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BOOK REVIEWS

Review of Gerhard Schurz's *Optimality Justifications*

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Optimality Justifications[1] presents a far-reaching overview of Gerhard Schurz's project to rehabilitate foundationalist epistemology through optimality justifications. Typically, foundationalist projects in epistemology attempt to justify certain methods of reasoning through (i) non-circular, (ii) first-person accessible demonstrations of (iii) the impossibility or improbability of their failure to lead to true beliefs. Such projects have been, relatively, on the back foot now for at least three quarters of a century. Instead of revising (i) non-circularity as the coherentists do or (ii) first-person accessibility as externalists do, Schurz proposes to revise (iii). Instead of trying to show that certain methods of reasoning have a (probable) guarantee of success Schurz aims to show that, while there is no such guarantee, they are nonetheless optimal in some sense among the available options and therefore justified.

The book consists of ten chapters, which form a progressive narrative. The first two chapters set the scene with an overview of the epistemic justification literature. Chapters three through five introduce the basis and plan of Schurz's new foundationalism. The main substance of the book is in chapters six through ten, in which Schurz develops optimality arguments for reasoning in inductive, deductive, and abductive contexts.

The overview of the epistemic justification literature in the first two chapters cover familiar ground but are worthwhile for how they motivate Schurz's foundationalist approach. Chapter one reviews familiar discussions stemming from the analysis of knowledge as justified true belief, which Schurz identifies as the goal of cognition. The chapter's primary contribution is to put forward the view that justification, truth, and belief all come in degrees, which motivates the search for highly reliable, though not infallible, methods of inference. The second chapter examines and rejects the alternative views of externalism, coherentism, and commonsensism. Readers who are already hold an alternative view will find the arguments in the first two chapters too brief to change their minds. However, even those with settled opinions will find it helpful to

[1]All citations are to Schurz 2019 unless otherwise specified.

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know how Schurz thinks about the alternatives to clarify how his argument in the rest of the book should be understood.

Chapters three and four outline the basis and structure of foundationalist justification. The basis is the set of propositions in the foundationalist picture that do not stand in further need of justification. For Schurz, these are 1. analytic propositions and 2. internally-accessible and immediately evident propositions about experience. This kind of division and choice of basis bears similarities to other foundationalist projects, but Schurz brings some new light to old debates here by appealing to insights from cognitive science. The new developments begin with Schurz's account of the kinds of epistemic justifications he's after. In Schurz's framework, these justifications issue in reliable lower probability bounds on propositions so long as we have higher-order justifications for the inductive, deductive, and abductive inferences used in the justification. The main substance of the book consists of showing that such higher-order justifications of inductive, deductive, and abductive reasoning are possible.

The meta-inductive justification of induction is the highlight of Schurz's foundationalist approach. This justification is a development of the pragmatic approach to justifying induction initiated by Hans Reichenbach and carried on by Wesley Salmon. The argument has two steps. The first, a priori step aims to show that certain "meta-methods" are optimal in the sense that, given a set of candidate methods, the meta-method is guaranteed to do as well or better than the best candidate method in the long run and not much worse in the short run. These guarantees are given by results from a subfield of machine learning.[2] Schurz argues that the provable optimality of these methods justifies their use. The argument is in the tradition of Reichenbach's justification of induction in *Experience and Prediction*, which Reichenbach likens to that of a doctor who justifies an operation by pointing out that while we do not know if an operation will succeed we know that if *any* treatment will succeed then an operation will succeed.[3] The second, a posteriori step appeals to historical track records to argue that these meta-inductively optimal methods would currently favor predicting similarly to our best scientific inductive methods, and so the justification of the methods of the former carries over to the predictions of the latter. The argument is given a much more extended treatment in Schurz's previous book, *Hume's Problem Solved: The Optimality of Meta-induction*.[4] Those already familiar with Schurz's meta-inductive approach will find that the main noticeable addition in this book is a fuller treatment of the transition from meta-inductively optimal probabilistic predictions to optimal qualitative beliefs with methods from the field of reliability engineering. But these additions, while interesting, are given a relatively short treatment. For those not already familiar with the meta-inductive approach, these chapters are an excellent survey to help them decide whether they would be interested in reading the fuller argument of the previous book.

The remaining chapters extend the argumentative strategy of optimality justifications to deductive and abductive reasoning. The relevant notions of optimality are different in each of these than in the treatment of induction. In the chapter on deduction, Schurz argues for the optimality of classical logic among the set of alternative logics in the sense of having optimal representational power. Schurz makes use of standard theorems

[2] See Cesa-Bianchi and Lugosi 2006 for a classic survey.
[3] Reichenbach 1938
[4] Schurz 2019

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about translation schemes to show that classical logic supplemented with modal operators can represent the consequence relations of non-classical logics such as intuitionistic logic, multi-valued logics, and paraconsistent logic. So, we are justified in using classical logic since it gives us access to all of the deductive reasoning capacity of the alternatives while the reverse is not necessarily true. This kind of argumentative strategy is standard in debates about foundations of logic and mathematics, and its inclusion in the book is more for completeness of the overall system than for extending this particular line of research. The primary drawback of this chapter is that its treatment of deductive reasoning is limited to propositional logics and does not extend to first- (or higher-)order logics nor to alternative foundations for mathematics. In addition, the book could have used more discussion about how much room there is for disagreement when interpreting translation-representation results. While the intertranslatability of classical and intuitionistic logic, for example, is well-known, it is not universally agreed that this means classical logic is equivalent to or even no weaker than intuitionistic logic. There are a great many open questions on how to precisify and understand different notions of theoretical strength, equivalence, and inequivalence for logic and mathematics[5], not to mention many theorems to prove at the ground level about how different theories relate. There are, I think, enough thorny details left to work through that the jury should still be out on how a fully worked out foundation of logic or mathematics will look in an optimality-foundationalist epistemology.

Some of the most interesting content of the book is found towards the end in its justification of theory-generating abduction, which is abduction to new theories and theoretical resources rather than to particular models within accepted theories or to particular facts. The meta-inductive approach from the section on induction applies to optimal aggregation of the predictions of theories, so we already have a pragmatic justification of an instrumentalist inference to *using the predictions of* the *predictively* best explanation. Schurz shows how assuming a weakened version of the Causal Markov Principle and a simplicity ordering based on the relation of embeddability of causal structures lets us run arguments like the following: If we were brains in vats, then our reality would be isomorphic in some sense to the program running on the computer we are hooked up to, so the skeptical brain-in-a-vat scenario posits strictly more structure than the non-skeptical scenario and so is less probable given our preference for simplicity. The result is a justification of abductive inference to structural realism. However, Schurz's justification of the Causal Markov Principle rests on a separate abductive argument for the use of the theoretical resources of causality. The argument is that the theoretical resources of causality are unifying and yield independently testable predictions, which are the two rationality conditions for abduction that Schurz defends. However, as Schurz himself points out, "unification and independent testability are *necessary* criteria of the rational justifiability of theory-generating abduction"[6] and are not sufficient to demonstrably justify the abductive inference. The abductive argument for causal inference receives "a justification meeting scientific standards"[7] but not an independent optimality justification. Schurz is aware of this, but notes that it is still "an achievement if we can show that the acceptance of a single fundamental abduction

[5] See for example Meadows 2021
[6] p. 241
[7] p. 268

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[of the Markov Principle] provides a justificatory basis for theory-generating abductions of all other sorts."[8] Strictly speaking, optimality justifications only give us an instrumentalist epistemology.

Optimality Justifications is a survey that covers a great deal of ground in a relatively short number of pages. It presents the optimality-foundationalist project in a small enough space that the reader can see at once how everything hangs together but in enough fine-grain that they can also appreciate how the system as a whole works. Some details are necessarily left out. The ideas in the two chapters on induction, for example, previously received a book-length exposition, and other chapters would deserve the same treatment if the goal was an airtight rather than accessible presentation. As is, the book's comprehensive coverage and references make it an ideal entry point for anyone wishing to learn more, but on its own will certainly leave a careful reader with a solid understanding of the project's virtues, difficulties, and (what's the same) avenues for future work.

References

[1] Nicolo Cesa-Bianchi and Gábor Lugosi. *Prediction, learning, and games*. Cambridge University Press, 2006.

[2] Toby Meadows. "Relative Interpretation Between Logics". In: *Erkenntnis* 88.8 (2021), pp. 3203–3220. DOI: 10.1007/s10670-021-00498-3.

[3] Hans Reichenbach. *Experience and Prediction: An Analysis of the Foundations and the Structure of Knowledge*. Chicago, IL, USA: University of Notre Dame Press, 1938.

[4] Gerhard Schurz. *Hume's Problem Solved: The Optimality of Meta-Induction*. Cambridge, Massachusetts: The MIT Press, 2019.

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[8] p. 264

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