



Topic
Science
& Mathematics

Subtopic
History of Science

The Philosophy of Science

Course Guidebook

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Jeff Kasser grew up in southern Georgia and in northwestern Florida. He received his B.A. from Rice University and his M.A. and Ph.D. from the University of Michigan (Ann Arbor). He enjoyed an unusually wide range of teaching opportunities as a graduate student, including teaching philosophy of science to Ph.D. students in Michigan's School of Nursing. Kasser was the first recipient of the John Dewey Award for Excellence in Undergraduate Education, given by the Department of Philosophy at Michigan. While completing his dissertation, he taught (briefly) at Wesleyan University. His first "real" job was at Colby College, where he taught 10 different courses, helped direct the Integrated Studies Program, and received the Charles Bassett Teaching Award in 2003.

Kasser's dissertation concerned Charles S. Peirce's conception of inquiry, and the classical pragmatism of Peirce and William James serves as the focus of much of his research. His essay "Peirce's Supposed Psychologism" won the 1998 essay prize of the Charles S. Peirce Society. He has also published essays on such topics as the ethics of belief and the nature and importance of truth. He is working (all too slowly!) on a number of projects at the intersection of epistemology, philosophy of science, and American pragmatism.

Kasser is married to another philosopher, Katie McShane, so he spends a good bit of time engaged in extracurricular argumentation. When he is not committing philosophy (and sometimes when he is), Kasser enjoys indulging his passion for jazz and blues. He would like to thank the many teachers and colleagues from whom he has learned about teaching philosophy, and he is especially grateful for the instruction in philosophy of science he has received from Baruch Brody, Richard Grandy, James Joyce, Larry Sklar, and Peter Railton. He has also benefited from discussing philosophy of science with Richard Schoonhoven, Daniel Cohen, John Carroll, and Doug Jesseph. His deepest gratitude, of course, goes to Katie McShane.

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Philosophy of Science

Scope:

With luck, we'll have informed and articulate opinions about philosophy and about science by the end of this course. We can't be terribly clear and rigorous prior to beginning our investigation, so it's good that we don't need to be. All we need is some confidence that there is something about science special enough to make it worth philosophizing about and some confidence that philosophy will have something valuable to tell us about science. The first assumption needs little defense; most of us, most of the time, place a distinctive trust in science. This is evidenced by our attitudes toward technology and by such notions as who counts as an expert witness or commentator. Yet we're at least dimly aware that history shows that many scientific theories (indeed, almost all of them, at least by one standard of counting) have been shown to be mistaken. Though it takes little argument to show that science repays reflection, it takes more to show that philosophy provides the right tools for reflecting on science. Does science need some kind of philosophical grounding? It seems to be doing fairly well without much help from us. At the other extreme, one might well think that science occupies the entire realm of "fact," leaving philosophy with nothing but "values" to think about (such as ethical issues surrounding cloning). Though the place of philosophy in a broadly scientific worldview will be one theme of the course, I offer a preliminary argument in the first lecture for a position between these extremes.

Although plenty of good philosophy of science was done prior to the 20th century, nearly all of today's philosophy of science is carried out in terms of a vocabulary and problematic inherited from logical positivism (also known as logical empiricism). Thus, our course will be, in certain straightforward respects, historical; it's about the rise and (partial, at least) fall of logical empiricism. But we can't proceed purely historically, largely because logical positivism, like most interesting philosophical views, can't easily be understood without frequent pauses for critical assessment. Accordingly, we will work through two stories about the origins, doctrines, and criticisms of the logical empiricist project. The first centers on notions of meaning and evidence and leads from the positivists through the work of Thomas Kuhn to various kinds of social constructivism and postmodernism. The second story begins from the notion of explanation and culminates in versions of naturalism and scientific realism. I freely grant that the

separation of these stories is somewhat artificial, but each tale stands tolerably well on its own, and it will prove helpful to look at similar issues from distinct but complementary angles. These narratives are sketched in more detail in what follows.

We begin, not with logical positivism, but with a closely related issue originating in the same place and time, namely, early-20th-century Vienna. Karl Popper's provocative solution to the problem of distinguishing science from pseudoscience, according to which good scientific theories are *not* those that are highly confirmed by observational evidence, provides this starting point. Popper was trying to capture the difference he thought he saw between the work of Albert Einstein, on the one hand, and that of such thinkers as Sigmund Freud, on the other. In this way, his problem also serves to introduce us to the heady cultural mix from which our story begins.

Working our way to the positivists' solution to this problem of demarcation will require us to confront profound issues, raised and explored by John Locke, George Berkeley, and David Hume but made newly urgent by Einstein, about how sensory experience might constitute, enrich, and constrain our conceptual resources. For the positivists, science exhausts the realm of fact-stating discourse; attempts to state extra-scientific facts amount to metaphysical discourse, which is not so much false as meaningless. We watch them struggle to reconcile their empiricism, the doctrine (roughly) that all our evidence for factual claims comes from sense experience, with the idea that scientific theories, with all their references to quarks and similarly unobservable entities, are meaningful and (sometimes) well supported.

Kuhn's historically driven approach to philosophy of science offers an importantly different picture of the enterprise. The logical empiricists took themselves to be explicating the "rational core" of science, which they assumed fit reasonably well with actual scientific practice. Kuhn held that actual scientific work is, in some important sense, much less rational than the positivists realized; it is driven less by data and more by scientists' attachment to their theories than was traditionally thought. Kuhn suggests that science can only be understood "warts and all," and he thereby faces his own fundamental tension: Can an understanding of what is intellectually special about science be reconciled with an understanding of actual scientific practice? Kuhn's successors in sociology and philosophy wrestle (very differently) with this problem.

The laudable empiricism of the positivists also makes it difficult for them to make sense of causation, scientific explanation, laws of nature, and scientific progress. Each of these notions depends on a kind of connection or structure that is not present in experience. The positivists' struggle with these notions provides the occasion for our second narrative, which proceeds through new developments in meaning and toward scientific realism, a view that seems as commonsensical as empiricism but stands in a deep (though perhaps not irresolvable) tension with the latter position. Realism (roughly) asserts that scientific theories can and sometimes do provide an accurate picture of reality, including unobservable reality. Whereas constructivists appeal to the theory-dependence of observation to show that we help constitute reality, realists argue from similar premises to the conclusion that we can track an independent reality. Many realists unabashedly use science to defend science, and we examine the legitimacy of this naturalistic argumentative strategy. A scientific examination of science raises questions about the role of values in the scientific enterprise and how they might contribute to, as well as detract from, scientific decision-making. We close with a survey of contemporary application of probability and statistics to philosophical problems, followed by a sketch of some recent developments in the philosophy of physics, biology, and psychology.

In the last lecture, we finish bringing our two narratives together, and we bring some of our themes to bear on one another. We wrestle with the ways in which science simultaneously demands caution and requires boldness. We explore the tensions among the intellectual virtues internal to science, wonder at its apparent ability to balance these competing virtues, and ask how, if at all, it could do an even better job. And we think about how these lessons can be deployed in extra-scientific contexts. At the end of the day, this will turn out to have been a course in conceptual resource management.