the appearance of memetics to be able to add an evolutionary dimension to cultural phenomena.[6] General semiotics had already dealt with that problem, some time ago.

But if so, one more feature common to the approaches needs to be taken up, their respective relations to the human mind. Dennett (1991/1996a) has expressed this relation by calling the human mind a creation of memes. Semiotics, for its part, has taken it as a creation of signs. According to Dennett (1996a, p. 207), ‘The haven all memes depend on reaching is the human mind.’ In semiotics the same idea has been expressed by Susan Langer, for example, according to whom it is not so that signs make the medium for the movement of human mind. It rather is so that the human mind serves as the medium for the movement of signs. Thus, the two positions agree that human mind does not so much produce either signs or memes; it rather is constituted *by* them. This much signs and memes have in common, but this is also where the agreement ends. Memes and signs both act as dynamic replicators, but with the important difference that signs simultaneously also represent the world, whereas memes do not, at least not explicitly.

### **Signs represent the world inherently – memes only contingently, or not at all.**

A sign’s relation to the world outside it is expressed in general semiotics by means of the concept of *object*. This term, as used for this purpose by Peirce, is not the happiest possible because it too easily brings to mind concrete particular things. The referred phenomenon, however, may as well be a general state of affairs rather than an individual entity. When we say, for example, ‘It’s raining!’ the weather outside is the object of the expression (i.e., sign). But whatever the object’s descriptive

status, the basic tenet in general semiotics is that signs necessarily have objects, just as they necessarily have, or rather, produce, interpretants. These are both theoretical terms. The point is not that we might be immediately able to identify empirically either objects or interpretants, their identification can make a problem for research (cf. Peirce CP 2.275). But the leading idea is that *in principle* and in the long run they are identifiable, so that there is not a sign without an object, nor a sign without an interpretant, according to general semiotics.

About objects, however, a further distinction needs to be made. Peirce, and the research tradition drawing on him, distinguishes between two kinds of objects: immediate vs. dynamical objects.[7] This distinction has much pertinence for semiotics, because it too often is overlooked that Peirce's most famous sign-classification, *icon-index-symbol*, does not deal with sign types *überhaupt*. It tells about how a sign can be related to its dynamical object (Peirce NEM 4, p. 887). What then are dynamical objects? They are such objects that *produce*, in a loose sense of the term, those signs that represent them.

Think about a child in high fever, with red spots on her face. This suggests the conclusion that the child has measles. This conclusion is not absolutely sure, but highly probable. The child's physiological condition, colloquially known as measles, is the dynamical object that produces those indexical signs, i.e., red spots, on her face. As soon as she is healed, the red spots vanish; in fact their absence is a reliable indicator about her getting well. The red spots are indexes of measles, they are present in all measles cases, but they do not tell anything closer to an untutored person about those bio-chemical processes that produce them.

In my opinion, the theoretical *raison d'être* of general semiotics is in its theory of objects, particularly in the theory of dynamical objects. Even though meme theory has been launched by such tough-minded empiricists like Dawkins and Dennett, it is nonetheless curiously reminiscent of current post-modernism, in that its memes and larger entities flow effortlessly above concrete reality without engaging in closer dealings with it. Saussurean semiology fares somewhat better in this respect, but only just, in that it does pay attention to the 'signifier-signified' dimension. But it is still content to float above reality, so to speak, because it lacks a theory of objects. Contrary to what one sometimes hears, de Saussure's 'signified' (*signifié*) does not at all answer to the concept of object in general semiotics. The signified is the same thing as a linguistic sign's conceptual content. The English word 'dog', the French word 'chien' and the German word 'Hund' all have the same conceptual content, for example. In the general theory of semiotics, however, when a sign is related to its object, this does not refer to the conceptual content of the word or sign, say, 'dog'. The sign's object is the real live dog, with its fur, fangs, and behaviour,

benign or aggressive. And this difference is important, because the real live dog can bite you, but the dog-word's conceptual content cannot.

And this brings us to the crucial difference between general semiotics and other approaches: Saussurean semiology tells something about how we *approach* concrete reality. According to it we do so by means of conceptual contents, and there is no reason to quarrel with that idea. Memetics does not seem to care much about concrete reality in the first place, it is so enamoured with the idea of replication. But both of these approaches leave untouched the at least as important question of *how reality approaches us!* One thing we know off-hand, reality does not do so by means of conceptual contents; rather, it cruelly destroys those contents that we have had and relied on. The pertinence of this question is perhaps easier to grasp after the year 2005 with its *tsunamis*, catastrophic floods and other such happenings that instructively have reminded that we still live in a world that from our point of view is 'hostile' (Sterelny 2003).

Culturalist approaches sometimes pose the question, not always unjustified, whether reality itself might be a mere construction. It of course is not, but the question of its representations as constructions is not thereby rendered quite futile, because it leads us to Popper's instructive principle about how it is wise to let our hypotheses die, instead of ourselves. Outer reality is thingy and obdurate, it can even hurt or kill us, if it comes to that. Our representations about it *are* constructions, individual and social, or hypotheses, as Popper called them, and they have a task in depicting that recalcitrant reality for us, so that interaction with it will be possible.

This principle and its fecundity have recently been reminded of in Dennett's fine book, *Kinds of Minds* (1996b). That book, however, arouses also ambiguous feelings, in view of Dennett's infatuation with memes, because those instructive hypotheses have to represent the world, as noted. Otherwise their proving correct or incorrect would not teach anything; in fact it would not be possible to prove them. It is indeed curious how Dennett tells memes to be 'made of information, which can be carried in *any* physical medium' (2001, p. 309; original emphasis), but apparently is so occupied with this phenomenon of carrying that he forgets to develop the other as important question: Memes are information, all right, information of *what?* There is no such thing as contentless information, it has to be *about* something, or information *to* someone or something. On the other hand, when the talk is not about memes, the same author provides some of the best arguments for an instrumental theory of mind. Such arguments are to be found in the aforementioned *Kinds of Minds* (chapter 4), where Dennett depicts with great pains, pictures and all, a possible hypothetical evolution from 'Darwinian beings', via 'Skinnerian' and 'Popperian' beings toward tool-making and tool-using 'Gregorian beings'.**[8]**

But this is the place where the meme theorist Dennett, unwittingly, as it seems, comes to meet semiotics. As he calls ‘Popperian’ those hypothetic beings that possess an ‘internal environment’ which represents their concrete surroundings to them, this is tantamount to discovering the same thing that Sebeok has taken over from Jakob von Uexküll, the early 20<sup>th</sup> century Estonian biologist, now almost forgotten (outside some semiotic circles). Drawing on von Uexküll’s ‘*Umweltlehre*’, Sebeok depicts the world-representing character of semiosis as follows:

Semiosis is the processual engine which propels organisms to capture “external reality” and thereby come to terms with the cosmos in the shape of species-specific internal modelling systems. This index-anchored model of the Umwelt operates as a circuit to suit the appropriate evolutionary purposes of each species and every individual. Whenever the model ceases to be compatible with or appropriate to *die Natur*, when disequilibria turn up for example, the organism’s environment, somewhat unstable at all times, oscillates radically enough so that the correspondence no longer fits between it and the organism’s internal model (Innenwelt) – coded in part in the genome, in part individually learned. Then the organism and perhaps the species, or even the now wobbly, soon turbulent, ecosystem which they inhabit, exits the way of the dinosaurs. (Sebeok 2001, p. 15; original emphasis).

The idea behind the *Umwelt - Innenwelt* relation is such that it enables the creature to care for only such things that really pertain to its fate and well-being. The animal[9] does not have to orient to the world at large. It orients only to that part of the world that is of importance to it, to its ecological niche, as this sometimes is called. Animals’ sentient and cognitive faculties and the synthesis of these in the *Innenwelt*, or world-model, as Sebeok called it, are geared to match their ecological *Umwelt* and *only* that part of the world. Outside their niche they are helpless and may perish. But, as we see above, the basic point in all this is that the world can change on its own, and probably does so, sooner or later, so that the living being has to alter its world-model to match the changed (part of the) world. That world-model that human beings make use of is very supple in this respect, and has a very good evolutionary track record, so that it has a particular name. It is called *culture*.

All this is old news to those semioticians who have spent any time with Sebeok’s writings, and it is as old news to the founders of the meme doctrine. One thing that often escapes the epigones in either camp is that living beings do not have those memes, signs, or world models just to behold them. They have them in order to do something with them or by means of them, bring

about something in the world – (though most often only in their own ecological niche) – to make use of those resources that the world has. As Dawkins reminds in *The Ancestor's Tale* (2005, p. 5), ‘A living creature is always in the business of surviving in its own environment (...) it has a living to earn.’ Yes, indeed, and semioticians and memeticists both agree about this. Of their respective theoretical terms and models, however, one has to conclude that the former camp is more consistent about the fact that this world-modelling has to be related to concrete action in the concrete world, or it is not worth much. ‘All behaviour must, by definition, be signifying behaviour,’ said Sebeok in *Global Semiotics* (2001, p. 74), but if that is so by definition, then the following conclusion is not too far-fetched: All signification must be behaviour! That is to say: Signification must not mean mere pondering the world, or saying something about it, it must (ultimately, not necessarily here and now) lead to concrete undertakings in and against the concrete world. And this is a point that semiotics indubitably remembers better than memetics does. Signs are inherently (though often only implicitly) action-related, memes only contingently, or not at all. This difference is pertinent, because it is action that connects the individual being, the carrier of signs, memes, or what have you to its environment. This again is important, because the environment is the judge of survival (Dawkins), and, curiously, it is the meme theorists who seem to forget this.

### **Signs transcend the nature/culture dichotomy – memes reproduce it**

Let us return to Dawkins’s original introductory definition of memes which found them drifting about in their own primeval ‘soup’, such a soup that was a new thing in an evolutionary perspective. That new soup, Dawkins (1989, p. 192) said, ‘is the soup of human culture.’ So be it, but the thing to be noted is that this definition defines memes in terms of culture. Culture is already there before the multifarious memes appear, they emerge out of it. This makes sense, of course, but elsewhere in meme literature the order of things is vice versa and this makes one wonder. As Dennett developed the idea further, in *Consciousness Explained*, he said that ‘Once our brains have built the entrance and exit pathways for the vehicles of language, they swiftly become *parasitized* (and I mean that literally) by entities that have evolved thrive in just such a niche: memes.’ (1996a, p. 200; original emphasis). This suggests that memes develop simultaneously with, or perhaps slightly ahead of culture, in the ordinary sense of the term, because this discussion is a part of Dennett’s general argument about the evolutionary origins of human consciousness (1996a, ch. 7). This too does make sense, but is not quite the same thing as Dawkins’s original argument, which started with culture intact.

These remarks are meant to show that meme theory apparently is still in its ‘pupal stage’, to borrow an expression of Dennett’s (1996a, p. 206), so that even its ablest representatives are not quite in the clear about where to start. Elsewhere in meme theory, the characteristic idea has mostly been fascination with the principle of replication, a hoary semiotic idea in itself, as we have seen by now. However, most meme theorists are surprisingly content with bare replication and have not bothered to look further. The principle of replication is the linchpin that is used to bring the study of nature (with gene as its key concept) and the study of culture (with meme as its key concept) to each other. The rest is silence, in the sense that meme literature does not seem to have noticed that this theoretical architecture leaves intact the cleavage that traditionally has kept nature and culture and their respective studies apart from each other. General semiotics has seen its task in bridging that cleavage, or better, in filling it up, so that there eventually would be slight if any ontological difference between biological nature and culture, and their respective sciences.

The key concept in such an undertaking has come up above, the concept of world model. General semiotics maintains that all living beings live in a modelled world, not in the world at large; by means of an *Innenwelt* that matches their *Umwelt*. Human culture is one special case of such world models. It of course differs radically from other modelling systems in that it is (almost) global rather than local and is constituted by intersubjectivity and language (in this order: Mead 1934; Bogdan 1997; 2000; Arbib 2005). Nonetheless, it serves the same basic purpose as do those other models that from our chauvinistic human perspective are ‘more primitive’. It enables its users to render their world predictable and habitable and to do things in it with some success.

But if so, then Dennett apparently does not have the last word, as he in ‘The Evolution of Culture’ (2001) suggests memetics to be taken as a kind of meta-theory for human studies. As he writes,

[T]he traditional perspective on cultural evolution handsomely explains many of the patterns to be observed. My proposal is rather that we adopt a perspective or point of view from which a wide variety of different empirical claims can be compared, *including the traditional claims*, and the evidence for them considered in a neutral setting, a setting that does not prejudge these hot-button questions. (Dennett 2001, p. 309; original emphasis)

This proposal is different from those of Blackmore (1999) and other meme enthusiasts, who suggest that memetics should simply *replace* the study of culture as we now have it. Dennett’s argument follows the venerable scientific principle, according to which a new theory

needs to explain *both* the anomalous *and* the sound part in the preceding one, do what Einstein's physics did to Newton's physics, as it were. Nonetheless, one does not have to be particularly partial to semiotics to see that it handles this meta-theoretical task better than memetics would be able to do. Semiotics has the same basic conceptual apparatus for both the study of (biological) nature and culture, but not so that its application would reduce the latter to the former. General semiotics has always maintained that humanities and fine arts should retain their traditional identities, instead of being thought of as junior versions of natural science. Let me give an example though I lack the space to develop it: It will not stretch imagination to see that the humanistic method *par excellence*, hermeneutics, can easily be taken as a case of the interpretive approach that prevails in semiotics. Human interpretations of nature and culture, respectively, rely on procedures that are radically different in empirical details, but the knowledge interest is much the same in both cases.[10]

### **Might a Synthesis Be Possible?**

Semiotics begins and ends with biology.  
T. A. Sebeok[11]

The above question is of course rhetoric, the tenor of my argument has all the time been that semiotics and memetics already *are* in a sort of synthesis, because meme theorists have discovered only the tip of the semiotic iceberg. Their studies have addressed a part of semiotics, one that could be called, after Sebeok (2000; 2001a; 2001b), *anthroposemiotics*. That field of study is only a sub-domain of entire semiotics, and even within that sub-domain the meme theorists have treated only one of its dimensions, the interpretive dimension. What I mean is that semioticians and memeticists both might benefit from explicit recognition of each others' existence, which so far has been lacking, as I said. Although memetics has not so far revealed any secrets unknown to semiotics, it should have the benefit of doubt in view of future possibilities. One such avenue of research might be an approach to culture by means of social practices instead of linguistic conventions, as has been the prevailing view in cultural semiotics.

The meme idea has at least once received a direct comment from leading semioticians, and it does not surprise that the comment was negative. In their joint work, *The Forms of Meaning* (2000), Sebeok and Marcel Danesi take notice about Dawkins's original definition that claimed memes to be the new universal mechanism of cultural evolution. It passes information from generation to generation and across populations, but without necessarily involving human

intentionality. The authors observe that the idea has received a good hearing particularly at sociobiological circles, but not among such scholars who know what the social sciences are all about. As Sebeok and Danesi sum up,

Dawkins' case is, at its core, a deceptive one. *Genes* can be identified and separated from organisms, and then studied, altered, and even cloned physically. That is a scientific fact. A *meme*, on the other hand, is no more than Dawkins' own term for what we have called a *model* in [general semiotics]. There is no empirical way to verify the reality of memes, as defined by Dawkins; they can only be talked about as if they existed. But it is possible to study the structure of mind in the structure of models, as [is done in general semiotics]. (Sebeok and Danesi 2000, pp. 163-164; original emphases)

As regards the theoretical status of semiotics and memetics, this vindicates my position throughout this paper, *viz.* that meme is a new name for some old sign-theoretic ways of thinking. Sebeok and Danesi equate it with their concept of model, whereas I have been comparing it with the concept of sign, as a rudimentary version. That does not make any contradiction, because signs act as constituents of models, in general semiotics. However, the issue at hand is not simply these authors' dissatisfaction with the meme notion. What seems to have upset Sebeok in particular is apparently not so much the meme itself, but the ballyhoo that it has aroused. The reason so to conclude is that in his first confrontation with Dawkins's brainchild, in *The Sign and Its Masters* (originally published in 1979), he met it with appreciation. He called Dawkins's replicators a 'nice idea,' and agreed that: 'Replicators – Dawkins's name for genes – are, in the last analysis, but signs which construct for themselves survival machines (containers, vehicles) to assure their continued existence,' so that 'all "survival machines" – meaning people, animals, plants, bacteria, and viruses – are only a sign's way of making another sign' (Sebeok 1989, p. xxix). As Sebeok here even borrows from Dawkins's terminology, he apparently found the original idea sound. It only was not Dawkins's original idea but Sebeok's own. *He* had been talking about universal replication – in signs and models – some ten years before Dawkins. It is no shame but an honour to be the second man to the South Pole, but such a man should not claim to have been there first. Dawkins made such a claim, but apparently in good faith, he seems to have been unaware that universal replication was something that others had by that time begun to take for granted.

Before I consider how Dawkins's ignorance and error was possible, a final word about the theoretical status of his discovery. He discovered universal replication in genes and he

postulated something to the same effect also for culture, but the idea of unification of the respective spheres he did not reach. Accordingly, some learned (and some not so learned) recent texts have repeatedly suggested double-entry book-keeping for replication in nature and culture, and marketed this as a revolutionary idea. The much more powerful idea that signs and world models can cater for both needs simultaneously has not reached an audience outside semiotics, and not a very wide hearing even within this field. It ought to reach a wider audience, if one agrees with, say, Dennett, who writes that ‘The traditional perspective on culture and the evolutionary perspective can join forces, instead of being seen to be in irresolvable conflict’ (2001, pp. 320-321). Such joining of forces is a commendable idea, but Dennett does not notice that the meme is actually a hindrance in such a project. Other concepts and viewpoints have brought culture and the evolutionary perspective closer to unification without reduction.

But why is this something that needs to be hammered home with gusto? Why has it escaped meme buffs that they are exhibiting an old hat and semiotics was there first? The relation between the two approaches is like the one between the proverbial ships at night: They just pass by without hailing each other. However, as the original knowledge interest behind the two projects was not so very much different, this curious state of negligence demands an explanation.

My suggestion for a first outline of such an explanation sets out from the following assumption: Although meme theorists do not refer to semiotics, all of them cannot be unaware of its existence. Thus, they presumably have a limited understanding of what this discipline is all about. My suspicion is that they associate semiotics exclusively with the study of language, culture, or communication. This is an essential part of semiotics, but it is regrettable that even some semioticians insist on this being its entire *raison d’être*. In so doing they are vulnerable to invasion from the side of meme theorists, who think that they would have something novel to add. They do not, but mere linguistic or cultural arguments do not suffice to demonstrate this. As noted, meme theorists do not care much about language. They present memes as floating about in culture, free of linguistic restrictions. No syntactic relations connect memes with each other, as far as I can see, and as was noted above, they do not have much semantics, either. Memes change hands effortlessly and without the intervention of human intention. So is the case also with semiotic signs. Peirce reached the sign concept by abstracting away the notions of sender and receiver, but he did retain sign’s connection to the outside reality, which means that the sign’s human users can be called back, so to speak, should such a need arise.

The theoretical task of general semiotics is, among other things, to provide a frame of reference for linguistic and cultural studies. This, however, is something not yet taken widely for granted even within semiotics, so that outsiders’ unawareness is no great wonder. But why should

the study of culture and language *need* any frame of reference in the first place? Aren't precisely these the ultimate borders of our existence out of which it is impossible to get?[12] Many semioticians think that they are, and this opinion enjoys widest adherence among those who study culture. One understands that they may feel a suggestion for a bio-semiotic basis for semiotic studies a restriction of their independence. Sebeok always emphasized his 'ecumenical' attitude toward the various variants of semiotics, and even jocularly boasted that such an attitude enables its holder 'to know the opposite sects' (1989, p. *xxviii*). That is well. However, cultural semioticians should realize that if a reductive threat is forthcoming, it comes from the meme quarters, not from general semiotics. Some (though not all) meme theorists *are* denying the independent status of cultural studies such as we so far have had them. In this situation, the least one can wish is that semiotics should stand united and show disciplinary self-assurance. It should not appear as a house divided against itself. And in order to demonstrate the theoretical hollowness of memetics, semiotics does need also its general theory; mere entrenchment to cultural studies will not suffice.

## Notes

[\*]

An earlier version of this paper was presented in the section ‘Global Semiotics’ that took place as a part of the annual meetings of the International Summer Institute for Semiotic and Structural Studies (ISISSS) in Imatra, Finland, June 2005. I wish to thank all section discussants for their comments. I have also benefited from an article by my compatriot and colleague Petri Ylikoski, ‘Kulttuuridarwinismi’ (Cultural Darwinism) that appears in a Finnish language journal, *Tiede ja Edistys*, (vol. 29 [2004], number 1, pp. 1-15), and deals critically with meme theories. As I cannot here quote its Finnish text verbatim, I take this occasion to extend my thanks to its author. Research for this article was conducted as a part of a project, ‘Life Regulation Practices and the Nature-Culture Problem’, financed by University of Helsinki and the Academy of Finland.

[\*\*]

It is perhaps not good manners to borrow other people’s epigraphs, and Edwina Taborsky (1998, p. 6) has already used this phrase as such, in semiotic literature, but I found it so apt in view of the meme discussion that I could not resist. The saying is from *The Marriage of Cadmus and Harmony* (1993), by R. Calasso (p. 33).

[1]

In citing C. S. Peirce, I follow Peirce scholars’ established codes of abbreviation, where CP refers to *Collected Papers of Charles Sanders Peirce* (8 vols. 1931-58), which is cited according to *paragraph*, not page number. CP 6.322 thus means the 322<sup>nd</sup> paragraph in the sixth volume of the edition. Other editions are cited with page numbers. NEM refers to *New Elements of Mathematics*, by Charles S. Peirce (5 vols. 1976), and EP to *The Essential Peirce: Selected Philosophical Writings* (2 vols. 1992-1998).

[2]

A book by Richard Semon, entitled *Die Mneme als erhaltendes Prinzip in Wechsel des organischen Geschehens* (1904) was (in 1914) translated also into English (Hull 2000, p. 50; see also Dawkins 2004, p. 295), which means that ‘*die Mneme*’ has received wide, international attention in its time.

[3]

Incidentally, I once answered to Dennett by saying that we already have such a science – in semiotics (Kilpinen 2002, p. 24). The present article attempts to develop a more thorough answer in the same vein.

[4]

For those who possess a nodding familiarity with some semiotic terms: Even though Peirce talks about symbols here, this does not mean that the same principles would not hold also for other types of signs. His famous sign classifications that have much exercised semioticians are not taxonomies but are meant to highlight different *aspects* of signs. Peirce's most famous trichotomy, *icon-index-symbol*, for example, does not divide signs into three (not even in this particular sign-object dimension), but the idea is that symbolic signs *include* also iconic and indexical aspects (Peirce CP 2.92; see also Fisch 1986, *passim*).

[5]

More accurately: Originally Peirce did define semiotics as the study of signs, but in his late period (approx. after 1900) he came to maintain that sign is to be defined in terms of semiosis rather than vice versa (Fisch 1978; 1983; see also Bergman 2004).

[6]

Even some critics of memetics intimate this, not to speak of meme enthusiasts. See the contributions to Aunger (2000).

[7]

Actually Peirce distinguished more than two kinds of objects (see Bergman 2004), but that is not pertinent at this juncture.

[8]

The terms pay homage to Charles Darwin, Burrus Skinner, Karl Popper and Richard Gregory, respectively.

[9]

According to Sebeok, all living beings, plants, fungi, bacteria and viruses included, have *Umwelten*. Whether they also have *Innenwelten*, is a question I wish to leave alone.

**[10]**

Another theme that I cannot develop here, though I have intimated about it above, is that in semiotics the interpretation of behaviour begins with non-human beings. Concerning animal interpretation and human-animal interaction, Sebeok quotes Heini Hediger to the effect that ‘the animal – be it horse, monkey, or planarian – is generally *more* capable of interpreting the signals emanating from humans than is conversely the case.’ (Sebeok 2000, p. 13 n1; emphasis added) Human interpretation, linguistic or otherwise, builds upon and makes use of this animal interpretation, the latter makes the former possible. In recent literature, this idea has been developed further by Bogdan (1997; 2000), Lakoff and Johnson (1999), and Bermúdez (2003), independently of Sebeok.

**[11]**

Sebeok (1989, p. *xxiv*)

**[12]**

The situation in semiotics is curiously analogous to the one that according to Jaakko Hintikka has characterized recent philosophy. Two viewpoints, based on opposite tacit presuppositions, are talking past each other and thus creating confusion. Those suppositions in question are (i) the idea about language as a *universal medium*, and (ii) the idea of language as a freely re-interpretable *model*, respectively (Hintikka 1997). I believe this distinction to have pertinence also to semiotics, because Sebeok’s insight was in thematizing language as a world model, instead of a medium of communication, as had been the received view. One consequence of those suppositions is that when language is understood as a medium, this leads to the ineffability of semantics, as Hintikka calls it in philosophy, or to the notion of *arbitrariness*, as the idea is more usually expressed in semiotics. This is only one of the many theoretical points that suggest this difference to be worth of closer study also in semiotics.

## References

- Anderson, Myrdene et al. (1984). A semiotic perspective on the sciences: Steps toward a new paradigm. *Semiotica* 52 (1/2): 7-47. Republished in Sebeok (1986, pp. 17-44), reference to this volume.
- Arbib, Michael (2005). From monkey-like action-recognition to human language: An evolutionary framework for neurolinguistics. *Behavioral and Brain Sciences* 28 (2): 105-124.
- Aunger, Robert (ed., 2000). *Darwinizing Culture: The status of memetics as a science*. Oxford & New York: Oxford University Press.
- Bergman, Mats (2004). *Fields of Signification: Explorations in Charles S. Peirce's Theory of Signs*. Philosophical Studies from the University of Helsinki 6. Vantaa, Finland: Dark Oy.
- Bermúdez, José Luis (2003). *Thinking without Words*. Oxford & New York: Oxford University Press.
- Blackmore, Susan (1999). *The Meme Machine*. Oxford & New York: Oxford University Press.
- Bogdan, Radu (1997). *Interpreting Minds: The Evolution of a Practice*. Cambridge, MA & London, England: MIT Press.
- Bogdan, Radu (2000). *Minding Minds: Evolving a Reflexive Mind by Interpreting Others*. Cambridge, MA & London, England: MIT Press.
- Brodie, Richard. (1996). *Virus of the Mind: The New Science of the Meme*. Seattle: Integral Press.
- Dawkins, Richard ([1976], 1989). *The Selfish Gene*. 2<sup>nd</sup> edition. Oxford & New York: Oxford University Press.
- Dawkins, Richard ([1982], 1999). *The Extended Phenotype: The Long Reach of the Gene*. Paperback edition, with a new afterword by Daniel Dennett. Oxford & New York: Oxford University Press.
- Dawkins, Richard (2004). *A Devil's Chaplain: Selected Essays*. Ed. by L. Menon. London: Orion Books.
- Dawkins, Richard (2005). *The Ancestor's Tale: A Pilgrimage to the Dawn of Life*. Paperback edition, London: Phoenix Books.
- Dennett, D. C. (1990). Memes and the exploitation of imagination. *Journal of Aesthetics and Art Criticism* 48 (2): 127-135.
- Dennett, D. C. ([1991], 1996a). *Consciousness Explained*. Paperback edition. Harmondsworth: Penguin.
- Dennett, D. C. (1995). *Darwin's Dangerous Idea: Evolution and the Meanings of Life*. New York: Simon & Schuster.

- Dennett, D. C. (1996b). *Kinds of Minds: Towards an Understanding of Consciousness*. London: Weidenfeld & Nicholson.
- Dennett, D. C. (2000). Foreword, to R. Aunger (ed.), *Darwinizing Culture*. Oxford & New York: Oxford University Press.
- Dennett, D. C. (2001). The Evolution of Culture. *The Monist* 84 (3): 305-324.
- Fisch, Max (1978). Peirce's General Theory of Signs. Pp. 321-355 in Fisch (1986).
- Fisch, Max (1983). Just How General Is Peirce's General Theory of Signs? Pp. 356-361 in Fisch (1986).
- Fisch, Max (1986). *Peirce, Semeiotic and Pragmatism: Essays by Max H. Fisch*. Ed. by K. L. Ketner & C.J.W. Kloesel. Bloomington: Indiana University Press.
- Heiskala, Risto (2003). *Society as Semiosis: Neostructuralist Theory of Culture and Society*. Frankfurt am Main: Peter Lang.
- Hintikka, Jaakko (1997). *Lingua Universalis vs. Calculus Ratiocinator: An Ultimate Presupposition of Twentieth-Century Philosophy*. Dordrecht – Boston – London: Kluwer.
- Hull, David (2000). Taking memetics seriously. In R. Aunger (ed.), *Darwinizing Culture: The status of memetics as a science* (pp. 43-67). Oxford & New York: Oxford University Press.
- Jahoda, Gustav (2002). The ghosts in the meme machine. *History of the Human Sciences* 15 (2): 55-68.
- Kilpinen, Erkki (2002). A neglected classic vindicated: The place of George Herbert Mead in the general tradition of semiotics. *Semiotica* 142 (1/4): 1-30.
- Lakoff, George & Johnson, Mark (1999). *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York: Basic Books.
- Lynch, Aaron (1996). *Thought Contagion. How Belief Spreads through Society: The New Science of Memes*. New York: Basic Books.
- Mayr, Ernst (1997). *This Is Biology: The science of the living world*. Cambridge, MA: The Belknap Press of Harvard University Press.
- Mead, G. H. (1934). *Mind, Self and Society, from the Standpoint of a Social Behaviorist*. Edited by C. W. Morris. Chicago: University of Chicago Press.
- Peirce, C. S. (1931-58). *Collected Papers of Charles Sanders Peirce*. 8 vols., edited by C. Hartshorne, P. Weiss and A. W. Burks. Cambridge, MA: Harvard University Press. (Cited as CP, with volume and paragraph, not page numbers.)
- Peirce, C. S. (1976). *New Elements of Mathematics, by Charles S. Peirce*. 4 vols (in 5 tomes), edited by Carolyn Eisele. The Hague & Paris: Mouton. (Cited as NEM.)

- Peirce, C. S. (1992-98). *The Essential Peirce: Selected Philosophical Writings*, I-II. Vol. 1 ed. by K. L. Ketner & C. J. W. Kloesel; vol. 2 ed. by the Peirce Edition Project. Bloomington & Indianapolis: Indiana University Press. (Cited as EP)
- Ransdell, Joseph (1992). Teleology and the autonomy of the semiotic process. In *International Association for Semiotic Studies, Proceedings of IVth International Congress, 1989, vol. 1*, G. Deledalle et al. (eds.), Berlin and New York: Mouton de Gruyter.
- Richerson, Peter and Boyd, Robert (2005). *Not By Genes Alone: How culture transformed human evolution*. Chicago & London: University of Chicago Press.
- Sebeok, Thomas ([1979],1989). *The Sign and Its Masters*. 2<sup>nd</sup> edition. Lanham, MD: University Press of America.
- Sebeok, Thomas (1986). *I Think I Am a Verb: More Contributions to the Doctrine of Signs*. New York & London: Plenum Press.
- Sebeok, Thomas (1991a). *Semiotics in the United States*. Bloomington & Indianapolis: Indiana University Press.
- Sebeok, Thomas (1991b). *A Sign Is Just a Sign*. Bloomington & Indianapolis: Indiana University Press.
- Sebeok, Thomas ([1994], 2001a). *Signs: An Introduction to Semiotics*. 2<sup>nd</sup> edition. With a foreword by Marcel Danesi. Toronto – Buffalo – London: University of Toronto Press.
- Sebeok, Thomas (2000). *Life Signs: Essays in Semiotics – I*. With an Introduction by Marcel Danesi. New York – Ottawa – Toronto: Legas.
- Sebeok, Thomas (2001b). *Global Semiotics*. Bloomington & Indianapolis: Indiana University Press.
- Sebeok, Thomas & Danesi, Marcel (2000). *The Forms of Meaning: Modeling Systems Theory and Semiotic Analysis*. Berlin & New York: Mouton de Gruyter.
- Short, T. L. (1981). Semeiosis and intentionality. *Transactions of the Charles S. Peirce Society* 17 (3): 197-223.
- Sterelny, Kim (2003). *Thought in a Hostile World: The Evolution of Human Cognition*. Oxford: Blackwell.
- Taborsky, Edwina (1998). *Architectonics of Semiosis*. Houndsmills & London: Macmillan.