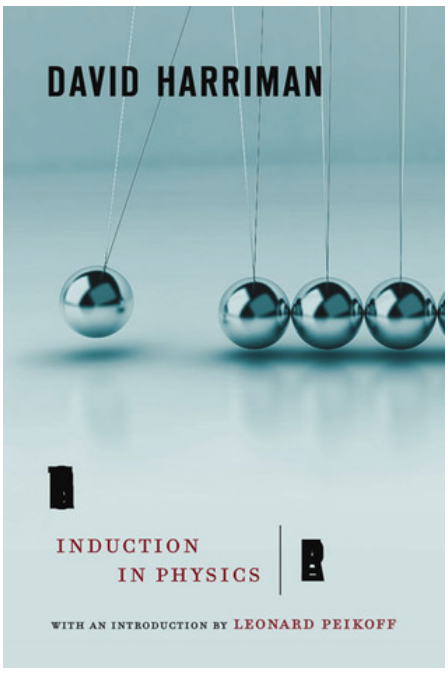

The Logical Leap: Induction in Physics

David Harriman (Introduction) , Leonard Peikoff (Introduction)

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A groundbreaking solution to the problem of induction, based on Ayn Rand's theory of concepts.

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Ayn Rand presented her revolutionary theory of concepts in her book *Introduction to Objectivist Epistemology*. As Dr. Peikoff subsequently explored the concept of induction, he sought out David Harriman, a physicist who had taught philosophy, for his expert knowledge of the scientific discovery process.

Here, Harriman presents the result of a collaboration between scientist and philosopher. Beginning with a detailed discussion of the role of mathematics and experimentation in validating generalizations in physics-looking closely at the reasoning of scientists such as Galileo, Kepler, Newton, Lavoisier, and Maxwell-Harriman skillfully argues that the inductive method used in philosophy is in principle indistinguishable from the method used in physics.

The Logical Leap: Induction in Physics Details

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From Reader Review The Logical Leap: Induction in Physics for online ebook

Kiri says

Educational and often intriguing, the title is somewhat deceptive as the book is more about the process of concept formation and right thinking than it is about physics. Indeed, the chapter I was most interested in was the one about the history of chemistry and chemical elements, as that was the area that I had the least prior knowledge in. Large portions of the book are devoted to an overview of the history of physics, as scene through the lens of objectivist philosophy.

The author is convinced of the wrongheadedness of certain ideas prevalent in modern physics. I grew up learning about those particular ideas (curved spacetime, the big bang theory, string theory) and thus I realize that I am biased on the subject. However, I'm both not convinced by his arguments and not capable of debunking his position. There are critical reviews of his book that one can find online that make the point better than I could.

Corbin says

Leonard Peikoff wrote a book and David Harriman is taking credit for it. At the beginning Leonard is mentioned as the "silent author" but anyone who has read Peikoff will pick up on the style of his writing.

I like this book, just as I like most Objectivist literature. But it just doesn't seem quite complete.

First, this book has little to do with physics, math, or science. When it says, "Induction in physics", what it really means is induction through anecdotes about physics. I don't mean this negatively, but if you are thinking there is some "discovery" or mathematical proof that is going to be laid out in this book then you are mistaken.

Second, this book is written polemically. If the world actually fit into the nice categories Peikoff gives us then his method of induction will seem so profound and extraordinary. But the reality is that there is a wide margin between rationalist and empiricist and for the most part I doubt others would agree this his definitions of these terms apply. In one case Kant is both the cause of the empiricists and a rationalist herald, as well. Again, this is not bad, but it does seem unnecessary.

Third, as a work of epistemology it is fairly removed from the common language of epistemology. There is no mention of JTB (justified true belief). No mention of the difference between knowledge and belief. No mention of self-knowledge, will, faith, courage, or meaning. These subjects all have epistemic merit and are typically added by philosophers into their system of epistemology, but none of this is discussed in this book. This is not bad, but is does seem incomplete.

Now about the work itself... it is good, really good, possibly great, but it doesn't seem too different than Ayn Rand's original work on this called, "Introduction to Objectivist Epistemology". This book simply has more anecdotes and a better literary structure.

Peikoff does an amazing job on explaining what induction is, and how it works, and how we can rely on it. It

really is top notch philosophy, but it seems very one sided to say the least. Peikoff defines induction as an integration of observable data. It all seems so scientific, in fact the whole book is committed to this thesis. I do not doubt his conclusion on this matter. I am comforted and inspired by his insights as to how concept formation and the scientific method are intrinsically identical. But not everything is "observable data". My inner thoughts, my experience of self, and my will for significance are all epistemic factors that are not observed in any sensational manner. And yet, I say that I possess knowledge according to these things.

Perhaps, "observable data" can be used to include certain internal states which are not observed in any way at all, but have epistemic value according to the objective nature of man? But this is never really discussed in the book.

I suspect the reason for this is because the book is committed to the thesis that thinking is quantitative in essence and the aforementioned articles exhibit a qualitative identification through knowledge. Of course, Peikoff writes on how we can know qualities through our thinking which is quantitative, and this is well and good, but it seems that there could be a flip side to knowledge which can be called qualitative thinking. Of course, it could not be called "inductive" by nature, and thus would also not be propositional.

There does seem hope for this in other areas of epistemological research. Warrant, for one, has potential to provide justification for non-propositional forms of knowledge. Hofstadter has also contributed a fascinating synthesis of epistemology and metaphysics which makes utilizes a mathematical self-referential formula discovered by Godel to illustrate how a self-referring system can develop higher level thinking. Using this method it could be argued that the quantitative thinking is just one level one which the qualitative reinterpretation takes place on another level. Thus, both systems could work together. But this book doesn't consider this option. Objectivists in general seem dogmatic to their own view of reason, which isn't bad, because its not a bad view of reason, but it just seems limiting.

Pavel Urub?ík says

Brilliant book about essential method of knowing: induction. This book contains references to history of physics and points out how proper approach led to valid theories and how contradictory method led to failures and years of stagnation of various fields.
If you are interested in philosophy (epistemology) and physics (or history of it), this is the book to read. I love this guy.

Joshua Stein says

I went into this book knowing that I was going to disagree with Harriman. That often encourages me to give a text a more thorough reading, and I often enjoy the amount of material I'm getting at. That was not the case with Harriman; the problem is not that Harriman is a staunch advocate of Rand's brand of epistemology and metaphysical realism. The problem is that Harriman is not well versed in philosophy. The text contains a number of strawmen of important philosophical positions, particularly those held by Kuhn and Popper, who are sort of the "anti-science" demon that is looming at Harriman gives a thorough, though periodically inaccurate, account of the history of physics and chemistry.

But that isn't what made this book a One-Star read. What made it miserable was the absurd claims about

epistemology that anyone familiar with the subject matter would likely be able to easily direct him to. I suppose that point doesn't speak well of Leonard Peikoff, who was supposed to have helped with the editing process. Anyway, I should give a few specifics:

> A theory of induction presupposes answer to the fundamental questions of metaphysics and epistemology. For instance, I take for granted the law of causality (which states that the action of an entity follow from its nature) and the validity of sense perception. (pp. 9)

Both of these things which Harriman takes for granted are going to be problematic. As he laments the tradition of British empiricism throughout the text, he fails to acknowledge that no empiricist worth his salt is going to simply grant "the law of causality" as some universal counterfactual; moreover, they are going to offer a number of reasons why such a claim is likely false, given our contemporary conceptual schemas in logic (which I'll return to in a moment), metaphysics and physics.

The second problem is that "the validity of sense perception" is actually not what he means to take for granted. It is easy to offer a reductio and point out that "sense perception" is often not a sufficient grounds for an inference, and that the inferences that we would draw from perception would lead us to conclusions that, one hopes, Harriman himself would find laughable in the contemporary day and age. He means something far more specific, a "something" so painfully underqualified and equivocated over throughout the book that it is totally worthless.

The third problem is actually what Harriman omits from this passage. He takes for granted the uniformity of mathematics and logics. We see this towards the end of the book:

> Logic, when properly applied, enables us to arrive at true conclusions, but it comes with no guarantee that we will apply the method correctly. The laws of deduction were identified by Aristotle more than two millennia ago, yet people still commit deductive fallacies. (pp. 189)

There is something a bit entertaining about this statement, given that later in the chapter Harriman names some fallacies which would be unrecognizable to Aristotle (and probably most philosophers).

Here's the problem: "Logic" is not homogeneous. There are a number of ways that this has been shown, largely by Kurt Gödel and other mathematicians working in formal logic. You don't need to take my word for it, of course. After all, by virtue of drawing a distinction between deductive and inductive logics, the existence of Harriman's text already acknowledges the heterogeneity of logical systems; his vigorous Aristoteleanism about logic would be laughable to most in the field, who acknowledge the importance of multi-valued and paraconsistent logic systems, along with the importance of modalities.

Anyway, I came into this book looking for something challenging and stimulating. I didn't find it. It seems others who have written positive reviews about this book found what they were looking for; if you are looking for an intellectually rigorous discussion of epistemology in physics, there are much heartier champions of the sort of metaphysical realism that you should look into taking on. I recommend Richard Boyd (and, apparently, Jarret Leplin has two books on the subject) instead.

Patrick says

Wow! What I've been thinking for a long time. I'm not crazy after all.

Amazon review:

Inspired by and expanding on a series of lectures presented by Leonard Peikoff, David Harriman presents a fascinating answer to the problem of induction-the epistemological question of how we can know the truth of inductive generalizations.

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Vasil Kolev says

The author probably got really tired and pissed off at the philosophy guys, who always say that there's no difference between the science and any other system of beliefs. So, if you want to beat some word-filled wanker over the head, this is probably the best book to do it with.

The book is also a really nice history of scientific reasoning, a good read for everyone.

Ryan says

Aside from the "Ayn Rand" soap boxing, I found it quite interesting.

Amy says

A rational look at 2 of my favorite subjects in college - history of science and philosophy of science.

Gerardo Herrera says

Amazing book. Really enjoyed it.

Bruce says

The invalidity of inference is, it seems, the dirty, little known secret of both 20th century science and modern philosophy. It could also be claimed it underlies a common, yet unacknowledged assumption that one can never be sure of anything, and does not actually *know* anything. Harriman drags this assumption into the limelight for intense scrutiny, demonstrating how the great scientific discoveries of the last 400 years depended largely on the validity of inference, in turn based on the premise that concepts reflect reality. Western philosophy has progressively undercut these twin supports of rational inquiry -- which will be my area of study for quite some time.

Jeff Yoak says

This book is utterly fantastic. It is covers the many, partially conflicting, bases of what I've been looking for in the history of physics for some time. I know some, but not a lot, about physics. Books that go deeply enough into the history to be interesting to me often become incomprehensible assuming a much more substantial background than I have. Books that don't have that latter problem mostly treat the subject fairly trivially. This one was perfect.

The Logical Leap also goes much further than anything I've read, and I suspect further than anything out there, in analyzing induction epistemologically. With a historical approach covering major accomplishments of the last few centuries, there is fertile ground for demonstrating what works methodologically, what doesn't, and delving into the whys and hows. I found the historical treatments bent toward this focus on epistemology. It wouldn't surprise me to find that history at times takes a backseat to the effort of describing what a person did to validate a process, describing it as a historical process even when this deviates from the actual historical process that occurred.

Finally, the book does a good job at differentiating the last century to century and a half from what came before and relating the differences to the basic philosophic approaches to science broadly. I've pulled that information together from a lot of sources over time, but this is not only the best single source that I've found, but took me much further.

Overall, just a complete delight.

Haider Al-Mosawi says

The reliability of induction as a method for understanding the world is deeply contested, and in this book the author presents evidence and explanations to help clarify what induction is and why it's important for human understanding.

The book blends Ayn Rand's thoughts on concept-formation as well as historical accounts of the major advances in physics (and chemistry). It also explains the failures of skepticism and empiricism in understanding induction and its reliability.

If you've ever wondered how we can make "logical leaps" in forming general explanations about the world from finite observations, then this book can help explain how the leap is made, and why it's a valid approach to take.

Quinndara says

The book answers the epistemological question of how we can know the truth of inductive generalizations. The author illustrates his points by detailing Kepler, Galileo and Newton's experiments and how they arrived at their ideas. I do not have a math or logic background so there were parts of the book that were hard for me to understand. Even so, I am glad I did because someday maybe I will.

Shawn says

Harriman presents his application of Rand's theory of concepts to an elaboration and defense of a theory of induction, particularly in physics. He draws interesting and novel connections between concept-formation, abstraction, and induction. He makes some strong and controversial claims about induction and certainty, some of which I am still mulling over. The basic format is to present the theory in outline and then, using the history of science, to show how induction in physics has worked. His presentation is clear and concise. His narrative is clean, without much of the distracting polemics sometimes seen in some followers of Rand and Peikoff. There is some controversy about some of the details of the history he presents. Having little expertise or experience in this area, I am not competent to judge this. If the criticisms are accurate, this would surely be a fault of the book. It would demonstrate carelessness or sloppiness. Nevertheless, I do not think these alleged faults, on their own, undermine Harriman's central claims about induction. He is not after all engaged in the history of science as such, but using that history as a way of illustrating the theory of induction. I say this not to excuse such possible errors, but only to put them into context. Even with these possible faults, I'd recommend the book to those interested in Rand, epistemology, or the history of science.

Bill Brown says

It starts off slow but patience is rewarded (as is often the case).

The tour through several major discoveries in the history of physics is interesting—though certainly not new or as thorough as other accounts. There's a reason for that: it's being used to inductively validate the conclusions about induction.

The end is a too-brief look at the contemporary state of physics. That's a book in itself. I wish he had finished with a "telling" of his theory of induction after the entire book's "showing."

I suppose the idea is to mull over the specific presentation and come up with the theory, but it would've been helpful to have a philosopher take care of that.