

genuinely new or surprising to anyone familiar with the literature on this topic (even if they are unfamiliar with either Horgan's own conclusions or the particular way he reaches these conclusions based on his more general account). Part of the problem, of course, is that both of these puzzles at present seem to many readers (the reviewer included) as little more than confusions – confusions that can be clarified and explained relatively straightforwardly to advanced undergraduates. Of course, this might well be a testament to the impact that Horgan's (and others') work has had on our understanding of these topics over the past few decades but that unfortunately doesn't make the relevant chapters any more exciting to actually read.

Despite this mild unevenness, the volume as a whole is excellent, providing a welcome introduction to Horgan's contributions to epistemic and probabilistic puzzles. Also, viewed as a whole, one of the reasons that it provides such a nice introduction is the final essay. Chapter 14 is, in effect, a primer on Horgan's approach to understanding and computing epistemic probabilities generally, and it provides a lovely summary of the overall approach that is used again and again throughout the other essays collected here. Without this chapter, the volume would be, perhaps, merely one more collection of good essays on interesting topics by a well-known philosopher. But this final chapter unifies the rest of the book, clearly explaining how the various chapters (or, many of them, at least) are instances of a single general approach to the probabilistic and to the epistemic. The essay is extremely helpful for those looking to understand Horgan's overall 'big picture' approach, and, as a result, for such readers, I would recommend treating this volume the way many impatient readers treat mystery novels – by reading the last chapter first.

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### Reference

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## Explanatory pluralism

By CHRYSOSTOMOS MANTZAVINOS

Cambridge University Press, 2016. xiv + 223 pp.

Pluralism is a conception of how many kinds of something there are; and applied to scientific explanation, it looks like a strong contender. Functional explanation is one thing, causal explanation another, and reductive explanation something further still; *mutatis mutandis* for nomological, mechanistic and statistical or mathematical explanation. Disciplinary differences may also reflect pluralism in mode or posit:

chemical explanation sometimes appears different from explanation in ecology or linguistics, and even within disciplines – psychology or economics, for example – there seem to be many subkinds.

All this variety motivates Chrysostomos Mantzavinos's book, *Explanatory Pluralism*, which is a valuable addition to the explanation literature and essential reading for pluralists in Philosophy of Science. But the variety also leads him to believe that no headway can be made on traditional questions regarding what all and only the scientific explanations have in common. For Mantzavinos, the traditional project of analysing the concept of explanation is sterile, and we should instead reorient ourselves toward analysing the explanatory process, understood in terms of rule-governed explanatory games.

The sterility claim is interesting and worth exploring. But Mantzavinos leaves it at the level of stipulation, and no self-critical consideration is given to why explanatory pluralists wouldn't be encouraged to pursue a plurality of projects. So, even if focus on the role of human agents and explanatory activity is a welcome consequence, Mantzavinos's attempt just to change the subject is undermotivated. Worse, a *sin qua non* condition on the adequacy of any conception of explanation is that it be about explanation. If explanatory pluralism is a conception of how many kinds of explanation there are, then Explanatory Pluralism leaves its pluralists hamstrung by a basic confusion between process and product.

In Chapter 2, Mantzavinos provides a helpful overview of some of the dominant conceptions of explanation and argues that each fails in two important respects: (i) provision of analyses of the concept explanation (a misguided project) and (ii) provision of a unitary conception of scientific explanation (an impossible task). Chapter 3 develops a series of case studies from the social sciences to establish that received conceptions of explanation fail to display a universal scope of applicability. He focuses on three in particular: the causal-mechanical, unificationist and manipulationalist conceptions. Mantzavinos's point – there is no single conception that adequately captures explanatory practices in every domain of inquiry – is an important one. However, it's unclear whether these conceptions were ever intended to be 'the one correct account of scientific explanation' (19), much less the one correct account of explanatory practice. For instance, most mechanists are quick to acknowledge that the causal-mechanical conception is well-suited for some domains (e.g. neurobiology) but not others (e.g. mathematics).

Chapters 4–6 present the core claims of Mantzavinos's pluralism. In Chapter 4, Mantzavinos explicitly articulates what he takes explanatory pluralism to be, and why it is independent from both the nature of causality (§4.1) and the validity of reductionism (§4.2). Chapter 5 presents an in-depth look at the reorientation on explanatory process. Mantzavinos introduces his conception of the explanatory enterprise as an essentially human phenomenon and argues that explanations emerge when cognitive agents participate in (or play) rule-governed explanatory games. Ironically, the reorientation ends up being an analysis of the concept of explanation no less than any traditional analyses soured upon in Chapters 1–3, and Mantzavinos's project has the pluralist's standard difficulties with conceptual unity and monism: although they may be instantiated in different ways, the thought that explanations are essentially rule-governed games gives the appearance of pluralism while still maintaining that explanations take a single overarching form: that of a game.

Chapter 6, 'The rules of the explanatory game', details the forms that games take and applies the approach to explanatory practice. Mantzavinos presents four types of rules: constitutive, representational, inferential and scope. Constitutive rules frame explanatory games by determining suitable explananda, and by determining which background knowledge and conditions must be assumed, and which metaphysical presuppositions should constrain the other rules. Rules of representation guide explanatory activities by determining which kinds of representations are best, as well as which entities count as representation-bearers and by virtue of what, and how, they are connected with the objects represented. Rules of inference determine the appropriate inferential strategies for relating the representation to the explanandum. Finally, rules of scope guide the application of the explanatory game by specifying the range of phenomena to which the game is applicable, and how different explanatory games can be nested together.

Mantzavinos continues Chapter 6 by illustrating his approach using case studies from economics and medicine. The former describe 18th and 19th century analyses of the value of commodities as an explanatory game from the history of economics. After sketching the initial period of the explanatory game, Mantzavinos addresses the formulation of the governing rules by leading economists like Adam Smith, David Ricardo and John Stuart Mill. He describes how the explanandum (the exchangeable value of commodities) was established through the work of Smith and others, how the game was taking place within the context of certain presuppositions, such as the idea that the social world is knowable, ordered, and governed by discoverable laws. Mantzavinos then describes the rules of representation, stating that they consisted of the basic natural language and numerical examples commonly used by classical economists. The inferential rules allowed for generalizations such as 'the value of a commodity depends on the quantity of labour necessary for its production', and the rules of scope limited the explanatory game to competitive markets. Mantzavinos traces the game's evolution, pointing out how theoretical criticisms led to gradual changes in the rules of inference, and the development of mathematical models led to changes in the rules of representation. The rules of scope also changed during this time, as the analysis was extended to include different forms of competition. Together, these two extended case studies reveal how Mantzavinos's pluralism captures explanatory practice in diverse domains of inquiry. Both are highly informative and well-researched, and succeed at leaving the reader with a clearer understanding of Mantzavinos's conception.

In the remaining chapters, Mantzavinos provides more context for his claim that the explanatory process is inherently social. In Chapter 7, he contends that a plurality of explanatory games exist at a single moment, and that the rules of these games continually evolve over time. Chapters 8–9 precisify how the rules are generated, as Mantzavinos argues that they emerge, and change, through the process of interactions between a game's participants. He highlights both the cognitive and social process at work in adopting and changing explanatory rules, before turning toward the task of providing normative assessments of explanatory activity in Chapters 10–11. Mantzavinos rejects attempts to generate a single normative model of successful explanations, and maintains that good explanations are what emerge when good rules have been followed. Acknowledging that explanatory games are embedded in an institutional framework, he argues that while epistemic values can be used for

evaluating rules, the social institutions that frame explanatory games are to be evaluated based on non-epistemic values.

Ultimately, Mantzavinos has composed a novel approach to understanding the explanatory process, which is firmly grounded in the thought that explanation is a fundamentally human endeavour. Even if it does not always navigate the distinction between epistemic and psychological conceptions of explanation well, *Explanatory Pluralism* is nonetheless an important antidote to the ontic conception of explanation that has recently plagued philosophy of science. Mantzavinos's project refocuses the debate so as to highlight the cognitive and social elements of explanatory activity; it is an important and welcome addition to the literature. The book does suffer from some typographical errors, and the unusually swollen footnotes should have been edited out. But the novelty of his conception, and the skill of Mantzavinos's presentation, make this book well worth reading.

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## *Causal Powers*

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Oxford University Press, 2017. xii + 232 pp.

This is a wide-ranging collection with a stellar line-up of contributors. Most of the articles it contains go beyond arguments for an ontology of causal powers (rather than one of categorical or qualitative properties) in order to investigate issues in which committed powers theorists would be interested: the explanatory applications of powers theories, the plausibility of pan-dispositionalism, and lingering philosophical questions about how a theory of causal powers is best formulated. As such, it is an important addition to the literature on powers and is not only of interest to powers theorists but to anyone researching properties, causation or laws more generally, or the metaphysics of science and mind.

The book is divided into four parts: Science and Laws of Nature; Causation and Modality; Space, Time and Persistence; and Mind. For reasons of space, I will have to pick and choose between papers to discuss in this review and so the discussion of some worthy and interesting contributions will be omitted.

Nancy Cartwright, Anjan Chakravartty and Heather Demarest have chapters in the first section which consider the intersection between powers, laws and scientific practice. These primarily serve to motivate the adoption of a powers ontology rather than to develop the account of laws within it. It is here that the main discussions of why one should be a powers theorist take place.