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The Universe As We Find It, by John Heil. Oxford: Clarendon Press, 2012. Pp. xiv + 311. H/b £32.00.

John Heil's *The Universe As We Find It* is a much anticipated follow-up to his *From an Ontological Point of View* (2003, OUP). The continuity between the books is more thematic than systematic, but the new book is both a helpful summary of the ontology that Heil has built as well as an interesting, methodological reaction to recent debates in ontology and metaontology. The themes that most interest Heil are the bridging of fundamental ontology with fundamental physics on one hand and everyday language on the other hand. The first theme is familiar from much of recent work in metaontology, e.g., by philosophers such as Theodore Sider, but it is the attempt to connect metaphysics with our lives and to demonstrate the relevance of philosophy that is most original to Heil's work.

In *The Universe As We Find It* Heil attempts to take his lucid, accessible style to a new level. Heil's ability to express technical concepts without resorting to jargon is commendable, although some readers may interpret this as a compromise between clarity and precision. They would be mistaken: Heil does not compromise, but attempts to open the field of fundamental ontology to a whole new audience. Whether his strategy is successful remains to be seen, but it does appear that Heil has managed to tackle difficult questions with unprecedented clarity. This is a point worth emphasizing, as it is clear that Heil is frustrated – with good reason – about the direction that some recent work in metaphysics has taken: 'metaphysics has been too long in the thrall of the linguisticizers, those who believe that deep truths about the universe are to be had by analysing ways we talk about the universe' (p. 10).

What about the positive story? This will be largely familiar, as Chapters 3 to 7, 9, and 12 include previously published material. Heil's view could be summarized as follows. Fundamental physics tells us the actual structure of the universe, whereas fundamental ontology attempts to settle the necessary conditions for

any theory (p. 2). It should be noted though that Heil does not think that ontology proceeds by a priori methods, but rather by acting in concert with science. Heil's central ontological claim is that there are two basic ontological categories: substance and property (where properties are understood as modes of being). However, the book is rich in other themes as well: universals, causation, relations, truthmaking, reductionism, and natural kind essences each receive a brief but illuminating treatment in Chapters 5 to 9. Chapters 10 to 12 are devoted to philosophy of mind, a topic into which much of Heil's early work delved. *The Universe As We Find It* offers an updated account of Heil's views concerning mentality, conscious experience, and conscious thought. While Heil's negative remarks concerning dualism and non-reductive physicalism are worthwhile, he seems unwilling to place himself in any of the usual lockers.

Instead of outlining each chapter, I'd like to focus on one central aspect of Heil's ontology which is especially interesting – and controversial. This is the idea that substances must be *simple*, introduced in Chapter 2 and discussed throughout the book. Simple substances lack proper substantial parts, they are *mereologically* simple, but they need not be point-like. Heil thinks simple substances could be extended – a view also defended by E. J. Lowe (see my review of Lowe's *More Kinds of Being* in this journal, doi:10.1093/mind/fzt020). The connection between Heil's two fundamental categories is that simple substances are property bearers. Since properties must have bearers and only simple substances are apt property bearers, a complex entity such as a tomato is not a property bearer – it does not have the *properties* of being red or spherical, for instance. Heil is aware of this seemingly unintuitive result:

I am not arguing that tomatoes are not red or spherical. I am not denying that there are indefinitely many *truths* pertaining to complex entities, including states of affairs and events. What I *am* suggesting is that truthmakers for these claims are not properties, or at any rate not properties of the complex entities. (pp. 23–24.)

Heil hopes to save ordinary talk about tomatoes while arguing that tomatoes are, in fact, only '*quasi-*

substances' and hence cannot have genuine properties (a truthmaker theory is developed in Chapter 8). I have no space here to examine whether Heil succeeds in this regard, but given his conviction that ontology proceeds by acting in concert with science, another aspect of his strategy of defending simple substances ought to be discussed. In particular, does Heil manage to reconcile fundamental ontology with fundamental physics? Heil is familiar with recent, scientifically informed debates on this topic and suggests that even if it turns out that the universe is 'an arrangement of interpenetrating fields', his ontology can stand its ground, for fields could play the role of substance and objects would be fluctuations in fields (p. 25). Later, in Chapter 3, he considers some of the problems related to this type of approach, such as the possibility of atomless gunk and actual infinities (p. 38 ff.).

A 'gunky' ontology would, on the face of it, seem to present a problem for Heil, since it entails that there are no mereological simples. But Heil attempts to avoid this problem by taking aboard Spinoza, whose 'priority monism' has been recently popularized by Jonathan Schaffer. The idea is that the universe itself could be a simple substance, perhaps consisting of fields, but having a non-mereological complexity. According to priority monism, it is the whole that is prior to its parts. Leaving this option open, Heil proposes a neutral ontology where science fills in the blanks, but insists that fundamental physics must include 'simple, propertied substances' (p. 41). For Heil, a 'gunky' world is non-mereological: a seamless 'blancmange world' (as D. C. Williams calls it), which has no substantial parts. Hence, the result is a simple, extended substance.

Yet, this is only one way that a 'gunky' ontology could be interpreted, and Heil also needs to rule out the possibility whereby the priority relations move in the other direction, from the larger to the smaller, perhaps featuring an infinite descent of simple substances. This would seem to be the case on the mereological conception of gunk: each proper part is further divisible into smaller and smaller proper parts, *ad infinitum*. Heil presents a counterargument deriving from the impossibility of actual infinities, but I find the case to be wanting. Heil's concern is that if there were infinitely many electrons or other simple substances, the universe would be infinitely complex – denying this possibility is one, albeit minor, necessary constraint for scientific theorizing. But this may already be too much of a constraint; the possibility of infinite descent ought to be taken seriously.

Indeed, this is a possibility considered by Schaffer (see his 'Is There a Fundamental Level?', *Noûs* 37, 2003, pp. 498–517), who points to work in theoretical physics, e.g., by David Bohm and Hans Dehmelt, where the possible physical realization of infinite descent is considered. It is worth noting, however, that infinite descent itself may not entail infinite complexity. This type of scenario is possible if infinite descent is 'boring', as Schaffer speculates. In this case the supervenience relations between all lower levels 'go symmetric' – it's turtles all the way down. 'Boring' infinite descent requires that there is no *novelty* in the structure after a certain point.

This is not the place to fully assess the possibility of infinite descent, but it does appear that Heil's argument is too quick, since the suggested conclusion is supposed to be a *constraint* for scientific theorizing (for further discussion on the possibility of infinite descent, see Ricki Bliss's 'Viciousness and the Structure of Reality', *Philosophical Studies*, forthcoming, doi:10.1007/s11098-012-0043-0). Two possibilities present themselves: either infinite descent (at least of the 'boring' type) does not entail infinite complexity, or Heil's proposed constraint is mistaken and the possibility of infinite complexity should not be proscribed from scientific theorizing.

I have spent a lot of time examining what might seem like a minor detail in Heil's rich book. I hope that this has been a worthwhile endeavour, since the issue at hand is crucial for both Heil's fundamental ontology as well as his broader, metaontological project concerning the relationship between fundamental ontology and fundamental physics. I do not mean to suggest that Heil's project stands or falls on the basis of this issue, but I would like to take the opportunity to invite him to elaborate on this theme.

I should conclude by emphasizing the merits of the book. *The Universe As We Find It* is an exceptionally readable book about some of the most burning issues in fundamental ontology. Heil does not hide behind needless technicalities and jargon; difficult topics in contemporary metaphysics are discussed with such clarity that I do not hesitate to recommend the book even to beginners in philosophy, while at the same time it provides material on which professional metaphysicians will debate for years.

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