

INTRODUCTION

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The view that providing understanding of the world is one of the aims of science is widely accepted. This standpoint raises two philosophical questions:

- (1) What does this understanding consist in?, and
- (2) What are the mechanisms by means of which scientific knowledge increases our understanding of the world?

In this issue the first question is addressed by Wesley Salmon and Thomas Grimes, the second by Peter Lipton, Matti Sintonen and John Forge.

Wesley Salmon argues that there are at least two intellectual benefits that scientific explanations can confer upon us. The first one is a unified world-picture, combined with insight into how various phenomena fit into that overall scheme. The second benefit is knowledge of the mechanisms that produce the phenomena we want to understand.

While Salmon claims that people aim at different kinds of scientific understanding (at least two), Thomas Grimes argues that scientific understanding always consists in understanding the conditions nomically responsible for the explanandum phenomenon. Grimes clarifies the nature of nomic responsibility, establishes some of the shortcomings of three other accounts of explanatory understanding (pragmatic, inferential, causal) and discusses a potential objection to his own conception.

In order to increase our understanding of the world, we have to construct explanations. So if we want to know the mechanisms by means of which scientific knowledge increases our understanding of the world, we must try to answer two questions:

- (2a) What is the nature of explanations?
- (2b) Which actions must be performed in order to obtain a scientific

explanation?

Peter Lipton focuses on the first question, John Forge on the second. Matti Sintonen deals with both problems.

Some explanations are answers to questions of the form “Why E?”, others to questions of the form “Why E rather than F?”. Peter Lipton analyses the nature of explanations of the second kind, i.e. contrastive explanations. After criticising two accounts of contrastive explanation and presenting his own account, Lipton answers the question of why we often ask “Why E rather than F?” rather than simply “Why E?”.

Matti Sintonen develops an account of explanation based on Jaakko Hintikka’s interrogative model of inquiry. In Sintonen’s view, an explanation is an interrogative derivation of an explanandum from initial premises and answers given by nature. He shows that his model of explanation can clarify the construction process of explanations; so he discusses both the nature of explanations and the way they are constructed.

According to John Forge, showing that an event is an instance of a law of nature is sufficient for understanding it. But showing that a phenomenon is part of a structure (e.g. an extensive structure) is sufficient too. Forge proposes to choose the second option when trying to understand remote correlations in the domain of quantum mechanics: he suggests that the non-Boolean probability structure of probability in quantum mechanics is responsible for remote correlations.

As these five articles show, the idea that science has to provide understanding is an interesting starting-point for studying scientific explanations. My contribution and the article of Peter Achinstein show that there are at least two other interesting perspectives.

Scientific knowledge has a theoretical function (providing understanding) but also a practical one (improving the efficacy of our actions). The relation between explaining and improving the efficacy of our actions constitutes the perspective from which I analyze explanations. In my opinion, the view that scientific explanations are instruments by means of which we can achieve understanding of the phenomena we observe is too narrow. On the one hand, explaining is often directly practically useful, e.g. when we construct an explanation in order to make a diagnosis or to assign legal responsibility. On the other hand, explaining is sometimes practically useful in a more indirect way. The aim of my contribution is to clarify the nature of the indirect practical functions of the search for explanations.

In the final article of this issue, Peter Achinstein asks when “old evidence” constitutes genuine evidence for a theory. His answer is that (i) the probability of the theory must be high, given the “old evidence” and the other available information, and that (ii) assuming the truth of the theory and the “old evidence” it must be probable that there is an explanatory connection (not only a derivational one) between them. Achinstein’s contribution shows how explications of the concept of explanation can be used to solve the problem of the value of “old evidence”. Therefore, it is an example of a third perspective from which one can study explanations: theory acceptance and its relation to explanatory power.