Being Reduced: New Essays on Reduction, Explanation, and Causation. Edited by Jakob Hohwy and Jesper Kallestrup. (Oxford: Oxford University Press, 2008. Pp. x + 312. Price £49.00.)

Reduction remains a live philosophical topic, encompassing metaphysical issues about the natural world, as well as epistemological and methodological questions about science. Germane to various philosophical notions, such as ontological determination, causation, explanation, unification, and theory structure, reduction is analyzed and debated in metaphysics, philosophy of mind, and philosophy of science. The contributions in *Being Reduced* illustrate the perennial philosophical interest in reduction. The editors have succeeded in assembling an impressive lineup of authors; and nearly every contribution offers some new philosophical insights, so that it is worth acquiring the whole collection, rather than accessing merely an individual essay. Further, the contributions span a diversity of issues and cases: reductive explanation in neuroscience, how embodied cognition challenges reductionism, the consistency of rational group agency with supervenience, multiple realization and the special sciences, the possibility of mental causation, the difference between physicalism and microphysicalism, and *ceteris paribus* laws and explanatory pluralism—a topic treated particularly well in a posthumous essay by Peter Lipton.

Unsurprisingly, many contributions pertaining to the area of philosophy of science focus on causal and mechanistic explanation, reflecting the shift away from the traditional concern with theory reduction (e.g., Ernest Nagel's model). Whereas a variety of philosophical considerations and empirical cases are addressed by the philosophy of science essays, most of the philosophy of mind and metaphysics contributions deal with Jaegwon Kim's exclusion argument. This both limits the scope of the philosophical questions pursued and does not fully do justice to the fact that criticizing previous positions should not be an intellectual end in itself—often more insight

can be obtained by addressing a philosophical issue head on and developing a positive account on this matter (be it physicalism, ontological determination, or mental causation). Some of the contributions laudably bridge philosophy of science and traditional philosophy of mind. For example, Barry Loewer sheds light on how the laws of fundamental physics relate to and make possible special science laws, offering a more nuanced view than the autonomy of the special sciences known from the work of Jerry Fodor. Additionally, James Woodward presents his interventionist account of causation, which does not rely on philosophers' intuitions about causation, but is meant to capture the actual notion of causation and the practice of causal explanation in different sciences. Woodward puts this account to fruitful philosophical use by undermining assumptions in Kim's exclusion argument. The latter relies on a notion of 'sufficient cause', i.e., a cause nomologically necessitating the effect (closely aligning with the deductive-nomological conception of explanation—which philosophers of science have abandoned three decades ago). In contrast, on Woodward's interventionist account a cause is a variable (e.g. a determinable property) that makes a difference to its effects. This both captures studies of probabilistic causation in the special sciences and can make room for the idea that mental phenomena are causes—showing that Kim's exclusion argument is based on an irrelevant notion of causation.

It is a bad editorial habit that collections are usually assembled by having authors prepare their contributions independently, without asking authors to comment on other draft contributions and revising their essays in the light of the other contributions. This time it comes with a vengeance. The contributions by Woodward and by Peter Menzies both use an interventionist notion of causation to lay bare problems with the exclusion argument. While a few of their points are complementary, most of their discussions overlap so as to be redundant. Tim Crane's essay attempts to defend the exclusion argument, but Woodward's and Menzies's

essays make plain how Crane's account is from the outset based on problematic assumption. The editors have made no efforts to diminish these issues or made editorial revisions so as to create cross-references among the different contributions.

All this despite the editors' important introductory observation that there "are long-standing but relatively disjoint traditions for discussing reduction, explanation, and causation in philosophy of mind and philosophy of science" (p. 2). This fact makes it necessary to encourage intellectual interaction among these different branches of philosophy. While achieving it is admittedly a task for the future, an interaction across specialties apparently has not even been attempted in the preparation of this edited collection. In his contribution, philosopher of science Peter Godfrey-Smith points out that actual science falsifies a package of views about science that is the basis for much of philosophy of mind, including the philosophical assumption that law-based scientific theories exist at separate hierarchical levels and that there is a close link between the notions of law, natural kind, counterfactual dependence, and explanation. Yet most of the volume's philosophy of mind and metaphysics contributions do not accommodate this point. At the same time, a few of the philosophy of science contributions can also be subjected to criticism. John Bickle's essay starts out in a very promising fashion, by announcing that it will not rely on popular philosophical assumptions that are not backed up by actual science. Rather than developing a philosophical account based on examples from "elementary school science education" (p. 35), he sets out to understand reduction as it works in real neuroscience. However, after describing an experimental investigation into how a transcription enhancer is one molecular entity causally involved in the formation of some aspects of memory, Bickle simply proclaims this as "ruthlessly reductive" (p. 47) without offering any analysis of the notion of reduction involved. Even scientists have pointed out that molecular entities have their causal effects (on memory or other higher-level phenomena) only as part of an organismal context, which cannot

be reduced in the same sense. ‘Reduction(ism)’ as used by biologists covers different methodological or epistemological tenets in different contexts, so that an explicit philosophical interpretation of a scientific case is always mandatory.

Ultimately, *Being Reduced* offers a nice compendium of philosophical ideas and arguments, which at the same time highlights that in future investigations philosophers will need to pay more attention to discussions beyond their specialty and to continue reflecting on the presuppositions made and the relevance of the problems pursued by them.

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