BOOKS: HISTORY OF SCIENCE

Studied Ambiguity

Richard Rorty

Shaping Science with Rhetoric
The Cases of Dobzhansky, Schrödinger, and Wilson
by Leah Ceccarelli

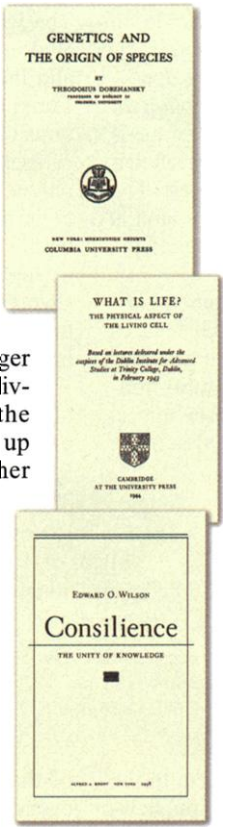
University of Chicago Press, Chicago, 2001. 216 pp. $55, £35. ISBN 0-226-09906-7. Paper, $20, £13. ISBN 0-226-09907-5.

Fifty years ago, when logical positivism and the "unity of science movement" were in flower, it seemed evident that natural scientists had no use either for rhetoric or for metaphor. Everybody took for granted that the scientificity, and thus the worth, of a discipline was a matter of its proximity and resemblance to that "hardest" of all sciences, physics. A "good" scientist, the positivists told us, deals only in logical arguments and "hard" facts. People working in the "soft" disciplines should toughen up and do the same. They should acknowledge that, as the neo-positivist Edward O. Wilson put it in his *Consilience: The Unity of Knowledge* (*1*), "All tangible phenomena, from the birth of stars to the workings of social institutions, are based on material processes that are ultimately reducible, however long and torturous the process, to the laws of physics."

Much has changed since those days. Two generations of post-Kuhnian philosophers, historians, and sociologists have done their best to fuzz up the logic-rhetoric and hard-soft distinctions. Contemporary philosophers of physics like Nancy Cartwright (*2*) argue that scientific fundamentalists who accept Wilson's reductionist claim have no more evidence for it than religious fundamentalists have for claiming that God's benevolence is manifest throughout the Creation.

If not the villain of Leah Ceccarelli's *Shaping Science with Rhetoric*, Wilson is at least the fall guy. Ceccarelli contrasts the failure of *Consilience* to rally support for the unification of knowledge with the success of Theodosius Dobzhansky's *Genetics and the Origin of Species* (*3*) in getting the natural historians and the geneticists of the 1930s to take each other seriously. She also considers the strategy Erwin Schrödinger used in his *What is Life?* (*4*) to jump-start molecular biology.

Ceccarelli treats all three books as what she calls "interdisciplinary inspirational monographs"—books designed to get the author's fellow academics to work together on common projects. Dobzhansky became famous for his fundamental contribution to "the modern synthesis" of genetics and evolutionary theory. His book was widely praised for accurately summarizing the most up-to-date scientific results. But, Ceccarelli goes on to note, the book contained no original ideas and promulgated no unifying theories. Rather its success was largely due to rhetorical devices, such as the metaphor of "adaptive landscapes." She comments, "After assimilating this metaphor, the thought patterns of each group would change: whenever geneticists would think about gene frequencies, they would imagine populations moving about in space; whenever naturalists thought about populations inhabiting ecological niches, they would think about the alteration of gene frequencies."



Schrödinger's book was generally admitted to be neither original, nor up-to-date, nor accurate. It was short on both hard facts and rigorous arguments. But it was genuinely inspiring, very widely read, and remarkably influential. One reason was that it was all things to all scientists. Nobody could tell exactly what Schrödinger meant by his famous claim that "living matter, while not eluding the 'laws of physics' as established up to date, is likely to involve 'other laws of physics' hitherto unknown, which, however, once they have been revealed will form just as integral a part of this science as the former." But this uncertainty left everybody, reductionists and anti-reductionists alike, free to read whatever stirring suggestions they pleased into Schrödinger's text.

They joyfully did so. Ceccarelli quotes four distinct, almost equally plausible, ways in which that passage was interpreted. She argues that what she calls "polysemy" (but might equally well have called "studied ambiguity") was crucial to the success of "a text rhetorically designed to negotiate different interests and beliefs." Like Dobzhansky, Schrödinger had something for everybody. He let everybody think that their own discipline, and perhaps even their own research program, had a good chance of initiating a cascade of important scientific discoveries.

In contrast to the approaches of these two authors, Ceccarelli claims, Wilson's *Consilience* was "a text rhetorically designed to fuel interdisciplinary hostilities." Wilson employed "a rhetoric of conquest rather than the rhetoric of negotiation used by Dobzhansky and Schrödinger." Although he presented himself as a syncretic bridge-builder, "the majority of metaphors used by Wilson to describe interdisciplinarity established an image of one territory dominating another through an expansionist war." Wilson seemed to show no more interest in finding out what biologists could learn from sociologists or literary critics than Genghis Khan showed in cultural diversity.

Ceccarelli hypothesizes that "Wilson's rhetorical choices in *Consilience* were influenced by an implicit theory of persuasion that was drawn from his socio-biological theory." She believes he decided to use "a rhetoric of conquest that was almost certain to sacrifice the potential assent of social scientists and scholars in the humanities because he thought that this approach would do the most to persuade natural scientists to engage in interdisciplinary activity." Just as Genghis Khan's target audience was the home-loving Mongol who had to be pressured to join the Golden Horde, so Wilson's was the reluctant colleague who had to be persuaded to take up the natural scientist's burden.

Whether or not that is the best explanation for Wilson's choice of rhetoric, and thus for the reception of *Consilience*, it is imaginative and plausible. Ceccarelli's book is full of such suggestive hypotheses, and is a good augury for the future of the relatively new sub-discipline called "the rhetoric of science," the area in which she works as a member of the Department of Speech Communication at the University of Washington. Her account of how Dobzhansky and Schrödinger succeeded helps us appreciate that scientists are as easily moved by ingenious metaphors as are litterateurs. She helps us

The author is in the Department of Comparative Literature, Stanford University, Stanford, CA 94305–2031. E-mail: rrorty@stanford.edu

see that a clever turn of phrase, or a strategic ambiguity, has sometimes done as much for scientific progress as even the most rigorous inference from even the hardest data.

References and Notes

1. E. O. Wilson, *Consilience: The Unity of Knowledge* (Knopf, New York, 1998).
2. Cartwright advances this argument in her recent book, *The Dappled World: A Study of the Boundaries of Science* (Cambridge Univ. Press, Cambridge, 1999), which is a sequel to her *How the Laws of Physics Lie* (Oxford Univ. Press, Oxford, 1983).
3. T. Dobzhansky, *Genetics and the Origin of Species* (Columbia Univ. Press, New York, 1937).
4. E. Schrödinger, *What Is Life? The Physical Aspect of the Living Cell* (Cambridge Univ. Press, Cambridge, 1944).

BOOKS: PSYCHOLOGY

Some of the Truth

John Polkinghorne

It takes a pretty self-confident reductionist to suppose that a book of a few hundred pages can dispose of all the questions that have been asked for many centuries about a complex aspect of human experience. Only those who think that they possess the master key that turns every intellectual lock could attempt so implausible an enterprise. After Daniel Dennett's bombastically entitled *Consciousness Explained*, now comes Pascal Boyer's *Religion Explained*. Such grandiose attempts fail in their imperialistic intentions, but that does not mean that they are without more modest interest. The single level of the reductionist discussion is a significant dimension, if only one, of the many-layered subject at hand.

Boyer is a professor at Washington University in St. Louis whose research focuses on the relations between cognitive development and the acquisition of cultural concepts. His chosen explanatory principle is an anthropologically based social science set in the context of evolutionary psychology. Two self-imposed restrictions severely limit the adequacy of his discussion. One is the complete bracketing off of the possibility that there might be truth about a transcendent reality contained within the diverse accounts of encounters with the sacred. It would be odd indeed to talk about science without considering its relation to the physical world. In the case of religion, however, we are briskly told that there will be no discussion of the view that it contains any truthful insight, and that is that. The second limitation is that the many examples of religious beliefs and practices discussed in the book are almost exclusively drawn from what one might call tribal religion. The world's great faith traditions (such as Buddhism, Christianity, Hinduism, Islam, and Judaism) are only very occasionally referred to, and then in simplistic and tendentious terms. This approach is the equivalent of seeking to explain science by reference only to accounts of the early alchemists—a topic not without interest, but scarcely the whole story. As far as this book is concerned, the typical religious figure is the shaman. Those significant religious figures, the prophet and the mystic, are conspicuous by their absence.

Boyer has recourse to a number of explanatory techniques. One is evolutionary psychology, with its discourse that can never be free from a degree of just-so storytelling, though Boyer has the honesty to often preface such episodes by the qualifier "quite likely." Coupled with this, the author uses the dubiously atomistic theory of culture that understands its subject as arising from the competing propagation of "memes." (It is a standard trick of the evolutionary reductionist to make everything look as genetic as possible.) Another of his resources is what one might call "the New Phrenology," a modular account of the human mind in which thoughts are supposed to arise from the interaction between separate, evolved "inference systems."

The author often takes some simplistic statement about religion, such as the claim that religion's use is to buttress morals, and stands it on its head: "To some extent religious concepts are parasitic upon moral intuitions" (the latter to be understood, of course, sociobiologically). In actual fact, the connection between religion and morality is more complex than either of these extreme positions. The two sets of insight stand in a subtle relationship of support, not altogether unlike the mutual self-sustaining of theory and experiment in science.

Much of *Religion Explained* is concerned with rather general issues. Boyer offers interesting insights into topics such as child development and only brings religion explicitly in toward the end of these discussions. The book's tone has the flatness that goes with reductionism, so that the actual richness of personal encounter is simply discussed in terms of the mind's "person-file system." Boyer provides no strategic explanation of the many-layered phenomenon of religion, but he certainly gives us some tactical insights derived from his chosen discipline—just as the sociologists of science have some things of value to say without being able to give an adequate account of the whole. For example, he makes the perceptive comment concerning the phenomenon of religious fundamentalism that it is "neither religion in excess nor politics in disguise. It is an attempt to preserve a certain kind of hierarchy based on coalition, when this is threatened by the perception of cheap and therefore likely defection." Religion explained? No. Religion illuminated? Up to a point.

Religion Explained
The Evolutionary Origins of Religious Thought
by Pascal Boyer

Basic Books, New York, 2001. 383 pp. $27.50. ISBN 0-465-00695-7.

The author is retired from Queens' College, Cambridge, CB3 9ET, UK.

BROWSINGS

Kokopelli. The Making of an Icon. *Ekkehart Malotki.* University of Nebraska Press, Lincoln, 2001. 177 pp. $35, £24. ISBN 0-8032-3213-6.

The image and name of the humpbacked fluteplayer Kokopelli appear on everything from jewelry and t-shirts to nature trails and string quartets. Malotki finds that the figure's popularity developed through cultural misunderstandings and linguistic corruptions that have blended and confused several elements: a prehistoric rock art motif from the Four Corners area; the contemporary icon based on this rock art; the Hopi kachina Kookopölö, modeled on the robber fly, who has a hump and is associated with fertility but never carries a flute; and *maahu*, the cicada, whose flute playing warms the earth and ripens crops. In addition to discussing these ethnographic elements, the author presents six Hopi oral tales that demonstrate the contrast between the traditional material and today's ubiquitous mythical fluteplayer of the Southwest.

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