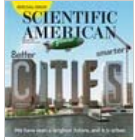


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## What Is Pseudoscience?

Distinguishing between science and pseudoscience is problematic

By Michael Shermer | Thursday, September 15, 2011 | 52 comments

Climate deniers are accused of practicing pseudoscience, as are intelligent design creationists, astrologers, UFOlogists, parapsychologists, practitioners of alternative medicine, and often anyone who strays far from the scientific mainstream. The boundary problem between science and pseudoscience, in fact, is notoriously fraught with definitional disagreements because the categories are too broad and fuzzy on the edges, and the term “pseudoscience” is subject to adjectival abuse against any claim one happens to dislike for any reason. In his 2010 book *Nonsense on Stilts* (University of Chicago Press), philosopher of science Massimo Pigliucci concedes that there is “no litmus test,” because “the boundaries separating science, nonsense, and pseudoscience are much fuzzier and more permeable than Popper (or, for that matter, most scientists) would have us believe.”

It was Karl Popper who first identified what he called “the demarcation problem” of finding a criterion to distinguish between empirical science, such as the successful 1919 test of Einstein’s general theory of relativity, and pseudoscience, such as Freud’s theories, whose adherents sought only confirming evidence while ignoring disconfirming cases. Einstein’s theory might have been falsified had solar-eclipse data not shown the requisite deflection of starlight bent by the sun’s gravitational field. Freud’s theories, however, could never be disproved, because there was no testable hypothesis open to refutability. Thus, Popper famously declared “falsifiability” as the ultimate criterion of demarcation.

The problem is that many sciences are nonfalsifiable, such as string theory, the neuroscience surrounding consciousness, grand economic models and the extraterrestrial hypothesis. On the last, short of searching every planet around every star in every galaxy in the cosmos, can we ever say with certainty that E.T.s do not exist?

Princeton University historian of science Michael D. Gordin adds in his forthcoming book *The Pseudoscience Wars* (University of Chicago Press, 2012), “No one in the history of the world has ever self-identified as a pseudoscientist. There is no person who wakes up in the morning and thinks to himself, ‘I’ll just head into my pseudolaboratory and perform some pseudoexperiments to try to confirm my pseudotheories with pseudofacts.’” As Gordin documents with detailed examples, “individual scientists (as distinct from the monolithic ‘scientific community’) designate a doctrine a ‘pseudoscience’ only when they perceive themselves to be threatened—not necessarily by the new ideas themselves, but by what those ideas represent about the authority of science, science’s access to resources, or some other broader social trend. If one is not threatened, there is no need to lash out at the perceived pseudoscience; instead, one continues with one’s work and happily ignores the cranks.”

I call creationism “pseudoscience” not because its proponents are doing bad science—they are not doing science at all—but because they threaten science education in America, they breach the wall separating church and state, and they confuse the public about the nature of evolutionary theory and how science is conducted.

Here, perhaps, is a practical criterion for resolving the demarcation problem: the conduct of scientists as reflected in the pragmatic usefulness of an idea. That is, does the revolutionary new idea generate any interest on the part of working scientists for adoption in their research programs, produce any new lines of research, lead to any new discoveries, or influence any existing hypotheses, models, paradigms or worldviews? If not, chances are it is pseudoscience.

We can demarcate science from pseudoscience less by what science is and more by what scientists do. Science is a set of methods aimed at testing hypotheses and building theories. If a community of scientists actively adopts a new idea and if that idea then spreads through

the field and is incorporated into research that produces useful knowledge reflected in presentations, publications, and especially new lines of inquiry and research, chances are it is science.

This demarcation criterion of usefulness has the advantage of being bottom-up instead of top-down, egalitarian instead of elitist, nondiscriminatory instead of prejudicial. Let science consumers in the marketplace of ideas determine what constitutes good science, starting with the scientists themselves and filtering through the editors, educators and readers. As for potential consumers of pseudo-science, that's what skeptics are for, but as always, caveat emptor.

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