John P. Burgess and Gideon Rosen, *A Subject with No Object: Strategies for Nominalistic Interpretation of Mathematics*, Clarendon Press, Oxford, 1997 (1999 in paperback), GBP 14.99, pp. x + 259, ISBN 0-19-823615-8, 0-19-825012-6 (Pbk)

Nominalism is the view that there are no abstract objects. In particular, according to nominalists, there are no numbers, no functions, and no sets. This view should be contrasted with *platonism*, the view according to which at least some abstract objects enjoy mind-independent existence. (Typically platonists believe in a great deal of the usual mathematical ontology: the natural numbers, the real numbers, sets, and so on.) It is not enough, however, for nominalists to simply deny the existence of abstract objects; they need to account for the apparent truth of various mathematical sentences such as 'there exists an even prime number'. They also need to show how to purge standard science of its apparent commitment to *abstracta*. For otherwise they are guilty of what Putnam calls "intellectual dishonesty" [8, p. 347]. This is the crime of taking back in one's philosophical moments what one daily presupposes when doing science.

Nominalist strategies are extremely popular these days—at least among those philosophers of the naturalistic bent. The main reasons for the popularity of nominalism are: (i) nominalism is ontologically more parsimonious than platonism and (ii) nominalism does not face the epistemological problems with which platonism must contend [1]. Despite the popularity of nominalism as a *general* strategy, there is very little consensus amongst nominalists as to which *particular* strategy is the preferred one—there are, a variety of nominalist strategies to choose from and yet they all seem to face various technical and philosophical difficulties.

In *A Subject with No Object*, Burgess and Rosen provide a rather comprehensive treatment of nominalist strategies available in the philosophy of mathematics, from the modern beginnings with Goodman and Quine [5] to the contemporary approaches of Chihara [2] and Field [3]. Burgess and Rosen provide a common framework that allows for a smooth presentation of the various strategies, and in doing so they shed light on both the nominalistic strategies they discuss and on nominalism in general. This book is thus an important contribution to the philosophy of mathematics and to metaphysics generally.

The book is divided into three parts. The first presents the philosophical and technical background. The former consists in discussion of the motivation for nominalism. The central questions discussed here are: What are abstract entities?; Why disbelieve in their existence?; Why embark on programs of reconstrual of scientific theories in order to avoid commitment to *abstracta*? The technical background in section 1 consists in a common formal framework for the various nominalist proposals—essentially a two-sorted language and first-order classical predicate calculus. Section 2 uses the framework outlined in section 1 to present three important nominalist strategies: a geometric strategy (in which the formal machinery at the nominalist's disposal is extended to include quantification over geometric entities, such as space-time points), a modal strategy (in which the nominalist extends her formal machinery to include modal logic), and a mixed-modal strategy (in which the nominalist extends her formal machinery to include both modal logic and some other logical resources such as mereology or second-order logic).

Finally, in section 3, Burgess and Rosen discuss a number of other nominalist options before they spell out the relationship between the somewhat idealised strategies presented in sections 2 and 3 and the various strategies found in the literature. (So, for example, it is in section 3 where we find that Field [3], [4] is someone who pursues the geometric strategy, and Hellman [6], Chihara [2], and Putnam [7], have pursued modal strategies.) Section 3 is rounded out with a tentative conclusion. (Burgess and Rosen suggest that this final section might be more appropriately titled "In Lieu of Conclusion" for their discussion here is neither conclusive nor is it "drawn from anything established in earlier chapters" (p. 205).) This conclusion pursues two very important questions in the context of the nominalism–platonism debate, namely: (i) What are the scientific merits of the nominalistically reconstructed theories compared to standard scientific theories?; (ii) What are the merits of *hermeneutic* nominalist strategies—strategies that take the nominalistic reconstrual of scientific theories to be theses about the meanings of the relevant scientific terms?

There is a great deal to like about this book. It is thorough, accessible and remarkably lively. The three nominalist strategies focussed on in section 2 are well chosen. For example, the discussion of Hartry Field's [3, 4] influential fictionalism (pp. 97–123 and pp. 190–196) is exemplary. (I dare say that many future discussions of Field's work will begin with Burgess's and Rosen's discussion of Field in *A Subject with No Object*.) I also liked the discussion of Occam's razor (pp. 214–225). Here Burgess and Rosen suggest that issues of rigour and consistency cloud ontological debates in mathematics to such an extent that it is difficult to know whether economy of abstract ontology really is a virtue of scientific and mathematical theories.

Throughout the book the discussion is also very even-handed (especially given that neither Burgess nor Rosen are nominalists). They have gone to great lengths to give fair and reasonable presentations of the various nominalist strategies. Sure they subject these strategies to criticism, but their criticisms are presented without advancing Platonist agenda at every turn. For instance, at one point Burgess and Rosen point out that

> [W]hether the obstacles [to the geometric nominalist strategy] enumerated can be surmounted is an open research problem. As a consequence of nominalism's being mainly a philosopher's concern, this open research problem is moreover one that has so far been investigated only by amateurs—philosophers and logicians—not professionals—geometers and physicists; and the failure of amateurs to surmount the obstacles is no strong grounds for pessimism about what could be achieved by professionals. (p. 118)

Indeed, the book reads as though it were written by nominalists interested in subjecting their own views to a rigourous and thorough critique, with the goal of determining the most promising nominalist strategies.

A Subject with No Object is something of a rarity in the contemporary philosophy of mathematics literature; it does not present any significantly new position and yet the importance of this book is undeniable. This book is proof that one does not have to advance radical new theses in order to advance debate in philosophy. I thoroughly recommend it to anyone interested in the philosophy of mathematics or metaphysics.

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