Lars-Göran Johansson. *Philosophy of Science for Scientists*. Springer 2016. 257 pp. $69.99 USD (Hardcover ISBN 978-3-319-26549-0).

Lars-Göran Johansson holds a B.Sc. (mathematics and physics) from the University of Gothenburg and a Ph.D in theoretical philosophy from Stockholm University. He is author of three books: *Introduktion till Vetenskapsteorin, Interpreting Quantum Mechanics: A Realist View in Schrödinger's Vein*, and *Kunskapsteori: En introduktion till vetande, berättigande och sanning*. He has also published papers and book chapters on laws of nature, induction, causation, probability and time. Since 2008 he has been professor in theoretical philosophy at Uppsala University. This book offers an introduction to the philosophy of science, and accordingly can be used as textbook. It is a substantial revision of his previous book published in Sweden, and reprinted in three editions over fifteen years, entitled *Introduktion till Vetenskapsteorin*.

Divided into three parts, this book first examines the question, What is Science? It describes the evolution of science, defines knowledge, and explains the use of and need for hypotheses and hypothesis testing. Moreover, part 1 deals with scientific data and observation, qualitative data and methods, and ends with a discussion of theories on the development of science such as logical positivism and falsificationism. Part 2 offers philosophical reflections on five of the most important concepts in science: causes and correlations, explanations and prediction, explanations in the human and social sciences, scientific laws, and scientific models. Part 3 presents discussions on philosophy of mind with particular reference to the mind-body problem, value-free and value-related science, and reflections on actual trends in science. In what follows, I shall delineate more fully the contents of the title under review.

The prime goal for a course in philosophy of science should be, according to Johansson, to convey an understanding of what science is: that is, how it has developed, what its core traits are, how to distinguish between science and pseudoscience, and how to know what a scientific attitude is. He attempts to offer these things in this text. He contends that the testing of hypotheses and making of interpretations is, essentially, the doing of hermeneutics. Indeed, the structural similarities between the hypothetico-deductive method, the hermeneutic circle, and Davidson's rules for interpretation are not difficult to recognize. The need for general criteria for scientific thinking is nothing more than an instance of the epistemological demand to produce reasons for your claims to know. Rational discussions in science about methods, measurements, inferences, and conclusions presuppose that it is possible to discuss and agree on epistemological and scientific norms independently of whether one accepts the conclusions of a particular theory or not. Some philosophers of science have claimed that it is impossible to do science based on fully theory-independent observations. If true, according to Johansson, this would undermine the possibility of objectivity of science, and thereby force one to accept relativism. Chapters 4 and 5 address this topic.

The second part of the book, consisting of chapters 7 through 11, discusses topics that Johansson has found relevant to talk about at an introductory course level: for example, causes, explanations, laws, and models. Arguably, causation is the most important topic among these, as almost all empirical disciplines contain causal idioms and to some extent search for causes. The notion of explanation is often connected to causation, but explanation differs so much from context to context that one may wonder whether there is anything at all that unites all 'explanations'. Chapters 8 and 9 address this issue. Laws and models are concepts in the natural sciences but less so in the social sciences, and perhaps not at all in the human sciences. Intense discussion about the concept of natural law has occurred among philosophers of science, and many views have been propounded. Chapter 10 discusses some of them, and therein Johansson indicates his own empiricist position. Chapter 11

discusses what type of epistemological and ontological status models might have, as well as what scientists might mean when they talk about models.

Philosophy of mind is discussed in chapter 12, a topic that is usually not covered in ether a philosophy of science course, or even in a philosophy of science textbook. The thirteenth chapter contains a discussion of some aspects of values in science, the most important of which are the concepts of being value-free and being value-laden. The important point here is that science is driven by values and it is value-laden, but its results both can be and should be value-free. Chapter 14 contains some reflections on actual trends within science; accordingly, it is forward looking, and much more tentative than the preceding material in the book.

In sum the reader that Johansson has in mind for this book is a student taking a philosophy of science course who has not had philosophy courses before. It could also be useful for introductory undergraduate courses in philosophy. It will help undergraduate students from the natural, human, and social sciences to gain an understanding of what science is, how it has developed, what its core traits are, how to distinguish between science and pseudoscience and how to discover what a scientific attitude is. It argues against the common view that there is a fundamental difference between natural and human science, with natural science being concerned with testing hypotheses and discovering natural laws, and the aim of human and some social sciences being to understand the meanings of individual and social group actions.

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