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BOOK REVIEW

Michael Bennett McNulty (ed.), *Kant's Metaphysical Foundations of Natural Science. A Critical Guide*. Cambridge: Cambridge University Press, 2022. pp. xi + 280. ISBN 9781108661072 (hbk) $32.99

The Cambridge Critical Guides are, according to the publisher, intended for an audience of graduate students and scholars, with each volume covering a key text in the philosophical tradition. Michael Bennett McNulty has edited this volume, which concerns Kant's *Metaphysical Foundations of Natural Science* (*MFNS*). This work was published in 1786, three years after the *Prolegomena* and one year before the B-edition of the *Critique of Pure Reason* (*CPR*), and its stock has risen and fallen several times over the last centuries, most recently regaining its importance for Kant-scholarship in general through twentieth-century collaborations between scholars in Konstanz, Western Ontario, and, finally, through the work of Michael Friedman – in particular, his 1986 'The Metaphysical Foundations of Newtonian Science', which first appeared in a collection edited by Western Ontario's Robert Butts.

The *Metaphysical Foundations* builds a bridge between the two banks of Kant's theoretical project. First, it shows how the *Critique*'s a priori Principles of Pure Understanding become fully binding on nature; second, it supposedly grounds a priori concepts and principles that should be in evidence already in the sciences of Kant's day. These dual aspects put significant demands on interpreters since they must know the *Critique* very well, but they must also have read a large volume of eighteenth-century science, almost all of which remains untranslated in its original languages.

Given Kant's own indications, the task of such a Critical Guide is, in a sense, straightforward. Within the *Critique* itself, each category is ascribed a time-determination, producing a schema that specifies it further and thereby links each to the manifold of *time*. The *MFNS* opens by adding a further specifier: the concept of a *movable point in space*. The body of the work then proceeds to derive the specifications of the schematised categories, and of their corresponding Principles of Pure Experience, by means of this *differentia* of *motion*. The *Critique*'s four groups of Principles therefore now reappear as the four main sections of the *MFNS*, while their individual components reappear within these as Propositions (*Lehrsätze*). Each of these Propositions has a specific role to play within the sciences of nature in question, which are: Phoronomy, Dynamics, Mechanics, and Phenomenology, which latter corresponds to the *Critique*'s Postulates of Empirical Thought. Finally, within the 'Explications' of each chapter, these concepts and propositions are shown to lie at the foundation of Eulerian mechanics, and these demonstrations conclude Kant's theoretical science of nature. One would therefore expect a Critical Guide to this book to offer an explanation, in general terms, of the above links, and a series of analyses following the exceedingly precise logico-mathematical structure of the work.

The value of such a structural-analytic approach has been demonstrated in the past, above all in full-length studies by Pollok (2001) and Friedman (2013), but it is lacking in this volume. Its first article, by Thomas Sturm, discusses the Preface and Kant's project as a whole. However, few of the papers in this collection are concerned with explaining either of Kant's texts (*CPR* and *MFNS*) in any greater detail. Marius Stan's 'Phoronomy: Space, Construction, and Mathematizing Motion' does focus on a single major chapter of the book. But Stan is mainly concerned with eliminating what he calls 'red herrings' in the literature, by analysing in great detail works of Kant's immediate predecessors and contemporaries.

Michela Massimi, Silvia De Bianchi, and Friedman all comment on the Phenomenology chapter. Here, we would expect a discussion of the difference between necessary and contingent determinations of phenomena, by means of a distinction between necessary and 'sempiternal' (i.e. always true) statements, as we find in the Postulates of Empirical Thought, along with some explanation of the link to J. H. Lambert's science of Phenomenology. We do find in these articles useful references to the problem of determining positions in absolute space and time, as well as to Kant's earlier works and those of some of his contemporaries, even if one is still left wondering how that problem connects to the schemata of the modal categories.

This pattern is evident throughout. We have articles on 'Finitism' (Lydia Patton), 'Space-filling' (by James Messina and Daniel Warren), 'The Applicability of Mathematics as a Metaphysical Problem' (by Katherine Dunlop), and 'Kant's Normative Conception of Natural Science' (by Angela Breitenbach), which relate tangentially to things Kant and, more often, his interpreters have said. In most cases, this reviewer was unable to understand what the purported problem was, and still less how Kant might have solved it.

The major difficulty in all cases is that a central chapter of the *MFNS* remains to this day obscure, meaning in turn that its concluding chapters (Mechanics and Phenomenology), whatever their internal consistency, are left dangling. For, while it is by now reasonably well understood how the Phoronomy and the Mechanics are connected to Euler's project, the longest section of the *MFNS* – the Dynamics – does not make this connection in an obvious way. In part for this reason, several articles in this collection concern Kant's remarks about space, dynamic and attractive forces, and early chemical theories that pepper this long chapter (by McNulty).

The very length of the Dynamics is difficult to square with the brevity and seeming unimportance of its corresponding section in the *Critique* – the so-called Anticipations of Perception, which schematise the categories of quality as the concept of an intensive magnitude. Here, Kant must correct for an unavoidable and indeed desired consequence of the Relativity Principle that drives the preceding chapter. In the Phoronomy, the rest space provisionally provided by the *Critique*'s Transcendental Aesthetic was rendered empirically indeterminate. But Euler had attempted to *explain* the source of force by grounding it in a conjunction of three factors: the notion of position, the notion of a body occupying a given space, and, finally, the law of non-contradiction. Since Kant can no longer appeal to absolute position within the Dynamics, while he holds (correctly) that it is not a *logical* contradiction that two bodies occupy the same space at the same time (B191ff), his solution is, typically, to invert the relation. He obtains a family of arguments that seek to explain the notion of a determinate position with reference to force, which arguments are then concluded

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in the Mechanics, while their consequences are then assessed epistemologically in the Phenomenology. On this question, much work certainly remains to be done, but we cannot find in this volume much that would help us bring it to a successful conclusion.

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