study of science has never been a more interesting field. It will likely shape the future perception of science as greatly as did the positivism of the last century.

Ian Hacking is among the best philosophers now writing about science. His book is about more than an ephemeral *Kulturkampf.* He discusses psychopathology, weapons research, petrology, and South Pacific ethnography with the same skeptical intelligence he brings to quarks and electron microscopy. It is not his aim to enter a partisan controversy, still less to decide it. Instead, he clearly explains what is at stake—nothing less than the intellectual authority of modern science. "Fuzzy dragon" that it may be, social constructionism poses a serious argument. To answer it, philosophers and scientists will have to think hard about how science works and why it is important.

BOOKS: EVOLUTION

Flying Over Uncharted Territory

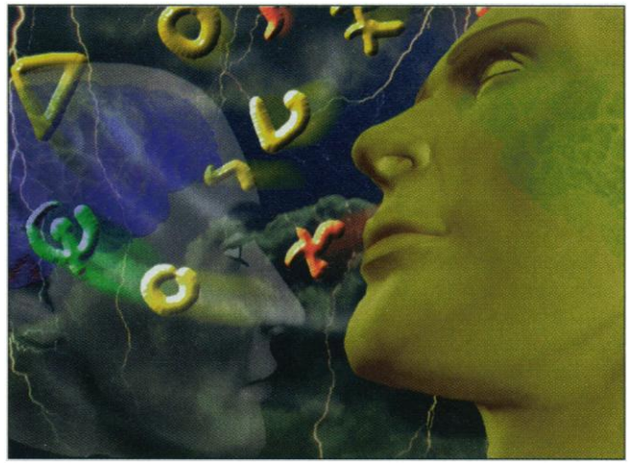
David Sloan Wilson

Human culture is still a blank spot on the map of scientific understanding. Cultural change is often likened to an evolutionary process, but cultural anthropologists tend to be anti-biological, even anti-scientific. Theories of cultural evolution, developed primarily by biologists, present culture as everything from a servant of the genes to its own master, liberated from the laws of both biology and psychology.

Among this varied crowd is the concept of memes, a term coined by Richard Dawkins in his famous book *The Selfish Gene* (1976). Memes are units of cultural transmission (or imitation). They share with genes the status of replicator, because both are copied across generations with high fidelity. Like genes, memes that evolve are "selfish," existing only to replicate themselves. In this view, not only are we lumbering robots controlled by our genes, but we are also controlled by our memes, which do not always agree with our genes. For example, memes might compel us to produce symphonies instead of babies.

Dawkins' main point was to show that genes are not the only replicators. In *The Meme Machine*, psychologist Susan Blackmore attempts to develop the meme concept into a full-fledged theory of cultural evolution. Her book belongs to a genre that strives for both scientific importance and mass-audience appeal. It is published by a distinguished university press but has the splashy cover of a trade book, with memes that look like children's breakfast cereal floating between two human heads and lightning bolts in the background for dramatic effect. Ideally, it should be as revolutionary as Darwin's *Origin* and so readable that you want to take it to the beach. This genre works best when important scientific developments are reported to a wider audience by a gifted writer, who need not be involved in the actual research. Unfortunately, there have been no recent breakthroughs in meme research, which places Blackmore in an impossible position. She must achieve the breakthrough herself and describe it for nonspecialists—all in one book. Not surprisingly, she fails.

The Meme Machine
by Susan Blackmore
Oxford University Press, New York, 1999. 286 pp. $25, £18.99. ISBN 0-19-850365-2.



A memetic adaptation. The splashy dust jacket illustration may help transmit the concept of memes to a wider audience.

Part of the problem stems from the replicator concept, which has led to some interesting insights but often merely redescribes the familiar. Although those selfish genes care only about replicating themselves, that action usually requires coordination with other genes, suggesting the conventional view of well-adapted organisms. Genes have "extended phenotypes" that reach beyond the individual organism, but how does this change our understanding of familiar examples such as termite mounds and beaver dams? In much the same way, selfish memes often turn out to be a convoluted way to describe the obvious. What do we gain by thinking of the first four notes of Beethoven's fifth symphony as a powerful meme? Or by saying that "Religious memes are stored, and thus given improved longevity, in the great religious texts"?

More problems arise when we try to think of culture as broken into replicating units like genes. Unlike genes, memes do not exist in a physical form. It is hard to identify a unit (a problem also existing for genes). And memes may not even replicate with high fidelity, as the children's game of telephone attests. Blackmore and Dawkins (in his introduction) confront some of these problems, sometimes quite successfully, but one of the largest problems is not addressed. The oft-repeated accusation that natural selection is a tautology fails because fitness is not defined in terms of whatever evolves but in terms of the properties that enable organisms to survive and reproduce in their environments. Moths that are colored to match their background have a high fitness with respect to bird predation, but cryptic coloration may not evolve if the appropriate mutations either do not arise or are lost by genetic drift. The ability to define fitness independently of what evolves saves the concept of natural selection from being a tautology. For the meme concept to escape the same problem, we must define cultural fitness independently of what evolves. If the first four notes of Beethoven's fifth is a powerful meme only because it is common, we have achieved no insight.

Another problem is that Blackmore addresses such large issues—our big brains, language, sex, altruism, religion, the concept of self—that her analysis becomes hopelessly superficial. In each case, huge literatures and complex issues are skimmed and found wanting in a few pages, paving the way for the new memetic approach, which is itself presented in only a few more pages. The effect on the reader is ultimately boring, like a person at a cocktail party who approaches you with a new theory for the fall of the Roman Empire.

Understanding the terra incognita of culture will require hard empirical research informed by solid theory. It will be more like trudging through a rain forest than cruising overhead at 30,000 feet. Blackmore's enthusiasm for the meme concept is genuine and may even be justified, but to make progress she will need to exchange her pilot's cap for a pith helmet.

CREDIT: *THE MEME MACHINE*

The author is in the Department of Biological Sciences, Binghamton University, State University of New York, Binghamton, New York 13902–6000, USA. E-mail: dwilson@binghamton.edu