

Review of *Scientific Understanding: Philosophical Perspectives*, Henk W. de Regt, Sabina Leonelli, and Kai Eigner (Eds.). University of Pittsburgh Press.

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Understanding is one of the central goals of science, but few philosophers of science have occupied themselves directly with the study of scientific understanding (compared with its close cousin, explanation), and so this book is welcome. Fifteen eclectic essays, which developed out of a conference held in Amsterdam in 2005, are organized in three parts. Part I investigates the relation between understanding, explanation, and intelligibility; Part II studies the relation between understanding and models; and Part III explores the notion of understanding in disciplines ranging from biology and physics to engineering, economics, and even history.

Whereas explanation has traditionally been construed as a two-place relation between *explanans* and *explanandum*, in their introduction the editors urge that understanding “is always a three-term relation involving *explanans*, *explanandum*, and a subject” (p. 3). That is, having a good explanation is insufficient for understanding – something more is needed, something pragmatic and subjective. The authors of the various essays propose differing accounts of the precise nature of this subjective element. Understanding, we are told, is:

“the cognitive achievement realizable by scientists through their ability to coordinate theoretical and embodied knowledge that apply to a specific phenomenon” (Leonelli, p. 197).

“having a theoretical account of how the system is constituted that enables us to solve problems, make predictions, and explain why the phenomena in question behave in the way they do” (Morrison p. 123)

“knowing how to perform an epistemic activity” (Chang p. 75)

“knowledge about the relations of dependence” (Ylikoski p. 116)

“answering a how’s that-question” (Boumans p. 210)

The sheer variety of working definitions of understanding, and the variety of scientific disciplines and sub-topics studied in these essays, makes it difficult to say anything very comprehensive about the content of the book in this short review. But moreover, the sheer variety of working definitions of understanding itself suggests the value of this book: we are far off from understanding the notion of understanding, and so the mere existence of this book ought to help.

As an indication of the scant attention philosophers of science have paid to the notion of understanding, six of the essays critically cite a single article by Trout (who does not himself have an essay in this collection). Trout (2002) argues that understanding can be dangerous, since the experience of feeling that one understands something can lead one astray. To quote from Ylikoski’s essay: “most people are prone to feel that they understand the world with far greater detail, coherence, and depth than they really do” (p. 105). Trout is the villain in this book, since most of the authors argue that understanding is a desirable goal in itself. In contrast, the hero of the book is one of the editors: every essay here without exception cites de Regt (2004) and/or de Regt and Dieks (2005), in which understanding is proposed as a topic for philosophical study. The tension between the supposed value of understanding and the risk of the feeling of understanding is one of the interesting themes running through several of the essays (e.g. Grimm, Ylikoski, van Bouwel, Boon).

The reluctance that philosophers have shown toward the study of understanding may be well-founded. It is precisely the requirement of considering the *subject* which has led philosophers since Hempel to avoid studying the notion of understanding. Consider a simple example: suppose a quantum physicist proposes a perfectly good explanation for some interesting phenomenon, and yet I do not understand the explanation (on any of the definitions of understanding above). Perhaps I have not received the requisite training. Perhaps I have drunk too much wine. If one agrees with most of the authors of these essays, then the conditions required for understanding are subject-specific, and thus

perhaps there is nothing general that can be said about the notion. Many have thought that this is not true for most philosophical theories of explanation, however. On the other hand, if the inclusion of the subject is a quiet placeholder in the concept of understanding, as it seems to be in some of the essays here (e.g., Ylikoski, Lipton), then one might wonder how different the notion of understanding is from the notion of explanation. Post-positivist philosophers of science have developed theories of explanation in which some of the features of understanding highlighted in this book – the importance of context and of subject, for instance – have been studied. My central complaint about *Scientific Understanding* is that, besides a few passing references, there is too little engagement with this relevant literature.

Regardless, this book will be useful for philosophers and historians of science interested in the notion of scientific understanding. I doubt it will be useful for teaching, though I expect it will initiate further research in filling a philosophical lacuna, and for that alone this book is valuable.

Also cited:

De Regt, H.W. 2004. "Discussion Note: Making Sense of Understanding" *Philosophy of Science* 71: 98-109.

De Regt, H.W. and Dieks, D. 2005. "A Contextual Approach to Scientific Understanding" *Synthese* 144: 17-170.

Trout, J.D. 2002. "Scientific Explanation and the Sense of Understanding" *Philosophy of Science* 69: 212-233.