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978-0-521-87649-0 - A Metaphysics for Scientific Realism: Knowing the Unobservable

Anjan Chakravartty

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A METAPHYSICS FOR SCIENTIFIC REALISM

Scientific realism is the view that our best scientific theories give approximately true descriptions of both observable and unobservable aspects of a mind-independent world. Debates between realists and their critics are at the very heart of the philosophy of science. Anjan Chakravartty traces the contemporary evolution of realism by examining the most promising recent strategies adopted by its proponents in response to the forceful challenges of antirealist sceptics, resulting in a positive proposal for scientific realism today. He examines the core principles of the realist position, and sheds light on topics including the varieties of metaphysical commitment required, and the nature of the conflict between realism and its empiricist rivals. By illuminating the connections between realist interpretations of scientific knowledge and the metaphysical foundations supporting them, his book offers a compelling vision of how realism can provide an internally consistent and coherent account of scientific knowledge.

ANJAN CHAKRAVARTTY is Associate Professor at the Institute for the History and Philosophy of Science and Technology and Department of Philosophy, University of Toronto.

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Knowing the Unobservable

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*It is the fault of our science that it wants to explain all; and
if it explain not, then it says there is nothing to explain.*

Van Helsing to Dr Seward
Bram Stoker, *Dracula*

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Preface

This begins as a book about scientific realism. To a very rough, first approximation, realism is the view that our best scientific theories correctly describe both observable and unobservable parts of the world. When philosophers consider this idea they are usually concerned to address the issue of whether it is a reasonable view to hold. They worry about whether it gives a plausible account of scientific knowledge, and rightly so! This is an undeniably important question. It is close to the heart of almost all issues in the philosophy of science, and importantly relevant to many issues in philosophy and the sciences more generally. This book, however, starts with a much more basic and arguably prior question. What is scientific realism, exactly?

One might think that in order to discuss the question of whether realism is plausible or reasonable, one should already know what it is. As philosophers know only too well, however, one cannot think about everything at once, and the debate surrounding realism is no exception. One must often assume coherent accounts of various components of a position in order to give careful attention to others, and people on all sides of this debate usually take a great deal for granted so as to focus on epistemic questions. For example, when describing their positions realists often rely heavily on things such as causation, laws of nature, and the natural kind structure of the world. These ontological ingredients play important roles in disputes about realism, but the natures of these things are generally passed over *tout court* in these disputes specifically. Their brief mention leaves open the question of whether such metaphysical foundations are themselves secure enough or otherwise appropriate to support the edifice of realism.

So, what begins as a book about scientific realism soon becomes a book about its foundations, and as a consequence this work is not a defence of realism, *per se*. Nevertheless, equipped with a better understanding of what a view entails and does not entail, one may find oneself in a better position

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to defend or condemn it. I believe this to be the case here, and though my primary objective is not to defend or to condemn, I hope that a clarification of what realism entails will facilitate further discussion of the important disputes between realists and antirealists. Currently, much of what can be said regarding some of these disputes *has* been said, and in order to move forward perhaps greater clarity is needed regarding the nature of this world which realism takes to be illuminated by the sciences. The metaphysics of realism has lagged behind its epistemology, and one of the best reasons for addressing the former is to facilitate better the latter. But the metaphysics of realism comprises a fascinating set of issues on its own, and in this book I aim to consider them.

Some think there are as many versions of scientific realism as there are scientific realists. That is probably a conservative estimate! There are probably as many versions of realism as there are realists and antirealists. What hope is there, then, for a book about what scientific realism *is*, let alone a proposal for a metaphysics supporting it? It would certainly be impossible to describe realism precisely in a way that would satisfy all realists and antirealists. No one detailed account answers the descriptive question of what scientific realism is. That said, I believe there is something like an account (with negotiable boundaries) that answers the descriptive question of what some of the best hopes for conceiving realism may be. Certain elements of realist views appear time and again in divergent accounts, and their recurrence suggests their centrality to realist approaches generally. These commonalities merit attention on any version of realism. No discussion of these matters can hope to be purely descriptive, of course, and arguments for the many normative suggestions I will make concerning what I take to be the most promising ways to understand realism appear throughout. Many will surely disagree with the account of realism argued for here, but I do hope that realists and antirealists alike will take an interest in the arguments for why the realism I describe is attractive and defensible.

These arguments serve two distinct but closely related ends. The first is to identify metaphysical commitments that are importantly constitutive of realism, and thus crucial to the internal coherence of the position. Thinking about these commitments helps one to distinguish them from others that fall outside the immediate context of realism, and to clarify the ways in which they do and do not conflict with traditional empiricist rivals. Importantly, though – and I cannot stress this enough – I will not argue for the exclusive coherence of the metaphysical account I propose. For reasons discussed in Chapter 1, I suspect that different metaphysical approaches are consistent with realism and comprise a spectrum, from

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Humean austerity regarding certain metaphysical questions to the more elaborate terrain I will map and beyond. The differences between these approaches have consequences for the sorts of things realists may hope to explain, and I endeavour to clarify various trade-offs involving ontology and explanation throughout. The second objective of this work is to give a unified account of a metaphysical proposal in support of realism, and here in particular various normative suggestions take centre stage. To summarize the aims of the book very concisely, I investigate the core elements of promising versions of contemporary realism, and develop a metaphysics that makes sense of these commitments. The end product, I hope, is a basic framework with a capacity for elaboration by realists and antirealists both, as may be appropriate to the specific issues they engage.

Here is a brief description of the contents by chapter. The first part of the book, 'Scientific realism today', sketches a preliminary account of the central commitments of realism as they have evolved over time and quite recently, often in response to antirealist scepticism. The essence of the controversy between realists and antirealists concerns the possibility of having knowledge of the unobservable, and this possibility is most strongly contested by varieties of empiricism. In Chapter 1, I introduce the idea of realism in the context of the sciences and consider the dialectic between this position and the forms of empiricism that dispute it, thus illuminating some different senses in which realism is apparently metaphysical. In Chapter 2, I develop this initial sketch of realism by considering what I take to be its most promising formulations, such as entity realism and structural realism, in order to produce a portrait of the position that incorporates the best of their insights and avoids their defects. The resulting inventory of realist commitment, to certain properties, relations, and particulars, and various connections between them are explored in Chapter 3.

'Metaphysical foundations', the second part of the book, delves more deeply into the ontological issues raised by the contemporary view of realism offered in Part I. The internal coherence of realism depends in part on the possibility of articulating an integrated and compelling account of these issues, and I articulate one such account here. Chapter 4 examines the issue of causation, on which much of the justificatory story of realism depends, and argues that its role in this story is nicely facilitated by a specific understanding of causal phenomena in terms of processes and dispositions. This discussion is extended in Chapter 5 to a consideration of laws of nature, where I argue that the natures of causal properties and the dispositions they confer lend themselves to a promising and metaphysically minimal account of natural necessity. Moving from an investigation

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of properties and relations to objects, Chapter 6 focuses on the role played in realist discourse by the concept of natural kinds. I argue that a proper understanding of this concept results in a dissolution of the traditional dichotomy between objective and subjective classification, and a rejection of certain vestiges of ancient metaphysics, outmoded in the context of realism today.

In the final part of the book, ‘Theory meets world’, I consider several matters arising from Parts I and II that overlap the hazy boundary between the metaphysics and the epistemology of realism. In Chapter 7, I examine the use of models to represent parts of the world, and the question of whether the “ontological” nature of scientific theories, conceived either linguistically or in terms of models, has any bearing on the epistemic commitments of realism. Chapter 8 builds on this discussion by giving an amalgamated account of certain features of theories and models that have implications for a realist understanding of scientific knowledge. Drawing analogies to representation in art, these features include the use of abstraction and idealization, and the notion of approximate truth.

It is sometimes said that scientific realism is a perennial issue of philosophy. Indeed, one of the implicit themes of this book is that some disputes between realists and antirealists, not to mention disputes between realists with different philosophical predispositions, are destined to remain unresolved due to an irresolvable lack of shared assumptions. To a great extent, these assumptions concern the metaphysical aspects of realism. It seems unlikely to me that there are convincing responses to all forms of antirealist scepticism, and it seems even less likely that there are any knock-down arguments against them. Some forms of scepticism are, no doubt, coherent philosophical positions, and it is doubtful whether there are any non-question-begging arguments that will decide these matters ultimately. If one is interested in realism, however – in seeing whether *it* can be understood as an engaging, coherent, compelling account of the sciences – then much work remains to be done. If one feels any pull in this direction, then it is crucial that one have recourse to an internally consistent and substantive position. It is the goal of this book to furnish a unified picture of the metaphysics of scientific realism with which to answer this challenge. It aspires to give a wide-ranging answer to the question of what sort of realist a sophisticated realist can be.

Much of the book took shape while I was a Visiting Fellow at the Center for Philosophy of Science at the University of Pittsburgh in 2004. I am grateful for that opportunity, as well as to the Social Sciences and Humanities Research Council of Canada for financial support. I am also

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Three final remarks are in order concerning the chapters to follow. Single quotation marks indicate quotation, or the mention of a term or phrase. Double quotation marks indicate the (generally figurative or metaphorical) use of a term or phrase. Lastly, a warning: I have made extensive reference to many tempting desserts. The reader is advised to snack before reading.

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DIT	dispositional identity thesis, for causal properties
ER	entity realism
IBE	inference to the best explanation, sometimes called abduction
NE	the New Essentialism, concerning scientific ontology
NOA	the natural ontological attitude
PI	pessimistic induction, or pessimistic meta-induction
PII	principle of the identity of indiscernibles
QM	quantum mechanics
SD	Salmon-Dowe (causal process)
SR	structural realism
UTD	the underdetermination of theory choice by data or evidence