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The misunderstanding of memes: Biography of an unscientific object, 1976–1999

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When the “meme” was introduced in 1976, it was as a metaphor intended to illuminate an evolutionary argument. By the late-1980s, however, we see from its use in major US newspapers that this original meaning had become obscured. The meme became a virus of the mind. (In the UK, this occurred slightly later.) It is also now clear that this becoming involved complex sustained interactions between scholars, journalists, and the letter-writing public. We must therefore read the “meme” through lenses provided by its popularization. The results are in turn suggestive of the processes of meaning-construction in scholarly communication more generally.

“Greed, for lack of a better word, is good. Greed is right. Greed works. Greed clarifies, cuts through, and captures the essence of the evolutionary spirit.”

—Gordon Gekko, as portrayed by Michael Douglas in the 1987 film *Wall Street*

“From the outset [in 1976] the reviews were gratifyingly favorable and it [*The Selfish Gene*] was not seen, initially, as a controversial book. Its reputation for contentiousness took years to grow until, by now, it is widely

An earlier version of this paper was pre-circulated and presented at the History & Theory of Psychology Evening Colloquium Series in the Fall of 2010. The author wishes to thank Jacy Young (the series coordinator) for the invitation to speak, as well as all those who attended and provided feedback—especially Laura Ball, Ron Sheese, Kelli Vaughn, and Fred Weizmann. It was originally written following the publication of Alexandra Rutherford’s (2009) *Beyond the Box*, which—among other things—used popular press coverage to examine how the ideas of B. F. Skinner became integrated with American thinking in the 1950s–1970s. Finally, it should also be noted that the resulting manuscript would not have taken the shape it did were it not for the contributions of a handful of correspondents—most notably Michael Schrage. Responsibility for all remaining errors and omissions rests with the author.

regarded as a work of radical extremism. But over the very same years as the book's *reputation* for extremism has escalated, its actual *content* has seemed less and less extreme, more and more the common currency."

—Richard Dawkins, in the preface to the 1989 edition of *The Selfish Gene*

How could it be that Dawkins' most famous book became controversial, but not as a result of what it said? How could its ideas have become the basis of textbooks, yet its arguments be labeled increasingly as revolutionary? The answers to these questions are tied to the reception of its claims: in particular, that genes are selfish—purposefully greedy in the pursuit of their own survival.

This interpretation of the book's argument, as it became increasingly well-known, seemed to justify the self-centeredness of the 1980s: greed is good, because that's just how evolution works (see e.g., James 1998, 2008). Yet Dawkins anticipated this reading, and defended against it, even reaching out to the public in a collaboration with the BBC: an episode of *Horizon*, "Nice guys finish first" (Taylor 1986), laid out his position in clear terms.

In this early documentary, Dawkins discussed the importance of individual choice in producing optimal outcomes through cooperation (cf. Dawkins 1989, pp. 202–233). Indeed, the film echoed his book's closing line: "We, alone on earth, can rebel against the tyranny of the selfish" (Dawkins 1976, p. 215). I suggest, therefore, that the continuing reception of his ideas as controversial—in the 1980s and through the 1990s—can be understood more deeply if we examine what has been understood as *The Selfish Gene's* secondary claim, as well as how the two claims came to have the meaning they now have.

If individual choice can lead to more optimal results than blind selfishness, as Dawkins argued in his documentary, then that which shapes choice itself becomes evolutionarily important. Indeed, in *The Selfish Gene*, Dawkins even seemed to suggest a way to think about this: that *that which shapes choice in humans*—culture—is like a large shared genetic pool, in which the most virulent *ideas* compete to infect your mind. The popular understanding of this second claim will be the focus of this essay: that *ideas* are selfish, even if the individuals who think them (i.e., those who are infected by an idea) don't themselves intend to be greedy.

However, to say that this second claim was "received" is to misrepresent its history. The notion of a meme didn't hit the newspapers in the US until the late-1980s, and later still in the UK. A disciplinary critical mass was only achieved in the late-1990s, when a peer-reviewed journal—the *Journal of Memetics*—was founded and several popularizing books pub-

lished (e.g., Blackmore 1999; Brodie 1996; Lynch 1996). Clearly, though, this was not the result of an immediate infection: the meme's "virulence" took twenty years to engineer.

The '90s-era exuberance diminished somewhat in the new millennium. The idea's merit as a scientific claim came into question (e.g., Atran 2001; Aunger 2000; Distin 2005). Doubts were expressed about whether and how the advances suggested by the claim were supposed to be meaningful (e.g., Jahoda 2002ab) or even novel (e.g., Kilpinen 2008). And the journal failed. But few critics have chosen to focus on the processes by which *the idea itself* came to have the meaning it now has. Such is the goal here: to lay out the story of that which became controversial in the 1980s, and insightful in the 1990s, by tracing the actions of the individuals involved in the construction of its meaning.

The fact is, perhaps surprisingly to some readers, Dawkins did not make the claim that has since been attributed to him. The meme was not introduced purposefully as an "idea virus." It was a metaphor. Dawkins' intent, in *The Selfish Gene* (1976), was not to put the meme forward as the true cultural counterpart to the gene. Rather, he used it as part of a larger goal: redefining the fundamental unit of selection in evolutionary biology. In short, he hoped to catalyze a shift in understanding; he hoped to redirect the focus of biology away from genes and toward a more general engine for evolution. There weren't two claims in the first edition of *The Selfish Gene*; there was only one, albeit a different one from what many readers have understood.

Dawkins' intent—contrary to the popular understanding—was never to inaugurate the new science of memetics. That was accidental. He explained this in an essay published in *Time* magazine in 1999:

I am occasionally accused of having backtracked on memes, of having lost heart, pulled in my horns, had second thoughts. The truth is that my first thoughts were more modest than some memeticists might wish. For me the original mission was negative. The word was introduced at the end of a book that otherwise must have seemed entirely devoted to extolling the "selfish" gene as the be-all and end-all of evolution, the fundamental unit of selection. There was a risk that my readers would misunderstand the message as being necessarily about DNA molecules. . . . This was where the meme came in. (Dawkins 1999a, p. 46; see also Dawkins 1999b, p. xvi)

The original meme, in other words, was a rhetorical flourish intended to clarify a larger argument.

That Dawkins' intended clarification has since gotten so confused is an

interesting problem, both of the history of biology and more generally of the public understanding of science. That the resulting misunderstanding shares an obvious overlap with psychology suggests it also affords a problem for the history of that discipline as well. These problems situate this essay at the boundary between the usual scholarly silos: it presents a history of a biological (and psychological) idea, but not of Biology (or Psychology) *per se*.

My purpose here is simply to lay out how the meme's interminglings came to be: how *The Selfish Gene* came to imply a selfish meme. But it is not intended to unmix the mixed metaphor (instead, see Henrich, Boyd, and Richerson 2008; Jeffreys 2000). Nor does it attempt to present a history of the idea itself (see Costall 1991). Rather, what follows is intended to contribute to a larger discourse regarding the emergence of meaningful inter-disciplines at the boundary between hard science and human science. In this sense, it is broadly related to the recent examinations of socio-biology (e.g., Jumonville 2002; Li and Hong 2003), social Darwinism (e.g., Weikart 2003), and evolutionary psychology (e.g., Cassidy 2005; 2006). That said, however, it also takes a very different approach. The result is something rather more like a biography of a scientific object, except of course that the meme was never scientific to begin with.¹ In short, therefore, what follows is a story about the construction of *meaning* through *social* interaction; how an *understanding* is shared among *minds* that are forever situated in their own contexts, having their own interests, and working toward their own ends. It is not a story about the spread of a social infection.

To achieve all of this, the essay begins simply by situating the original proposal (§I). What was Dawkins doing when he introduced the meme? I then examine the first major popularization of the meme proposal, in Douglas Hofstadter and Daniel Dennett's collection *The Mind's I* (§II). This leads to an examination of that book's success in the US and a two-part discussion of the introduction of memes into the American popular understanding (§§III–IV). I then move to a similar examination of the

1. The notion of a biography of a scientific object is due to Lorraine Daston (2000). That said, however, the approach here must also be contrasted with Geoffrey Hodgson's (2004) examination of the changing meaning of "social Darwinism" in English-language academic journals. This essay is therefore not the tracing of a definition, in the style of the Oxford English Dictionary, but a targeted enquiry examining how the definition came to be constructed by individual people acting in social contexts constructed by other individual people. It was originally written following the publication of Alexandra Rutherford's (2009) *Beyond the Box*, which—among other things—used popular press coverage to examine how the ideas of B. F. Skinner became integrated with American thinking in the 1950s–1970s.

idea's reception in the UK (§V). These parallel stories are put in a larger social context, although briefly, in a four-part analysis of why and how the meme was popularized (§VI). And, finally, the essay concludes with a discussion of what these four steps imply for the role of scientific communication in constructing the public understanding of science (§VII).

I. Origins

Dawkins' book merits special attention because it straddles two traditions. As science writer Matt Ridley (2006) recently explained, "Before *The Selfish Gene*, scientists wrote books for each other, or for laymen, but rarely for both" (p. 265). For Ridley, in other words, the book represents a new species of scientific communication. But, as we will see, it wasn't immediately successful: only in the 1980s did it become a hybrid in the way Ridley now means to celebrate. Thus, in approaching it here, we must first treat it as a particularly well-written book for scientists.

Background, to 1976

Following the synthesis, in the 1930s and 1940s, of Charles Darwin's theory of natural selection with Gregor Mendel's theory of particulate inheritance, the "gene" became the engine of evolution: natural change was conceived as resulting from inheritance and mutation, and nothing more. But this, initially, was a mathematical abstraction; a prediction of theory. When DNA was discovered in the early 1950s, the fundamental assumption of population genetics acquired a material basis. This perspective was then solidified—as the "central dogma" of molecular biology—through work conducted in the 1950s and 1960s. Then, in 1970, when François Jacob published *La logique du vivant, une histoire de l'hérédité* (translated in 1973 as *The Logic of Life*), the gene took on its current meaning:

Just as a sentence represents a segment of text, so a gene corresponds to a segment of nucleic acid. In both cases, an isolated symbol means nothing; only a combination of symbols has any "sense." In both cases, a given sequence, sentence or gene, begins and ends with special "punctuation" marks. (Jacob [1970] 1973, p. 275)²

When Dawkins wrote his book, in the early 1970s,³ this was the background against which he worked: evolution was understood to be driven by natural selection and the inheritance of essentially meaningful strings

2. The primary source for this introductory paragraph is Jan Sapp's (2003) *Genesis*, in which the stories of Mendel's "rediscovery" and of the construction of a "master molecule" are told on pages 117–129 and 187–200, respectively.

3. Dawkins situates the work in the preface to the 1989 edition: he began writing *The Selfish Gene* during a blackout caused by the miners' strike in 1972, but then stopped after

of particulate genes. (Sociobiology responded to the same background, but then became intertwined with Dawkins' program in ways that are too complex to go into here [instead, see Segerstråle 2000].)

Dawkins' original argument, in the first edition of *The Selfish Gene*, was that the gene—and the DNA from which each gene is composed—is ultimately not what's important for evolution. Genes are rather a single example of a larger set of evolutionary engines. Genes, argued Dawkins, are a kind of “replicator.”

A replicator is something, *anything*, that either (1) can make copies of itself or (2) is easily and automatically copied by virtue of its relationship to the medium in which it is found. Dawkins imagined this was the case with the origins of life: a string of molecules came together by accident in the early soup of the Earth's tidal pools and, by virtue of their chemical affinity for other similar molecules, ultimately served as the basis for subsequent duplication.

Think of the replicator as a mould or template. Imagine it as a large molecule consisting of a complex chain of various sorts of building block molecules. The small building blocks were abundantly available in the soup surrounding the replicator. Now suppose that each building block has an affinity for its own kind. Then whenever a building block from out in the soup lands up next to a part of the replicator for which it has an affinity, it will tend to stick there. The building blocks that attach themselves in this way will automatically be arranged in a sequence that mimics that of the replicator itself. It is easy then to think of them joining up to form a stable chain just as in the formation of the original replicator. (Dawkins [1976] 1989, p. 15)

As a result of the invention of this chemically-chaperoned form of pattern-copying, a new kind of stability was introduced into the world. And it was this stability, Dawkins argued, that enabled the process we recognize today as evolution by means of natural selection. But his intended contribution was more specific: it was *replicators* that did this (as a class), not *genes* (as individual units).

From Dawkins' perspective, evolution is impossible without stability. This is because only stability allows for differential selection following replication: if heritable traits are to vary (as a result of accidents in duplication) and if the material causes underlying these traits are ultimately to be represented in the larger population of replicators (due to competition

two chapters. He later resumed work, and finished the book, during a sabbatical in 1975 (p. xii).

for building blocks), then there must be a shared stable core with respect to which inter-generational change can occur. For life as we know it, this role is played by the organic crystal we call DNA. But Dawkins argued that this was just one kind of replicator; memes, he suggested, might provide an example of another: a second example of apparent stability drawn from life as we know it, which although hypothetical could be used to clarify his point. And, initially, this is how his book was received in the popular press (Lehmann-Haupt, 1977; Pfeiffer, 1977).

Constructing Memes, 1976–1981

The meme, in *The Selfish Gene*, was a thought experiment: a rhetorical device intended to illuminate Dawkins' argument that the replicator ought to replace the gene in the scientific understanding of what it is that drives evolutionary change. Yet its re-presentation in 1981, in a popular collection of essays and short stories, stripped it of its oratorical context. This began the process of reifying the meme as the actual cultural counterpart of the gene.

This collection, *The Mind's I*, was celebrated by its publisher as having been “composed and arranged” by recent Pulitzer Prize-winner Douglas Hofstadter and his philosopher friend Daniel Dennett. It brought together, as the subtitle indicates, “fantasies and reflections” on the themes of mind, self, consciousness, and soul. More than this, however, it provided a gentler way for readers to engage the ideas presented by Hofstadter (1979) in his hugely successful *Gödel, Escher, Bach*. And, to this end, it included commentaries from the “composers” connecting each contribution with the collection's themes: “What is the mind? Who am I? Can mere matter think or feel? Where is the soul?” (p. ix).

If you read past the marketing material, which is admittedly saccharine, *The Mind's I* is a wonderful book. And I would recommend it highly except for one minor detail: it cannot be read except as *a thing to think with*. This criticism applies to all of its chapters. But, in the case of the meme, the caveat has special significance: in the early 1980s, *The Mind's I* was more popular—and had a greater impact—than *The Selfish Gene*.

Who cares about impact? These are works of substance, not a popularity contest. Simply put: impact is important because the contribution from Dawkins in *The Mind's I* wasn't really Dawkins' writing. It isn't his “meme.” Sure, the chapter used his words; at base, the units are the same. But the meaning isn't.

In *The Mind's I*, Hofstadter and Dennett presented a new version of the meme-metaphor. To construct it, they selected harmonious themes from across *The Selfish Gene* and presented them as a coherent single work. Although a footnote at the start of the piece indicates that the text had been

excerpted from the original, it doesn't indicate that the essay had been wholly fabricated from those excerpts; reinvented by pulling text haphazardly, hither and thither, so as to assemble a new narrative from multiple sources.

This omission could perhaps be forgiven. The collection was "composed," after all. But, in the case of the meme, there is more to its composition than a simple departure from the original. The new version provides no clear indication that changes had been made, such as to shift the spelling and punctuation from UK to US standard; or that, in several instances, material had been lifted mid-paragraph and re-presented out of context. Indeed, comments are included from the original—without any editorial remarks—that misrepresent the whole as a coherent unit.

In the following (a particularly egregious example), a naïve reading is biased toward a new non-metaphorical meaning for meme:

As my colleague N. K. Humphrey [a theoretical psychologist] neatly summed up an earlier draft of this chapter: ". . . memes should be regarded as living structures, not just metaphorically but technically. When you plant a fertile meme in my mind, you literally parasitize my brain, turning it into a vehicle for the meme's propagation in just the way that a virus may parasitize the genetic mechanism of the host cell. And this isn't just a way of talking—the meme for, say, 'belief in life after death' is actually realized physically, millions of times over, as a structure in the nervous systems of individual men the world over." (Dawkins in Hofstadter and Dennett 1981, p. 143)

In other words, the suggestion is that *this* chapter—in *The Mind's I*—was the chapter read by Humphrey, which then led him to suggest that the memes "be regarded as living structures." It was not; he read a different chapter in *The Selfish Gene*. Following this, then, it seems uncontroversial to suggest that the replicated narrative had indeed been disconnected from the original Replicators Argument. But this is just a single example. How much of the chapter is cobbled together? From where were the cherries picked?

Table 1 compares the text from the constructed essay presented in *The Mind's I* to the original words as they were presented in the first two editions of *The Selfish Gene*. Although Dennett (2006) later noted that he and Hofstadter had constructed the essay from two excerpts, rather than one (as suggested by the editorial footnote), this analysis implies something rather more selective. We also see that only a few pages from the original memes-as-replicators chapter (the one that Humphrey commented on)

Table 1. From Selfish Gene to Selfish Meme

| Passage starting: | <i>The Mind's I</i> | <i>Selfish Gene/1e</i> | <i>Selfish Gene/2e</i> |
|--|---------------------|------------------------|------------------------|
| “In the beginning was simplicity . . .” | pp. 124–131 | pp. 13–21 | pp. 12–20 |
| “Once upon a time, natural selection consisted of . . .” | pp. 131–132 | pp. 25–26 | pp. 24–25 |
| “Natural selection in its most general form means . . .” | pp. 132–133 | pp. 35–36 | pp. 33–34 |
| “Survival machines began as passive receptacles . . .” | pp. 133–134 | pp. 49–50 | pp. 46–47 |
| “One of the most striking properties of survival . . .” | pp. 134–139 | pp. 53–59 | pp. 50–55 |
| “One of the most interesting methods of . . .” | pp. 139–142 | pp. 61–64 | pp. 57–60 |
| “The laws of physics are supposed to be true all over . . .” | pp. 142–143 | pp. 205–207 | pp. 191–192 |
| “I conjecture that co-adapted meme-complexes . . .” | pp. 143–144 | pp. 213–214 | p. 199 |

This table shows from where, in *The Selfish Gene*, the text presented in *The Mind's I* originates. It's clear that, while the words are the same, their organization has been changed: in *The Mind's I*, passages from *The Selfish Gene* are re-presented out of context. The result is a smoothly-flowing essay with continuous pagination. Yet the gaps between pages in the original source indicate how much material was skipped in constructing the new presentation. Although Hofstadter and Dennett had access only to the first edition of *The Selfish Gene*, page references to both editions are provided here should the reader wish to replicate this finding. In the constructed version, a new sub-heading was also added: “Selfish Memes” (Hofstadter and Dennett, 1981: 142).

have been included in the new essay. And this, really, means just seven paragraphs.

The two most crucial of the seven paragraphs connect the idea of the gene pool—and the primordial oceans in which the Earth's first replicators were imagined by Dawkins to have arisen—with that of a cultural “meme pool” (Dawkins in Hofstadter and Dennett 1981, p. 143). Presented out of context, and without guidance from the editors, I suggest that this text could not but be read for what it said:

The new soup is the soup of human culture. We need a name for the new replicator, a noun which 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*. It should be pronounced to rhyme with “cream.” (Dawkins in Hofstadter and Dennett 1981, p. 143)

The most famous passage, in terms of how the meme has since come to be understood, is the one that followed this introduction of terminology:

Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches. Just as genes propagate themselves in the gene pool by 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. (Dawkins in Hofstadter and Dennett 1981, p. 143)

Here, the metaphorical meme has been made active in its pursuit of replication. Gone is the passive, chaperoned copying of the molecular soup. Memes, in this presentation, are selfish predators. And our brains are their prey.

II. *Mind's in America, 1981–1988*

The Mind's I had a massive, and immediate, impact in the US. (Among other things, it popularized an essay by Stanislaw Lem that led to the creation of SimCity, the hugely popular computer game franchise [see Lew 1989].) By contrast, the market uptake of *The Selfish Gene* was slow. The cause of this difference, I suggest, is the same as that which caused the controversy noted by Dawkins in the preface to the second edition: the reception of each book was tied to its popularization. We must therefore understand one book—the meme’s popularizer (*The Mind's I*)—to understand the other (*The Selfish Gene*).

Originally released in November 1981 by Hofstadter’s publisher (Martin Kessler of Basic Books), *The Mind's I* was an immediate commercial success. By January 1982, it had become an official selection of Book-of-the-Month/Science, Macmillan Book Clubs, and Readers’ Subscription. In March, it was serialized in *Book Digest* magazine. And the pulp paperback Bantam edition was published in November 1982, which in turn went through seven printings by April 1988.⁴

The Mind's I was first reviewed in *The New York Times* on December 13, 1981. Reading the reviewer’s comments now, though, we must interpret

4. Noted on the copyright page of the 1988 edition.

his reaction as “mixed” at best—even as we note that Bantam later extracted a positive, though heavily-elided quote and included it on the back cover of the paperback edition.

The reviewer, William Barrett (who was well known for his works explaining philosophy to lay audiences), treated the book as if Hofstadter had been totalitarian in his direction of the project: “The chief voice throughout is that of the principal editor, Mr. Hofstadter.”⁵ Barrett also suggested that the commentaries had made interpretive mistakes, as a result of Hofstadter’s naiveté as a computer scientist dabbling in philosophy: “for all its stimulation, I found the book rather confusing, and even confused” (Barrett 1981).

Dennett was miffed. He set the record straight by letter on January 10, 1982: “Hofstadter . . . sought me out as his collaborator precisely to insure that the book would be philosophically sophisticated and informed. . . . Hofstadter and I enjoyed a collaboration that was intense, and our agreements run broad and deep” (Dennett 1982). And, indeed, it seems Dennett’s perspective prevailed. Barrett’s negative comments clearly did not damage the opinion of the reviews editor: the *Times* included *The Mind’s I* on the “books for vacation reading” list on June 6 (1982a), in the “new and noteworthy” list of paperbacks on November 14 (1982b), and highlighted it as one of the “notable books of the year” on December 5 (1982c). But this was just the beginning.

On August 21, 1983, James Gleick—then an assistant metropolitan editor at the *Times*, but shortly to become the bestselling author of *Chaos: The Making of a New Science*⁶—published a sprawling 7,000-word essay celebrating Hofstadter as a writer and a thinker. There, he noted that *The Mind’s I* had sold more than 100,000 copies after fewer than two years in print. He also quoted Dennett, who comments about the then-recent turn by philosophers to try and understand the mind as something more than an inflexible computational mechanism: “that’s something of a band-

5. Examining the end-of-chapter “reflections” reveals this to be somewhat misleading: of the 26 commentaries, 12 were authored individually by Hofstadter, 8 were authored individually by Dennett, 3 were co-authored but first-authored by Hofstadter, and 3 were co-authored but first-authored by Dennett. The preface was co-authored but first-authored by Hofstadter; the introduction authored individually by Dennett; and the “further reading” section co-authored but first-authored by Dennett. (There is no conclusion.) It is therefore clear, as Dennett (1982) points out in his letter to the editor, that this book was indeed the result of a full collaboration. The reviewer’s impression therefore likely came from the inclusion of three chapters (i.e., reprints) from Hofstadter and only one from Dennett.

6. Dawkins’ writing style clearly had an impact on Gleick: both *The Selfish Gene* and Gleick’s (1987) book are described by Matt Ridley (2006) as being exemplary of a new kind of science writing.

wagon these days,” he said, “and to get on that bandwagon you’ve got to pay attention to Hofstadter” (qtd in Gleick 1983).

Gleick’s conclusion is interesting in light of what ultimately happened with the popularization of Dawkins’ idea through the lens provided by Hofstadter and Dennett. It’s clear, from this perspective, that they did not intend a cold mechanistic reading:

Synapses and souls are hard to reconcile. But for many philosophers, and perhaps for the many nonspecialists drawn to Hofstadter’s writing, the outline of a bridge from one to the other is emerging. The most valued kinds of behavior seem to depend on a willingness to recognize the soul in ourselves and others—*the danger of looking only at the lowest biological level is in losing sight of the essential humanity that, in Hofstadter’s view, exists in the pattern and in the paradox.* (Gleick 1983; my emphasis)

Yet the intended perspective—the human duality of mechanism and mindfulness—was clearly at risk. The reviewer for the *Times*, Barrett, noted something similar about a possible misunderstanding by nonspecialists.

There is a curious schizoid state of our culture at work here. In our ordinary life we know that other people are conscious and have minds, and that there is an I behind their actions, unique in its own way but like our own, and this knowledge permeates all our social and personal intercourse with others. If we believed, really believed, in our everyday life that other people were merely intelligently behaving mechanisms, we would be pushing ourselves into psychosis. Yet in the theoretical parts of our culture, at least in our behaviorist moments, we affect to believe that it is sufficient, at least for the purposes of science, to regard human beings as mechanisms that behave with sufficient complexity to be called intelligent. (Barrett 1981)

Ultimately, however, whether these observations were fair or not is irrelevant for our purposes (*pace* Dennett). What matters is that they indicated a second, soulless, reading of *The Mind’s I* that Hofstadter himself had apparently not intended (cf. Hofstadter 2007).

III. Memes in America, 1981–1988

Just prior to the publication of *The Mind’s I*, Hofstadter began a successful column in *Scientific American*, a magazine of popular science. This ran from 1981 through 1983; the peak of his popularity and influence.

In January of 1983, Hofstadter published an essay that directly dis-

cusses his interpretation of the memes proposal. This was inspired, he said, by letters from readers of his previous columns—in particular, by letters from Stephen Walton and Donald Going, who suggested that self-referential sentences of the sort discussed in *Gödel, Escher, Bach* (e.g., “This sentence is false”) could be described as being afflicted by a kind of meaning-virus: self-reference parasitizes language, makes it inconsistent with itself, and then encourages the reader (as carrier) to find or construct new instances of meaning-breaking self-reference.

Given the existence of such self-replicating structures, Walton and Going wondered how meaning could be preserved. Hofstadter’s answer provides one of the earliest instances of the meme’s actual use in the popular press.

Both Walton and Going were struck by the perniciousness of such sentences: the selfish way they invade a space of ideas and manage, merely by making copies of themselves all over the place, to take over a large portion of that space. Why do they not manage to over-run *all* of the space? It is a good question. The answer should be obvious to students of evolution: the sentences do not do so because of competition from other self-replicators. One type of replicator seizes one region of the space and becomes good at fending off rivals; thus a “niche” in idea-space is carved out. (Hofstadter 1983, p. 14)

We see here the affinity with Dawkins’ original proposal, as well as with the sentential view of evolutionary biology to which Dawkins responded. Indeed, Hofstadter even pointed to Dawkins explicitly: “In 1976 the evolutionary biologist Richard Dawkins published his book *The Selfish Gene*, whose last chapter further develops this theme” (Hofstadter 1983, p. 14). But Hofstadter did not follow Dawkins’ rhetorical approach; rather, he followed the same problematic interpretation as he and Dennett had advanced in *The Mind’s I*.

Hofstadter’s meme isn’t just *like* a gene, in the sense that illuminates Dawkins’ Replicators Argument; it is *the same as* a gene, in the sense that both are replicator-kinds.

Memes, like genes, are susceptible to variation or distortion—the analogue of mutation. Various mutations of a meme will have to compete with one another, as well as with other memes, for attention, that is, for brain resources in terms of both space and time devoted to that meme. Memes must compete not only for inner resources but also, since they are transmissible visually and aurally, for radio and television time, billboard space, newspaper and maga-

zine column-inches and library shelf-space. Furthermore, some memes will tend to discredit others, and some groups of memes will tend to be internally self-reinforcing (Hofstadter 1983, p. 18)

This, clearly, is an example of the active, non-metaphorical meme. Perhaps tellingly, however, it didn't catch on right away; it wasn't "infectious." For that, it needed further re-engineering.

A book collecting the revised versions of Hofstadter's popular essays was published in 1985: *Metamagical Themas*. Although this was reviewed in *The San Francisco Chronicle* (Riordan 1985), *The New York Times* (Maddox 1985), and *The Washington Post* (Rucker 1985), none of the reviewers discussed his presentation of the meme as a self-replicating sentence. A hint appeared later in *The Washington Post*: "How did survival of the melodious give us Mozart?" (Mallove 1986). But the meme itself was not formally introduced to general audiences in the US until two years later. And, even then, it still took a while to catch-on. Our next section examines the relevant period: 1988–1995.

IV. Memes in America, 1988–1995

January 22, 1995, was something of a landmark date for the popular understanding of the meme. This is because *The New York Times Magazine* ran a short piece that explicitly explained what, at the time, a meme was. In describing the idea's source, however, it also made a curious connection: in addition to mentioning its origins in Dawkins' writings, it linked the meaning of the meme to a book by Dennett that had been published a few years before.

The best source seems to be "The Selfish Gene," by Richard Dawkins, a 1976 book that argued that an organism was just a gene's way of making more genes. . . . Daniel Dennett, who picked up the word in his book "Consciousness Explained," sees human consciousness as a collection of memes. (*New York Times Magazine* 1995)

We can read this as an innocent mention of the original source and a recent interpretation. Yet I suggest that it may be more accurate to interpret the resulting definition as the product of having been projected through the lens previously provided by Hofstadter and Dennett. Indeed: in the *Times'* original review of the book, published almost twenty years before, the reviewer hadn't bothered even to mention the meme—he had focused instead on the Replicators Argument (Pfeiffer 1977).

It is therefore clear that, by 1995, the meme had become active and

non-metaphorical. Yet it was also still sentential. And not trivially so: here, memes shape both language and thought.

Meme. Pronounced meem. Think of it as a thought virus or the cultural equivalent of a gene, a phrase, a way of thinking. For instance, the habit of saying “Yo,” as in “Yo, Dad, where’s my allowance?” might be thought of as an extremely successful, although trivial, meme. The idea of racism would be a more powerful and malevolent meme, while the idea of individual freedom would be a powerful and good meme. One meme that is starting to catch on is the very word “meme.” (*New York Times Magazine* 1995)

Whatever else the meme may have been, it seems clear from this that by the mid-1990s it had been reified in the US as something more than a rhetorical device. Yet, as the piece also suggests, this was not the meme’s first introduction to the American mass market. That task fell to Michael Schrage, in the late-1980s, who was then a fellow at the MIT Media Lab.

Schrage (1988a) introduced the general American reader to the meme via *The Washington Post* on October 30. His essay was subsequently edited and republished in the *Chicago Sun-Times* (on November 9 [1988c]) and the *San Francisco Chronicle* (December 11 [1988d]). In each replication, he explained the concept and—crucially, in terms of how the meme’s meaning continued to shift as others adopted it as their own—incorporated a discussion of its possible applications:

Like genes, memes can replicate themselves, mutate and travel from one host to another. They are literally ideas with a life of their own. Now researchers have begun using the notion to explain such diverse phenomena as the spread of innovation, drug addiction, birth control and political campaigns. And the new science of memetics may enable students of society to purge their discussions of such imprecise terms as “trend” and “tendency.”

Still, though, the result was mostly an academic discussion. But a side-bar published in *The Washington Post* and *The San Francisco Chronicle* made the meme more immediately relevant to readers:

The advertiser as memetic engineer would be able to splice memes together to create memorable and effective advertisements. . . . Mark [sic] Feldman of Stanford [then the Clifford G. Morrison Professor in Population and Resource Studies and editor of *American Naturalist*] is “surprised” that Madison Avenue hasn’t yet leapt to exploit the new concept. (Schrage 1988b; 1988e)

The meme thus became a topic of interest for business people: Schrage's sidebar introduced the idea of the selfish meme as a scientific tool for money-making.

Schrage expanded upon Feldman's comments in a later piece, published in *AdWeek* in August 1992. There, he called for the equivalent of a Human Genome Project for culture:

Just as there are gene markers that identify heritable traits, Feldman and others anticipate the discovery of "culture markers" that correlate the co-evolution of genes and memes. These "meme maps" might ultimately chart the future of memetic engineering and the advertising it inspires. . . . Researchers have yet to find the "double helix of culture," as Watson and Crick did with the double helix of life. But if they do, can a Mementech be far behind? If Dawkins and other sociobiologists are right about how culture evolves, everything we know about this industry's future is up for grabs. (Schrage 1992)

Memes, in Schrage's reading, offered an exciting future: a science of culture, which—given the allusion to Genentech and its incredibly successful performance on the stock market—would have huge implications for investment.

By 2003, however, Feldman had completely reversed his position: "the most recent attempts using a 'meme' approach (Blackmore 1999, Dawkins 1989) appear to be a dead end" (Ehrlich and Feldman 2003, p. 94). And indeed, this is consistent with the meme's changing fortunes within the Academy. Yet Schrage's intent, in his recollection, had not been to use the meme to advance a solution to an economic concern. Indeed, Feldman's later rejection was totally consistent with Schrage's earlier goals as a journalist.

When I asked Schrage about what he had hoped to achieve in writing the original essay, as part of a conversation by email in 2009, he explained that he had wanted to push the meme into the discussions then-ongoing at the boundary between evolutionary, psychological, and cultural theory. He wrote:

i do explicitly recall finding "memes" particularly interesting as a unit of analysis because a lot of the wilson/tooby evo-psychology and sociobiology crowd kind of did ch-cha-cha hand-waving around issues of "culture" and "learning"—memes as "viruses of the mind" and "pattern organizers" struck me as an underappreciated and underexplored construct . . . (Personal communication, 18 November 2009, 9:55 PM; typography as in the original)

Yet the idea's key attraction, for Schrage, was its simplicity: "i was struck by memes and the conceit of 'memetic engineering' because they were ACCESSIBLE ideas that bridged impenetrable academic discourse and 'pop' psychology . . ." (Personal communication, 18 November 2009, 9:55 PM; typography as in the original).

Schrage's goal, in other words, was to help readers engage with the debates surrounding the same ideas popularized by Hofstadter in *Gödel, Escher, Bach* and *The Mind's I*; to help make minds more thinkable from an evolutionary perspective.⁷ It was then Dennett who took up this challenge, initially in *Consciousness Explained*, which was published in 1991. But beyond its connection to *The New York Times'* definition, the details of that book as an intellectual achievement—although wonderful—are largely unimportant for our purposes. It is sufficient simply to point out that it was the popularization of Dennett's later reading of his and Hofstadter's take on the original meme proposal that helped to construct the context through which other ideas (e.g., Feldman's arguments regarding the implications of "niche construction" for cultural change)⁸ have since been read.

We end this chapter of our story with a final contribution from Schrage: his July 1995 feature, for *Wired*, which put Dawkins on the cover of a major American magazine. With this, the meme and its maker—or rather, their popular understanding—had both become thoroughly Americanized: "A meme for, say, astrology, could parasitize a mind just as surely as a hookworm could infest someone's bowels" (Schrage 1995).

V. Memes in the UK, 1995–1999

Our story ultimately ends with the publication of Susan Blackmore's *The Meme Machine* in 1999. This has become the contemporary touchstone for discussions of memes in both the US and the UK, including the debate regarding its meaning and subsequent dismissal—by Feldman and many others. But since the meme's introduction into the UK occurred later than it did in the US, it followed a different trajectory that must also be traced. Conveniently, however, Daniel Dennett's involvement on both sides of the Pond makes the two halves of the story commensurable.

While Dennett had played second fiddle to Hofstadter in *The Mind's I*, his own hugely successful book—*Darwin's Dangerous Idea* (1995), which in its turn also became a finalist for the Pulitzer Prize—secured his position

7. Confirmed by email (personal communication, 3 October 2010, 7:48 PM).

8. Feldman has been involved in related projects for many years. The earliest of these is Cavalli-Sforza and Feldman, 1973. The most relevant of his contemporary writings, in connection to the idea of "niche construction," are probably Laland, Odling-Smee, and Feldman, 2000; Laland, Odling-Smee, and Feldman, 2001.

as a public intellectual. This didn't translate into immediate fame in the UK, though: the British equivalent of Gleick's celebration of Hofstadter, and Schrage's celebration of Dawkins, was published by Andrew Brown (author of *The Darwin Wars* [1999]) in *The Guardian* well after the millennium (Brown 2004). Instead, and in parallel with the rest of our story, the British uptake of Dennett's ideas was slow: it started with a review of *Consciousness Explained* (Prowse 1992), followed a few years later by a review of *Darwin's Dangerous Idea* (Brittan 1995). And, indeed, it was in that later review that audiences in the UK were first introduced to the meme—in, of all places, the *Financial Times*.

The *Financial Times* is a business broadsheet; the UK equivalent of *The Wall Street Journal*. Its later uses of the meme-concept reflect this interest, as if almost in echo of Schrage's writings in the US. But first the connection was made to Dennett: in the British introduction of the meme, Dennett was presented as the lead expositor of Dawkins' original proposal.

... he follows a hint of Richard Dawkins, the Oxford biologist, that human ideas, beliefs and institutions may be studied by means analogous to genetics, but without reducing them to genes. To make the distinction they are named "memes"; but the detailed implications are largely left to the reader. (Brittan 1995)

Yet as we can see, in this first usage, very little else was "read in." That came later.

Following the initial introduction of the idea, journalists were enthusiastic in extending its active non-metaphorical meaning. For example, as Martin Mulligan explained in his discussion of the proselytizing use of the internet by religious organizations:

Few reasonable souls doubt any longer that the Net has ushered in a fresh communicative epoch. But similarly no reasonable soul could have foreseen such intellectual viral warfare breaking out on a scale unprecedented in the history of mass communication. The Net has effectively become a meme factory; a laboratory of good and bad infections. (Mulligan 1996)

By the mid-1990s, in other words, the internet had thus come to stand-in for the primordial ocean of replication. By the end of the millennium, however, this reading had been pushed much further.

Indeed, by the year 2000, Michael Prowse—the financial journalist who had written the review of *Consciousness Explained* in 1992—had begun to present the meme as something akin to a philosophical zombie-maker.

The significance of the idea, at least in the hands of Dennett and Blackmore, is that it throws doubt on the conventional view (at least in the liberal west) that individuals are independent, sovereign agents, broadly in control of their fates. What memeticists argue is that human beings exist in a soup of memes: how they turn out depends largely on which memes bed down in their brains, a matter that is often beyond their control. (Prowse 2000)

Clearly, regardless of how the idea came into being, the implication by the millennium was that understanding memes would give business leaders a more effective (read “scientific”) way to reach into the pocketbooks of their customers. And it is perhaps no surprise that, at around this time, marketing itself went “viral” (following Rushkoff 1994; Rayport 1996).

VI. Four Stages of Popularization

I think the popularization of the meme can be conceived of broadly as having developed through four stages. The first, which we have concentrated on here, relates to Hofstadter’s and Dennett’s involvement in its re-interpretation and the subsequent uptake of their version of the meme in newspapers; the second can be situated in the larger social context of the 1980s; the third, in the larger social context of the 1990s; and, the fourth, connected to the publication of Susan Blackmore’s *The Meme Machine* in 1999. Before concluding our discussion, we will briefly discuss each of these in turn.

Step 1: Dennett’s Reinterpretation

In §II, I suggested that it was through the cobbled-together re-presentation of Dawkins’ original proposal in *The Mind’s I* that the meme acquired its active, non-metaphorical meaning. This is a lot to lay on Hofstadter and Dennett. And I’m reluctant to do it, not least because I’m an admirer of both. But I think it’s fair. Why? Because, simply put, Hofstadter and Dennett made the idea of the active non-metaphorical meme thinkable as a social psychological entity. That said, however, their influence is split across time. Although Hofstadter (1985) popularized the term that was later used to describe the science of memes, “memetics” (p. 65), Dennett became increasingly influential through the 1990s.

The “smoking gun” demonstrating the primacy of Dennett’s later influence in popularizing the “meme” meme is provided first by his (1990) essay reaffirming the active view in explicit contrast to Dawkins’ (1982) retreat back to metaphor. This then provided the background against

which he developed the idea, more publicly, in *Consciousness Explained* (1991) and *Darwin's Dangerous Idea* (1995).

A further smoking gun is provided by Dawkins' own description of how his conception of the meme changed over time. Indeed, he was explicit in connecting the active meme to Dennett. As he explained in *Time* magazine in 1999:

I was always open to the possibility that the meme might one day be developed into a proper hypothesis of the human mind. I did not know, before I read *Consciousness Explained* and *Darwin's Dangerous Idea* by Daniel Dennett and then Susan Blackmore's new book, *The Meme Machine*, how ambitious such a thesis might turn out to be. Dennett vividly evokes the image of the mind as a seething hot-bed of memes. He even goes so far as to defend the hypothesis that "human consciousness is itself a huge complex of memes."
(Dawkins 1999a; see also Dawkins 1999b, p. ix)

Similarly, Dawkins' 1993 essay—"Viruses of the mind," which was posted online not long after it was published (noted by Mulligan 1996)—begins with a quote from Dennett. It seems, therefore, that the active meme can be more properly attributed to Dennett than to Dawkins. Yet how did this interpretation originally come to be? (Was it intended to be non-metaphorical?)

To be clear: I am not suggesting that the making of the active meme was the result of a misunderstanding. No one individual made a copying mistake; there was no "mutation" following continued replication. Rather, the active meaning came as a result of the idea's reconstruction: actions taken by individuals working in their own contexts. Thus: what was Dennett's context?

In 1978, Dennett published a book called *Brainstorms*, which Hofstadter reviewed for *The New York Review of Books* in 1980. This, in turn, led to the collaboration—also in 1980—which had as its fruit *The Mind's I*. (Dennett's chapter in that book is excerpted from *Brainstorms*.) The collaboration also led to a recommendation, by Hofstadter, that Dennett read Dawkins.⁹ And, coming full circle, it was in one of the essays collected in *Brainstorms* that Dennett introduced the idea that I think led to his espousing an active interpretation: "the intentional stance."

The intentional stance was originally intended to help people predict the actions of Others. A chess-playing computer could be made more thinkable, suggested Dennett (1971; reprinted in 1978) by way of exam-

9. Dennett explains this in *Darwin's Dangerous Idea*, 1995, p. 143; also in his essay of 2006, p. 102.

ple, if one were to treat it as an “intentional system”—*as if* it were “rational” (Dennett, 1978, p. 5). We can do the same thing in trying to understand the outcomes of evolution: “If we have reason to suppose that a process of natural selection has been in effect, then we can be assured that the populations we observe have been selected in virtue of their design” (p. 8). However, this also came with a warning: “a particular thing is an intentional system only in relation to the strategies of someone who is trying to explain and predict its behavior” (pp. 3–4). In other words: one should not be confused, by adopting the intentional stance, to make mistakes about the true nature of the simplified system’s supposed essences (see also Dennett 1987).

If we generalize this approach from predicting behavior to trying to understand culture, we immediately run into a problem: a cultural meme pool can be thought of as an intentional system only insofar as it remains an object of philosophical enquiry. As soon as it is reified as *actually involving intentions*, adopting either a “design stance” (*What did the individual human meme-maker intend?*) or a “physical stance” (*What is an intended meme made of?*) becomes more appropriate.

After comparing Dawkins’ original proposal with its later popularizations, I suggest that this rule (which we might call “Dennett’s Rule,” in echo of his appeal to Brentano’s thesis) became increasingly implicit over time. Indeed, without providing the same sort of editorial guidance in *The Mind’s I* as that which existed in *Brainstorms* (p. 3), the meme proposal could certainly have been read by non-philosophers as suggesting that these “cultural genes” actually do have intent; just as, without similar guidance by Dawkins, genes could be interpreted as actually being selfish in the same way that humans sometimes are. (Hofstadter, not Dennett, wrote the “reflections” on the memes chapter in *The Mind’s I*.) Although potentially productive in terms of the resulting predictions, this unremarked-upon application of the otherwise-useful intentional stance led the popular understanding astray.

Step 2: Greed is Good

If we expand the scope of the examination of the context in which Dawkins’ book was received, we must move beyond the intellectual environment and consider the broader social setting as well. Most notably: the stock market crash in October, 1987, followed in December by the theatrical release of the popular film *Wall Street*. The emergence of the meme in US newspapers at around this time could be read through this lens, as could the popular reception of the 1989 second edition of *The Selfish Gene*—exemplified, in particular, by Michael Douglas’ Academy Award-winning delivery of the famous line “greed . . . is good.”

I am of course not suggesting that it was this confluence of events which explicitly *caused* the emergence of the book's controversial reading into the public understanding. Rather, I am suggesting merely that such examples are representative of the larger context into which the second edition of the book fits.

At most, it seems reasonable to suggest that each new instance of the book's claims came to be treated as exemplary of the original message; each new meaning read through the implications of the last, rather than through its history. (For a discussion of the psychological and educational sides of this recursive function, see Burman 2008; for a discussion of a compatible model of bio-cultural causality, which blends "exaptation" with the Baldwin Effect, see Burman in press.) Greed and selfishness thereby came to be linked, first in language and then in the public understanding of what Dawkins seemed to imply: genes are selfish, and so are we, because *that's nature*. Society must be red in tooth and claw because *that's how evolution works*. This understanding of biology then became a property of minds and their ideas (see also Segerstråle 2000).

Unfortunately, however, my making the connection between *Wall Street* and *The Selfish Gene* is not original. Several observations on this theme were made in UK papers in the late-1990s (e.g., by Lynn and Trump 1998; James 1998). One of the authors, Oliver James (a clinical psychologist and television personality), expanded upon his earlier comment in 2008 in a way that makes my point quite clearly—albeit for different ends:

The history of the sales of Richard Dawkins' *The Selfish Gene* is an example of how such ideas ["the re-emergence of Social Darwinism clothed anew as evolutionary psychology"] knitted into neo-liberal ideology. Published in 1976, it was not until the 1980s that it became a bestseller. It was only when . . . Thatcherism took off that the book did too. Whatever its merits, the extent and timing of its success may be due to its central contention that we exist as machines for reproducing our selfish genes, a highfalutin justification for the "greed is good" ethos. . . . Dawkins' book, more than any other, supplied the "scientific" underpinning for Selfish Capitalism. (James 2008)

In his earlier comment, James included "Reaganism" as the American counterpoint to British Thatcherism, so the use of "neo-liberal" here should not be taken out of context and applied to American Democrats. Yet despite this potentially misleading use in a political context of a technical economic label, the point is well made: the controversy surrounding the book in the late-1980s was related to how its message was perceived, relative to the context in which it was received.

Step 3: Memetic Economy

The reverse of 1987's market crash occurred in the late-1990s. And just as there was a boom in the stock market, so was there also a boom in interest in all things related to memes. Memetics, from this perspective, provided a kind of folk psychology that was philosophically useful in thinking about economic behavior. In an essay published as this bubble then burst, Don Ross (2002) provided a more general version of the resulting argument: a Dennettian approach to explaining social behavior is useful only so long as you can assume that memetic (or, in Ross' case, economic) systems act like intentional systems. As soon as those rules began to break, and as the Dot-Com Bubble burst, the heuristic value of the intentional stance—and of the meme—disappeared.

Step 4: Blackmore's popularization

Given that Blackmore's book was one among many published in the late-1990s, it is not clear why *The Meme Machine* ultimately became the point of departure for all subsequent discussions of memetics. (Perhaps it was because Dawkins, whose work had been printed by the academic wing of the same publisher, anointed it as exemplary by contributing a foreword.) In any case, the value of the book for the idea's popularization is that it provided a single unified argument to which anyone could turn. It is lucid, well organized, and it also promoted Dennett's interpretation: "The meme . . . fits perfectly into Dawkins's idea of a replicator and into Dennett's evolutionary algorithm" (p. 14).

The main difference between Blackmore's replication of the meme and Dennett's, however, was that Blackmore dropped the intentional stance even as she kept its active interpretation. While the stance had been implicit in Dennett's discussions of the meme, it was absent in Blackmore's. As a result, following the publication of *The Meme Machine*, the meme was reified completely.

VII. Conclusion

I suspect, on the basis of the material reviewed, that the increasing controversy surrounding *The Selfish Gene* emerged as a result of reading Hofstadter's and Dennett's active non-metaphorical presentations of the meme "back in" to Dawkins' apparently sociobiological discussion of the selfishness of replicators. When the second edition was published in 1989, there was therefore already a widespread popular misunderstanding of what it was that he meant. How did this change?

For the first five years after *The Selfish Gene* had been published, it was a well-written academic argument. Over the next five years, it became interesting to the public. After 1987, it became insightful; a useful way to un-

derstand what was happening in the financial world. And in the 1990s, it became sacred—a prescient vision celebrated by Blackmore and other authors. This is now being unraveled, but the value of the original metaphor has been lost: memes have a meaning, and it isn't metaphorical.

So what? On its face, this analysis seems like it would *support* meme theory: an original idea was introduced, and then it mutated through replication and selection as it worked to achieve its own “critical mass for take-off” (cf. Dawkins 1986, pp. 219–220). Actually, such an interpretation seems fairly cut-and-dried. But this drift in meaning should not be taken as evidence for the theory as it exists now. The mutation of the “meme” meme is not the result of copying errors as it leapt from brain to brain, but of reconstructions by different brains in different contexts.

The brain is active, not the meme. What's important in this conception is the function of structures, in context, not the structures themselves as innate essences. This even follows from the original argument of 1976: if there is such a thing as a meme, then it cannot exist as a replicator separately from its medium of replication.

The medium is where messages are remade, and in the process of their remaking there is a competition for scarce resources. Dawkins tried to make this clear, in 1982, in *The Extended Phenotype*:

It is true that the relative survival success of a meme will depend critically on the social and biological climate in which it finds itself. . . . But it will also depend on the memes that are already numerous in the meme-pool. . . . If the society is already dominated by Marxist, or Nazi memes, any new meme's replication success will be influenced by its compatibility with this existing background. (p. 111)

Despite this more limited position, however, Dawkins' active language—and the non-metaphorical interpretation it affords—remained as the idea was popularized. Yet we should be clear: a meme, if it does exist, cannot seek out prey. And it certainly cannot leap from one brain to another. The conceit of thinking in this way is just useful sometimes.

Public understanding inflects scientific meaning. This brings us to the substantive claim that I wish to make; the observation that makes this essay about something more than memes.

We see in the vignette provided by Feldman's exuberant acceptance of memes in the late-1980s, followed by their near-complete rejection in the early-2000s, that the lines of scholarly communication don't just go one way: there is an interaction between “science,” the “public understanding of science,” and the “thoughts of scientists” (cf. Stekolschik, Draghi, Adaszko, and Gallardo 2010). As we have seen in this case, this interac-

tion provides the implicit frame through which scientific thoughts become thinkable. Indeed, if we are to understand the implications of scientific claims, then we must also understand the social processes through which their contents become meaningful as they are translated through the public understanding.

It's true that, as Dennett replied to Barrett following his negative review of *The Mind's I* in *The New York Times*, a "real" philosopher would have understood what he and Hofstadter had been up to. But that Feldman—who was even then an important figure in evolutionary biology (and also, like Hofstadter and Barrett, a former Guggenheim Fellow)¹⁰—didn't immediately see what Dennett thought was obvious suggests that Barrett's concern was well-founded. In fact, I would go one better: I suggest that his concern can be generalized into a law. Hence, *Barrett's Law: not everyone who might read the productions of scholarly writers is an expert in the fields discussed.*

Long before the rise of interdisciplinarity as a scholarly ideal, academics were reading material from outside their discipline. And they were doing so because those ideas interested them. (Indeed, how is this different from how non-academics choose what to read?) The lesson therefore seems simple: we must be careful in how we choose to present our ideas, lest they be misunderstood—and especially if they can be misunderstood in a way that becomes harmful to others (Teo 2008).

Barrett's concern, in this connection, was recently reiterated. Philip Stewart, an ecological economist at Oxford, sent a letter to *New Scientist* in 2006 that repeated many of the same worries about how Dawkins' writing has been received:

Hardly any have read his more scientific work, and many who have not read even that one book have concluded that it has been "scientifically proven" that "we are born selfish," as Dawkins says in his first chapter, confusing his technical sense of the word "selfish" and its everyday meaning. (Steward 2006)

In short, it seems almost as if Dawkins' meaning has been obscured by how he is understood. If this is true, however, then we are left with a problem: Dawkins is one of the best and most successful writers of science around (Ridley 2006).

For Schrage-the-journalist to have been surprised—"stunned," as he

10. Dennett received his Guggenheim Fellowship, for philosophy, in 1986. The subjects and dates for the others, in order of receipt, are: Barrett, philosophy, 1974; Feldman, organismic biology and ecology, 1976; Hofstadter, computer science, 1980. (This information is available at the John Simon Guggenheim Memorial Foundation website: www.gf.org.)

put it when we talked (Personal communication, 18 November 2009, 11:02 PM)—that Dawkins never developed his memes proposal into a proper book reflects the larger issue we must now attempt to take on: *How are we to write in a way that's engaging, yet also ensures that we are understood in the way we intend?* Dawkins' (2008) latest collection, *The Oxford Book of Modern Science Writing*, takes strides in this direction by providing examples of some of the best writing from the past century. But his commentaries, like those by Hofstadter and Dennett in *The Mind's I*, provide very little in the way of additional direction. We are thus left, simply, with this: the ideas of others are good to think with, but they may not always mean what you think.

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