



This painting, *The Battle Between the Gods and the Giants*, dates from around 1600 and was created by the Dutch artist Joachim Wtewael.

A history of philosophy of science

In Plato's dialog *The Sophist*, a character known as the Eleatic Stranger describes an ongoing battle between the gods and the giants—that is, between rationalist philosophers who believe that unchanging immaterial ideas are the ultimate reality and empiricist sophists who believe that the material world is all that truly exists.

Steven Goldman, a philosopher and professor emeritus at Lehigh University in Pennsylvania, takes that conflict as the starting point and organizing principle of his engaging new survey of the history of modern Western philosophy of science. Since its inception in the 17th century, he argues, modern science has

been a conscious and contradictory effort to have it both ways: embracing the empiricist methodology of the "Giants" while claiming the deductive certainty of the "Gods."

Science Wars: The Battle over Knowledge and Reality consists of a brief introduction and 16 relatively short chapters arranged largely chronologically. The first chapter describes the Gods–Giants conflict in antiquity. Chapters 2–4 consider how the competing ideals of knowledge and method were defended by the major figures of the so-called Scientific Revolution. Chapters 5 and 6 review a range of philosophical responses to natural philosophy in the 17th and 18th centu-

Science Wars The Battle over Knowledge and Reality

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ries, and chapters 7–9 cover challenges to and defenses of 19th-century scientific theories.

Chapters 10–16 cover the 20th century. In chapter 10 Goldman surveys conventionalist, pragmatist, and logical positivist attitudes toward scientific knowledge, and in chapter 11 he describes how the rise of quantum mechanics led to controversies over the nature of reality. The 12th chapter uses the question of who thinks scientifically to discuss the his-

tory of psychology and the relationship between individuals and collectives in scientific thinking. Chapters 13–15 are devoted to Thomas Kuhn's *Structure of Scientific Revolutions* (1962), French post-modernist theories, and the academic debates that ensued in their wake. Post-modernist critiques of modern rationality aligned with a widespread reading of *Structure* (with which Kuhn himself was uncomfortable) that saw scientific consensus as a political and ideological achievement that could never be truly objective.

In chapter 16, "The Science Wars Go Public," we arrive at the Sokal hoax and its aftermath. In 1996, the theoretical physicist Alan Sokal submitted a paper intentionally consisting of nonsense sprinkled with postmodern jargon to the journal *Social Text*, which at the time was non-refereed. The editors had their reservations, but they mistakenly believed it to be a good-faith effort by a respected physicist to engage with postmodern philosophy. When Sokal refused to revise his manuscript, they decided to publish the paper. Upon publication, Sokal announced his prank and declared it to be proof of the intellectual bankruptcy of the entire so-called academic left.

As Goldman observes, "The Sokal hoax proved nothing at all about the validity of postmodern criticism of science, including the claim that scientific knowledge was socially constructed." He goes on to describe the furious reactions to the hoax on all sides, as well as the ironic development that, in their efforts to establish "creation science" and intelligent design in the science curricula of public schools, fundamentalists on the religious right adopted the leftist critiques of science publicized by the Science Wars.

Goldman's exposition is consistently strong. He describes many complex philosophical positions with impressive accessibility, nuance, and an admirable evenhandedness. But that balance does not prevent him from explicitly articulating a stance of his own at the end of the book. He places his hopes in promoting an image of science more akin to common images of technology. Contemporary Americans are comfortable with the idea that a technology can become obsolete without rendering its past period of ascendancy an error or fraud. He suggests that the public must learn to see a similar process of replacing scientific models

with better ones as something expected rather than problematic.

Although Goldman is generally sympathetic to theories that emphasize so-called external factors—those pertaining to the social interests and identities of relevant people and institutions—in understanding how science works, his own method is largely "internalist": He deftly explicates ideas and arguments but only occasionally discusses their contexts in detail. One can only do so much in a book that covers so many scientists and philosophers, so that observation is not necessarily critical.

Instead it underlines that *Science Wars* should be read as a history of Western philosophy of science rather than a history of science. The reader should not expect to examine material practices of experimentation or the social and political forces that shaped the emergence of modern science as a profession. Goldman's aim is to explore the question of how scientific knowledge works by charting several past efforts to answer that question.

The book's structure and title prioritize the *Social Text* fracas as the story's culmination. But given its centuries-long

scope, I would have preferred Goldman devote more space to the ongoing ramifications of the tension he traces. Only in the final pages does Goldman briefly sketch the persistent societal stakes of his story: "The public, abetted by scientists, *does* misunderstand the natures of science and of scientific knowledge."

Because scientists act as though science produces certain truth, science loses public credibility whenever a previously "certain" truth is overturned. If we are ever to achieve sound science policy in a democracy, Goldman argues, "the public needs to understand the intrinsically conjectural, contingent, and corrigible nature of scientific knowledge," and it must understand that science nonetheless offers "the best experience-validated accounts of experience available to us at a given time." The urgency of the problem is clear. To anyone seeking a lively historical tour of the problematic nature of scientific knowledge and our unending struggle to pin down what makes it so valuable, I recommend *Science Wars* enthusiastically.

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