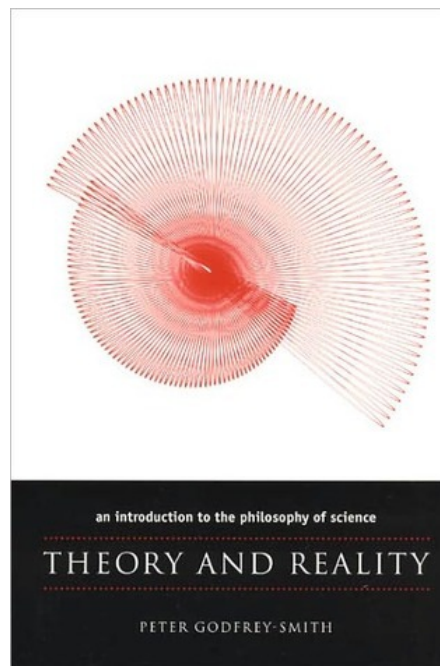




Theory and Reality: An Introduction to the Philosophy of Science

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How does science work? Does it tell us what the world is "really" like? What makes it different from other ways of understanding the universe? In *Theory and Reality*, Peter Godfrey-Smith addresses these questions by taking the reader on a grand tour of one hundred years of debate about science. The result is a completely accessible introduction to the main themes of the philosophy of science.

Intended for undergraduates and general readers with no prior background in philosophy, *Theory and Reality* covers logical positivism; the problems of induction and confirmation; Karl Popper's theory of science; Thomas Kuhn and "scientific revolutions"; the views of Imre Lakatos, Larry Laudan, and Paul Feyerabend; and challenges to the field from sociology of science, feminism, and science studies. The book then looks in more detail at some specific problems and theories, including scientific realism, the theory-ladenness of observation, scientific explanation, and Bayesianism. Finally, Godfrey-Smith defends a form of philosophical naturalism as the best way to solve the main problems in the field.

Throughout the text he points out connections between philosophical debates and wider discussions about science in recent decades, such as the infamous "science wars." Examples and asides engage the beginning student; a glossary of terms explains key concepts; and suggestions for further reading are included at the end of each chapter. However, this is a textbook that doesn't feel like a textbook because it captures the historical drama of changes in how science has been conceived over the last one hundred years.

Like no other text in this field, *Theory and Reality* combines a survey of recent history of the philosophy of science with current key debates in language that any beginning scholar or critical reader can follow.

Theory and Reality: An Introduction to the Philosophy of Science Details

Date : Published (first published 2003)

ISBN :

Author : Peter Godfrey-Smith

Format : Kindle Edition 288 pages

Genre : Philosophy, Science, Nonfiction, History

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From Reader Review Theory and Reality: An Introduction to the Philosophy of Science for online ebook

Mike Thicke says

I read Theory and Reality primarily with an eye toward using it as a teaching text. I have previously used Godfrey-Smith's chapter on Popper in an introductory history and philosophy of science course and I found it to be a balanced and accessible introduction to Popper's ideas. Overall, this characterization applies to the rest of the book as well, and I think it would serve as a good text to build an undergraduate course around. However, I do have some reservations about the text, especially its latter chapters.

First---and this is not really a criticism of the text itself---I am worried that using this in an introductory course might stifle debate and discussion in the classroom. Godfrey-Smith does do a good job of presenting multiple sides of debates in a charitable manner, but he does not shy away from making his own positions clear. In some sense this is inevitable and even desirable---complete neutrality is never possible so why pretend?---but I think it might be hard for students to disagree with his interventions into these debates. It might be better to expose students first to the "raw goods" of philosophical debates and let them form their own opinions. Time permitting, chapters from this text might work better as the final reading on a topic rather than as an entrance point.

Second, Godfrey-Smith gradually becomes more argumentative as the text goes on. He always has a point of view, but in the latter chapters he begins to argue for his particular "empiricist naturalist realist" position. I feel a lot of sympathy for the content of his argument and his moderate, pluralist stances, but at this point the pedagogical value of the book significantly decreases. In particular, I think better overviews of realism, explanation, and evidence could probably be found elsewhere.

Adam says

I've been reading a bunch of us if science lately, for some reason decided to do for this field when I should have done in macroeconomics and go back and read an introduction to get my bearings. Overall, that was a good idea, and this book is a decent stab at it. It breaks down into more or less 3 parts. All of them have a very conversational explanatory style that makes the book a breezy read, but it serves the purpose of clarity very differently in each part.

In the first third, Godfrey-Smith is at his best. He breaks down most of the early 20th century positions and debates in philosophy of science in clear terms that emphasize why they are important (i.e., what each thought experiment is designed to prove) and makes quick and easy work of pointing out their fatal flaws. In this phase of the story, the main concern was to establish the logical relationship between scientific inquiry and truth. This endeavor is plagued by what in retrospect seem like several obvious problems, from the reliance of scientific observation on theories and assumptions, Hume's logical proscription against induction, and the appearance impossibility of falsifying most theories.

The second third of the book moves from pure philosophy to scholars that mix history and sociology of science with philosophy and advice equal measure. If the goals of the philosophers and the first section were too narrow, the goals and approach here are all over the place. Kuhn, Feyerabend, Lakatos, and Laudan all seem to be trying to figure out the philosophical nature of scientific knowledge by describing the way that scientists have created knowledge in the past, but in the process discovering an angle they then present as normative. This seems like a huge mess to me, and Godfrey-Smith does little to help keep things straight. He

makes the distinction between descriptive and normative theories sometimes but not others, and never really makes it clear what relationship these ideas have to the questions posed in the first part.

The problem becomes even more confounding when he reaches the Strong Program. This, for some reason, he does treat as an exclusively descriptive approach to science, with little to say about the philosophical problems discussed elsewhere. Aside from raising the question of why it was included in the first place, this annoys me because the Strong Program does actually have good answers to many of the misguided questions posed by philosophers. Perhaps those are answers that philosophers don't like, because they are perceived as too circular or reflexive, but they happen to provide a coherent account of why exactly induction and falsification are not necessary, which takes holism and the theory-laden nature of observation as premises and not problems, and explains why scientific knowledge cannot but also does not need to be logically airtight. To add insult to injury, he concludes his brief, dismissive account of the best theory in the book with a few paragraphs about how the school of thought got tangled up in "navelgazing" and failed to contribute anything worthwhile (which might be true; it's hard to find contemporary works in the framework, but it certainly seems worth mourning if so). Then he goes on to spend a much longer action discussing Latour's botched attempts to do something similar but much less coherent. He is rather generous to Bloor personally, as a writer and thinker, but that doesn't seem to make up for the weird omissions here.

The final third is where things get really confusing. This is where he stops discussing specific thinkers and starts covering contemporary schools of thought and his own opinions in broad strokes. I maybe didn't give this an extremely fair read, moving too quickly, but it definitely tried my patience to take it slow. It tries to define and redefine terms like naturalism, empiricism, and realism, in a way that ultimately isolates and then resolves their contradictions to reveal a complete consilience. This endeavor largely returns to the same questions posed in the first part of the book, but something about the examples and the context that he gives made it hard for me to recognize what was at stake and what implications his conclusions had.

I think this last is a problem that dooms much of the philosophy of science as an endeavor. Rather than fitting science into a broader epistemological framework, they set out to prove that it is special. When logic fails, they turn to describing historical patterns. When that turns up answers they don't like, they turn back to logic, but this time they have to prove reality is real even though all of the obvious ways to try to do that have already been debunked.

The conclusions that Godfrey-Smith comes to seem to rely on evolution as the guarantor of empiricist sensory perception, as if that avoids any of the problems he levied against the sociological answer and isn't in fact just a bigger version of that same answer. Idk this field seems like a bit of a mess.

Josh Friedlander says

There is a white-coated, Latinate veil of competence draped over the world of science in English - one of the reasons the Anglo-Saxon nomenclature of Uncleftish Beholding is so jarring, as is learning scientific terms in a language besides English. Hearing talk about "water-stuff" or "sour-stuff" rather than Hydrogen or Oxygen sounds rather amateurish; we have convinced ourselves that the recondite Classicism of "deoxyribonucleic acid" represents something essential and unmoving, nature *as it is*.

Of course, this is a fiction. Science grubs together assumptions and guesses, moving in fits and starts, not always in the right direction, and its practitioners are just as vain and susceptible to groupthink as the rest of the human race. Recent news of the "replicability crisis" has further weakened the consensus around the existing system of experiment, peer review and publication.

And yet. Most systematic critiques of science, the ones proposing a whole new system, are far more terrifying than the system they seek to replace. I'm a pretty open-minded person, but some of the ideas summarised in this book - whole-cloth rejections of science as an imperialist relic of the Enlightenment, thrown around by the kind of people mocked by l'Affaire Sokal, are pretty awful.

The philosophy of science goes back around 100 years. The main schools are the Logical Positivists, pretty much dead now (they believed that nothing that couldn't be demonstrated had any meaning), Popper's verificationism (probably the best known theory, popular with scientists), Kuhn's idea of paradigm shifts, and a spattering of feminist, sociological, economist, and social constructivists critiques that score some valid points but often seem untethered from reality.

Today, the dominant ideas are naturalism, the idea that natural forces are all there is, motivated by what Hilary Putnam called the "miracle" of science; empiricism, a sort of skeptical-Kantian claim that all we can know is the phenomenal world, and there's no point speculating on anything metaphysical; and scientific realism, similar to naturalism but claiming that moral or mathematical facts also exist as part of a scientific reality. Godfrey-Smith is a competent but not overly ambitious or exciting narrator (though his squirming in a section on Bayesian Inference is amusing), and this seems like a good summary of the general ideas. This didn't make me want to read more Phil of Sci: one gets the impression that beyond some basic paradoxes (the nature of reality, Goodman's new riddle of induction, metaphysical realism) a lot of the century seems to have been spent going in circles. Science: it's a bit silly, really, but as long as those rockets launch and bridges stand up, it's the best we've got.

Safat says

Would've been an okay read, but it suffers from some insufferably tedious and irrelevant chapters.

Richard Houchin says

This book is to be commended for its brevity! It covers the history of the philosophy of science swiftly, which makes the tedious bits bearable.

I'm astounded the author actually takes the time to give a fair hearing and explanation of the stupid 'theories' that deny objective reality.

Like the 'philosophy' that we can't know anything about anything because we can't prove causality exists.

Or the 'observation' that because everything we experience is an *experience*, we can therefore never know anything about **real** things -- we can only know about *experiences*.

Or the 'idea' that thousands of years ago, say, in Aristotle's time, things like plutonium and electrons and the Andromeda galaxy literally did not exist. Because no one had theorized them yet. And if people aren't thinking of or haven't thought about it, it doesn't exist!

I use 'scare quotes' above because these 'concepts' are the worst kind of solipsistic shit that is so much bullcrap. That inane junk made it hard to follow or get into the more serious, interesting bits of the philosophy of science.

Oh, well!

J.P. says

I'm not entirely sure how to feel about this book. It was well written but it spent more time telling you what science is not as opposed to what it is. It did go into great detail about the history of various schools of thought within the realm of science in regards to evaluating the information we have at our disposal & what to make of it. Perhaps, I was expecting more of this book, expecting something from it that it wasn't supposed to give. My goal was to gain a better understanding of what science is, a deeper understanding of how thinking scientifically works. There is a lot of a good information in it & it's definitely worth reading. It just wasn't exactly what I was looking for. I did learn from it what to avoid & where I would personally lean or at least use as a tool in regards to where I would lead. It gives you various pieces that are a part of a larger whole & what I got from it is that these guides or general rules or flexible, depending on what field on is working in & that some aspects may work better in others. Inference, induction & falsifiability are definitely major parts of scientific thought. I will definitely be reading more books on the Philosophy of Science. This was an okay place to start.

Jafar Isbarov says

It was an exhausting, long, and sometimes boring read. Nevertheless considering the depth of the field and the amount of disorder and confusion surrounding it, these were expected. Author definitely deserves an applause for successfully outlining basic trends in philosophy of science during twentieth century. However this is the furthest I can go with praising him.

There are two serious problems with structure of the book. Solely concentrating on a century and leaving all other eras related to the discussion is a fatal one. Things don't get any better with unnecessary comments of the author on the subject. Mixing up introduction and criticism is not something new though.

Although this was by no means a bad book. I doubt there is another introduction to the topic as concise and informative as Theory and Reality.

Paul says

This was a letdown, in that it was sold to me (by a book about the philosophy of science as applied specifically to geology) as a great introduction to the current state of philosophy of science, but seems as if writing such a broad survey tired its author. In some ways, the earlier chapters are better, because there were fewer workers in the field and it's easier to write a coherent narrative--in my own field, geology, this would be just as true. On the other hand, the early chapters are where some of the more annoying personality traits of philosophers come out: the snippiness, the attempt to find fault on the most asinine of grounds, the envious iconoclasm, etc. The author almost seemed at pains to imply as clearly as possible that Popper's reputation among practicing scientists is envied, in a very crude and juvenile way, by other philosophers of science. (This is backed up by what little experience I have talking with philosophy students about Popper.) Both Popper and Kuhn are subjected to extremely specious criticisms, especially the non-criticism that "they didn't provide a complete model of how science works"...as if any one philosopher (or psychologist, or sociologist) will ever do that. Each of them contributed specific, groundbreaking insights. Leave it at that.

I was gratified to find out that philosophic realism is actually reviving and playing an important role of some

kind in contemporary philosophy of science. I have no idea what the "Explanation" chapter was supposed to be about. I was marginally intrigued by the Bayesian approach of many current philosophers. There is a bit of irony in that the author discloses that his reviewers thought the last chapter would be "a muddy paste" of supposedly contradictory viewpoints, as the author sketches the combination of empiricism, "naturalism", and realism that he thinks is the best description of science and allied ways of dealing with the world. In fact, that is not true; it's the several chapters before it, on contemporary trends, that are the muddy paste. On that subject, as a geologist, I can't imagine how awful peer review must be for philosophers. They seem to be so catty, so desperate to find some reason to tear each other down, I'm not even sure what the value would really be.

At this point, dissatisfied as I am with this broad, vague, weary overview, I guess the next thing to do would be to pick an author or subfield and start reading from there, but this book has so sapped my interest in contemporary philosophy that I'm not sure what I'll do next. I suppose I'll dig up some Whitehead. At some point I'll have to make myself read some Peirce, as much like a root canal as that sounds.

Ken Gloeckner says

While thought provoking and enlightening in parts, the author's writing style perhaps was more laborious than it needed to be. Instead of cutting to the chase, the author approached some subjects in a roundabout way. Additionally, some issues were given too much attention while other, more seemingly important and profound topics, were less well covered. Absent from the entirety of the book is any substantial discussion on the significant differences between the social and physical sciences and the particulars of experimental and non-experimental testing.

In one particular chapter, there is a peculiarly head-scratching moment where the author, in defending his position of a naturalized scientific realism, ignores the very well known, well studied phenomenon in quantum mechanics (the uncertainty principle) which undermines a position where reality is wholly independent of observation. The author breezes right past this issue by stating something along the lines of, "I hope QM is mistaken on this issue!"

Still, this book was interesting as an introductory piece to the field. I probably would not read his other work, but I would recommend it to whoever is interested in some of the confounding philosophical (and sociological) issues of science.

Dawn Ang says

Read selected chapters for an Introduction to the History and Philosophy of Science course. Excellent introduction with a clear, engaging narrative voice--not dry like most other textbooks. A list of recommended further reading is included in the end of every chapter. Great for anyone interested in learning about the early history of the philosophy of science.

Ege Özmeral says

- 1) Physics is thought as the purest example of science. Molecular biology, however, is probably the science that has developed most rapidly and impressively over the 50 years or so. A few as suggested that theoretical physics is becoming less scientific than it is used to be, as it is evolving into an esoteric, mathematical model-building exercise that has little contact with real world.
- 2) A descriptive theory is an attempt to describe what actually goes on or what something is like, without making value judgements. A normative theory makes value judgements; it talks about what should go on, or what things should be like.
- 3) Although describing a special scientific method looks like a natural thing to try to do, during 20th century many philosophers and others became skeptical about the idea of giving anything like a recipe for science. Science, it was argued, is too creative and unpredictable process for there to recipe that describes it. This is especially true in the case of great scientists like Newton, Darwin, and Einstein. For a long time it was common for science textbooks to have an early section describing the scientific method but recently textbooks seem to have become more cautious about this.
- 4) Empiricist philosophers have long used these anecdotes. For example, empiricist philosopher Carl Hempel used the anecdote of Ignaz Semmelweis. Semmelweis worked in Vienna in 19th century. He showed that if doctors washed their hands before delivering babies, the risk of infection in the mothers was hugely reduced. For this radical claim he was opposed and eventually driven out of the hospital. Another example is John Snow. Cholera was a huge problem in 18th and 19th centuries. There were various theories of how cholera caused. John Snow hypothesized that cholera was spread by drinking water. He mapped the outbreak of one epidemic in London in 1854 and found that it seemed to be centered on a particular public water pump in Broad Street. For a counter example to empiricism, Robert Koch isolated the bacteria responsible for cholera. Pettenkofer, however, unconvinced. To prove Koch wrong, he drank a glass of water mixed with the alleged cholera germs. Pettenkofer suffered no ill effects and he wrote to Koch saying he had disproved Koch's theory. It is thought that Pettenkofer might have had high stomach acid, which can protect people against cholera infection or the cholera germs might have died in that sample. The case reminds us that direct empirical tests are no guarantee of success.
- 5) Steven Shapin argues that empiricism often operates within the fantasy that each individual can observationally test hypotheses for himself. Empiricism is supposed to urge that people be distrustful of authority and go out to look directly at the world. But of course it is a fantasy because almost every move that a scientist makes depends on elaborate networks of cooperation and trust. If each individual insisted on testing everything himself, science would never advance. Cooperation and lineages of transmitted results are essential to science.
- 6) The worldview that had been inherited from the Middle Ages was a combination of Christianity with the ideas of Aristotle. The combination is often called the Scholastic worldview.
- 7) Why does an object dropped from a tower fall at the foot of the tower, if the earth has moved a considerable distance while the object is in flight? Copernicus's 1543 had an extra preface written by Andres Osiander, who had been entrusted with the publication urging that theory be treated just as a calculating tool. This idea is now known as Instrumentalism.
- 8) In some way Newton's physics contributes to the mechanical worldview, however, in some way it offers a post-mechanical worldview since it posited some forces that were hard to interpret in mechanical terms.
- 9) The classical forms of empiricism were based upon on theories about mind and how it works. Their(Locke, Berkeley, and Hume) view of the mind is often called 'sensationalist'. Sensations are the only things that the mind has access to and role of mind is to track and respond to patterns in these sensations.

Discussions and a problem for empiricism has been a tendency to lapse into skepticism, the idea that we cannot know anything about the world. One aspect is about external world (metaphysics) and second aspect, made vivid by Hume is inductive skepticism: what is the reason for us to think that the pattern in the past will also hold in the future? Many empiricists have thought that they don't care about the possibility that there might be real things behind the flow of sensations.

Perhaps our concept of world is just a concept of a patterned collection of sensations, which is called 'phenomenalism'.

Generally empiricist tradition has tended to be pro-science, worldly rather than religious and politically moderate or liberal.

Logic + Empiricism: The earlier version is called 'logical positivism' and the latter is called 'logical empiricism'. To contrary their names, the earlier version was more empiricist than the latter. Carnap is the one who suggested the change in name in the mid-1930s, the time during which logical positivist ideas changed after WWII. Logical positivism was a form of empiricism developed in Europe after WWI. The movement was established by a group of people, which is known as Vienna Circle, who were scientifically oriented and who disliked much of what was happening in philosophy. The logical positivists were inspired by developments in science, especially the work of Einstein. They were also inspired by the early ideas of Ludwig Wittgenstein, who was not an empiricist at all.

After rising of Hitler, many logical positivists fled to the US and became responsible for a great flowering of American philosophy such as Carnap, Reichenbach, Hempel and Feigl. Unfortunately Schlick couldn't make it and was murdered by his one of former student.

Clifton Knox says

This is book is a mind opening experience on the subject of science.

This book takes the reader far from the almost mystical like admiration taught in popular culture. It shows us that science is both objective and at times subjective. As the title implies, when it comes to how science is conducted there is "theory and then there is reality". If you are interested to know what science really is then this is your book.

Juan says

... la sola presentación del falsacionismo de Popper y las posteriores evoluciones Kuhn, Lakatos y Feyerabend lo hacen interesante

Luke says

A wonderful introduction. Much covered in little time in accessible language.

Godfrey-Smith does not succeed either at hiding his bias or making it clear, but rarely does it result in a misrepresented view.

Ac says

really good book, excellent introduction to ppl who dont know a thing about the philosophy of science. books starts out in the days of the scientific revolution and moves forward chronologically. this helps the reader understand concepts and to put things into perspective. godfrey-smith covers the different theories and issues and conflicting views in a clear and concise manner. also made me think of stuff i never really cared about before, which i probably wont care about in the future but it is great knowledge to have. i got kind of bored towards the end of the book, like the last 2 chapters. but the first 5-6 chapters were really good, because of the whole going back in time thing. this is like a 3.8 star book but theres no half ratings so whatever.
