

INTRODUCTION

Why the Demarcation Problem Matters

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Ever since Socrates, philosophers have been in the business of asking questions of the type “What is X?” The point has not always been to actually find out what X is, but rather to explore how we think about X, to bring up to the surface wrong ways of thinking about it, and hopefully in the process to achieve an increasingly better understanding of the matter at hand. In the early part of the twentieth century one of the most ambitious philosophers of science, Karl Popper, asked that very question in the specific case in which X = science. Popper termed this the “demarcation problem,” the quest for what distinguishes science from nonscience and pseudoscience (and, presumably, also the latter two from each other).

As the first chapters in this collection explain, Popper thought he had solved the demarcation problem by way of his criterion of falsifiability, a solution that seemed very convincing when he compared the eminently falsifiable theory of general relativity with the entirely unfalsifiable theory of psychoanalysis (Freudian or otherwise). Modern philosophers—made more wary by widespread appreciation of the issues raised in this context by the works of Pierre Duhem and W. V. O. Quine—have come to the conclusion that Popper was a bit too quick in declaring victory. They recognize that science is not a unified type of activity and that an ever-changing continuous landscape may connect it with nonscientific endeavors.

Nonetheless, the contributors to this volume also think that Larry Lau-

dan's famous dismissal of the demarcation problem—almost three decades ago now—as an ill-conceived and even pernicious pseudoproblem, and of terms like “pseudoscience” as pieces of hollow rhetoric, was just as premature and misguided. Laudan may have forgotten Socrates' lesson: even if we do not arrive at a neat and exceptionless formal definition of some X, based on a small set of necessary and jointly sufficient conditions, we may still come to learn a lot in the process. If we raise the bar for the demarcation project too high, settling for nothing less than a timeless and essential definition, a death pronouncement such as Laudan's is all too easy to make. As Daniel Dennett put it in *Darwin's Dangerous Idea: Evolution and the Meanings of Life* (1995), “nothing complicated enough to be really interesting could have an essence.”

Philosophers and scientists readily recognize a pseudoscience when they see one. Of course, certain interesting borderline cases are hotly disputed among scientists and philosophers, but even Popper's notorious critic Thomas Kuhn acknowledged that, despite their philosophical differences about demarcation, both of them were in remarkable agreement about paradigmatic cases, as were most of their colleagues. To argue that philosophers can neither spell out which criteria we implicitly rely on to tell science from pseudoscience, nor are able to evaluate and further refine those criteria, would be to relinquish one of the most foundational tasks of philosophy (what is knowledge? how do we attain it?). For too long, philosophers have been dwelling over technical problems and exceptions to formal demarcation criteria, only to rashly conclude that the demarcation problem is dead and that there is no such thing as “pseudoscience.” We think this is mistaken.

This volume testifies to a lively and constructive discussion about demarcationism among philosophers, sociologists, historians, and professional skeptics. By proposing something of a new philosophical subdiscipline, the Philosophy of Pseudoscience, we hope to convince those who have followed in Laudan's footsteps that the term “pseudoscience” does single out something real that merits our attention. A ballpark demarcation of pseudoscience—with a lot of blanks to be filled in—is not difficult to come up with: if a theory strays from the epistemic desiderata of science by a sufficiently wide margin while being touted as scientific by its advocates, it is justifiably branded as pseudoscience.

The nature of science and the difference between science and pseudoscience are crucial topics for philosophers, historians, and sociologists of science for two fundamental reasons. First, science is having an ever-increasing

impact in modern society. Science commands much public attention and prestige; it is funded at very high levels by governments and the private sector; its departments take more and more space and resources on university campuses; and its products may be beneficial to human welfare or bring about great destruction on a scale never before imaginable. It is therefore of compelling interest to all of us to understand the nature of science, its epistemic foundations, its limits, and even its power structure—which, of course, is precisely what philosophy, history, and sociology of science are set up to do.

Second, and in a complementary way, we also need a philosophical (and historical and sociological) understanding of the phenomenon of pseudoscience. The lack of interest for pseudoscience in some philosophical quarters derives from the tacit assumption that some ideas and theories are so *obviously* wrong that they are not even worth arguing about. Pseudoscience is still too often considered a harmless pastime indulged in by a relatively small number of people with an unusual penchant for mystery worship. This is far from the truth. In the form of creationism and its challenges to the study of evolution, pseudoscience has done great damage to public education in the United States and elsewhere; it has swindled people of billions of dollars in the form of “alternative” medicine like homeopathy; it has caused a lot of emotional distress, for example, to people who are told by mystics and assorted charlatans that they can talk with their dead loved ones. Conspiracy theories about AIDS, which are widespread in many African countries and even in the United States, have literally killed countless human beings throughout the world. Denialism about climate change, which seems to be ineradicable in conservative political circles, may even help to bring about a worldwide catastrophe. Dangerous cults and sects such as Scientology, which are based on pseudoscientific belief systems, continue to attract followers and wreak havoc in people’s lives. Even apart from the very real consequences of pseudoscience, we should pause to consider the huge amount of intellectual resources that are wasted in shoring up discredited theories like creationism, homeopathy, and psychoanalysis, not to mention the never-ending quest for evidence of the paranormal and the indefatigable activism of conspiracy theorists.

Pseudoscience can cause so much trouble in part because the public does not appreciate the difference between real science and something that masquerades as science. Pseudoscientists seem to win converts because of a combination of science parroting and of distrust of academic authorities, both of which appear to be particularly palatable to so many people. In addition,

pseudoscience thrives because we have not fully come to grips yet with the cognitive, sociological, and epistemological roots of this phenomenon. This is why the demarcation problem is not only an exciting intellectual puzzle for philosophers and other scholars, but is one of the things that makes philosophy actually relevant to society. Philosophers, accordingly, do not just have a scholarly duty in this area, but ethical and social ones as well. For all these reasons, we asked some of the most prominent and original thinkers on science and pseudoscience to contribute to this edited volume. The result is a collection of twenty-four essays, grouped under six thematic sections, to help bring some order to a large, complex, and inherently interdisciplinary field.

In the first part on “the problem with the demarcation problem,” Massimo Pigliucci assesses in some detail Laudan’s objections to the research program and goes on to propose an approach based on a quantifiable version of Wittgensteinian family resemblance. In a similar vein, Martin Mahner suggests a cluster approach to demarcationism, drawing inspiration from the taxonomy of biological species, which does not yield to essentialist definitions either. James Ladyman deploys Harry Frankfurt’s famous analysis of “bullshit” to highlight the difference between pseudoscience and straightforward scientific fraud. Sven Hansson recasts the demarcation problem in terms of epistemic warrant and proposes an approach that views science as unified on an epistemological level, while still accounting for diversity in its methods. Maarten Boudry tries to clear up some confusion between what he calls genuine demarcation (the science/pseudoscience boundaries) and the “territorial” demarcation between science and other epistemic fields (philosophy, mathematics).

The second part deals with the history and sociology of pseudoscience. Thomas Nickles gets things started with a brief but comprehensive history of the demarcation problem, which leads into Daniel Thurs and Ronald Numbers’s historical analysis of pseudoscience, which tracks down the coinage and currency of the term and explains its shifting meaning in tandem with the emerging historical identity of science. While we purposefully steered clear from the kind of sociology inspired by social constructivism and postmodernism—which we regard as a type of pseudodiscipline in its own right—sociologist Erich Goode provides an analysis of paranormalism as a “deviant discipline” violating the consensus of established science, and Noretta Koertge draws our attention to the characteristic social organization of pseudosciences as a means of highlighting the sociological dimension of the scientific endeavor.

The third part explores the territory marking the “borderlands” between science and pseudoscience. Carol Cleland and Sheralee Brindell deploy the idea of causal asymmetries in evidential reasoning to differentiate between what are sometime referred to as “hard” and “soft” sciences, and argue that misconceptions about this difference explain the higher incidence of pseudoscience and antiscience in the nonexperimental sciences. Professional skeptic of pseudoscience Michael Shermer looks at the demographics of pseudoscientific belief and examines how the demarcation problem is treated in legal cases. In a surprising twist, Michael Ruse tells us of a time when the concept of evolution was in fact treated as pseudoscience and then popular science, before blossoming into a professional science, thus challenging a conception of demarcation in terms of timeless and purely formal principles.

Part 4, on science and the supernatural, begins with Evan Fales arguing that, contrary to recent philosophical discussions, the appeal to the supernatural should not be ruled out as science for methodological reasons, but rather because the notion of supernatural intervention probably suffers from fatal flaws. Meanwhile, Barbara Forrest enlists David Hume to help navigating the treacherous territory between science and religious pseudoscience and to assess the epistemic credentials of supernaturalism.

The fifth part of the volume focuses on the tactics deployed by “true believers” in pseudoscience, beginning with Jean Paul Van Bendegem’s discussion of the ethics of argumentation about pseudoscience, followed by Jesper Jerkert’s contention that alternative medicine can be evaluated scientifically—contra the immunizing strategies deployed by some of its most vocal supporters. Frank Cioffi, whose 2012 passing we mourn, summarizes his misgivings about Freudian psychoanalysis and argues that we should move beyond assessments of the testability and other logical properties of a theory, focusing instead on spurious claims of validation and other recurrent misdemeanors on the part of pseudoscientists. Donald Prothero describes the different strategies used by climate change “skeptics” and other denialists, outlining the links between new and “traditional” pseudosciences.

Finally, we close with a section examining the complex cognitive roots of pseudoscience. Stefaan Blancke and Johan De Smedt ask whether we actually evolved to be irrational, describing a number of evolved heuristics that are rational in ecologically relevant domains, but lead us astray in other contexts. Konrad Talmont-Kaminski explores the noncognitive functions of superempirical beliefs and analyzes the different attitudes of science and pseudoscience toward intuitive beliefs. John Wilkins distinguishes between two

mindsets about science and explores the cognitive styles relating to authority and tradition in both science and pseudoscience. Nicholas Shackel proposes that belief in pseudoscience may be partly explained in terms of idiosyncratic theories about the ethics of belief, and Filip Buekens ends the volume with a chapter on pseudohermeneutics and the illusion of understanding, drawing inspiration from the cognitive psychology and philosophy of intentional thinking.

This collection will certainly not represent the final word on the issue of demarcation. On the contrary, it is meant to renew and stimulate discussion in an area of philosophy of science that is both intrinsically interesting from an intellectual point of view and that, for once, can actually make philosophy directly relevant to people's lives.

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