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A MINIMALIST ONTOLOGY OF THE NATURAL WORLD

MICHAEL ESFELD AND DIRK-ANDRÉ DECKERT

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Michael Esfeld and Dirk-André Deckert

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Among those who embrace naturalism, and consequently urge that the *a priori* methods of philosophy be connected to the empirical sciences, many hope to find a metaphysics already there, more or less waiting to be 'read off' from our best scientific theories. In this book, Esfeld and Deckert take a different, and arguably more plausible, stance: that of assuming that the empirical input underdetermines the metaphysics, and therefore scientific theories always require the careful, and squarely philosophical, activity of interpretation, many different ways of understanding things always being available. Based on this, Esfeld and Deckert shun the 'reading-off strategy' and follow a more complex route, one that consists in setting some basic desiderata for one's metaphysics at the outset, and then articulating in detail a coherent view of the world that meets those desiderata while also receiving support from science.

Esfeld and Deckert, in particular, make it clear right from the start that they work with one basic methodological principle in mind: one should seek the minimal, simplest ontology that accounts for all the facts in the actual world —metaphysically possible worlds consequently being ruled out as uninteresting and irrelevant. As they put it, '[t]he measure for ontology is simplicity (or parsimony) together with empirical adequacy' (p. 13). The focus is on physics,

which Esfeld and Deckert reasonably regard as prior to the other sciences when it comes to identifying the fundamental structure of reality.

Against this background, Esfeld and Deckert make two basic claims: (1) The world is entirely made up of property-less matter points and distance relations between them, everything else being derivative on these two primitives (including, most notably, time, which corresponds to the ordered sequence of changing configurations of points). As a consequence, (2) 'super-Humeanism' is (at least contingently) true: our universe is a 'mosaic' of matter points individuated by ever-changing distance relations, and all the rest of the stuff that appears in our descriptions of reality is a means to simplify things and should not be given ontological weight. Indeed, Esfeld and Deckert mount a detailed and carefully argued case that adding or subtracting anything to their two preferred categories (points and distance relations) only creates drawbacks. A large part of this case rests on the above-mentioned idea that physical theory doesn't have a straightforward metaphysical reading, and a good amount of effort is instead required to supply it with an interpretation. This entails, among other things, that there is room for the theory to be 'tweaked', as it were, so as to fit one's preferred philosophical framework. And indeed the book presents the reader with a significant amount of tweaking.

After an introductory Chapter 1, in Chapter 2 Esfeld and Deckert present their minimalist ontology and formulate their key claim, according to which the dynamical structure of a theory contains elements that enable 'us to capture the change in the configuration of matter points in a manner that is as simple and informative as possible' without corresponding to putative intrinsic properties of the matter points or, *a fortiori*, additional entity-types (p. 39). After all, our experience of the physical world is ultimately one of positions and trajectories of things in space and time, so why think that anything more should be included in the fundamental furniture of the world? Chapter 3 is devoted to the application of the minimalist ontology of matter points and distance relations to classical and quantum mechanics, and Bohmian mechanics emerges as a natural candidate for underpinning the metaphysical claim being made. Accordingly, we are invited to think of the world as a (finite!) collection of particles with well-defined positions and trajectories. The behaviour of such particles is encoded in the wave-function—which, it goes without saying, is a mere instrument, enabling one to express in a concise fashion a complex array of facts ultimately about configurations of matter points in space. Chapter 4 extends this to quantum field theory, which is interpreted through the so-called Dirac sea model for electrons. In particular, the creation- and annihilation-events typical of quantum field theory are explained away as mere by-products of the theoretical representation; in fact, particles are permanent endurants. Lastly, in Chapter 5 the model is applied to relativistic physics and quantum gravity. There, Esfeld and Deckert offer a very useful discussion of two rather different theoretical options: on the one hand, that of reformulating physics in purely relational terms, an attempt that dates back to Mach and has been recently revived, most notably, by Julian Barbour; on the other hand, that of putting together super-Humeanism as a form of relational ontology and a non-relational physics 'filtered' through philosophical analysis. The authors provide reasons for choosing the latter option, and develop on this basis an updated version of so-called Wheeler–Feynman electrodynamics (pp. 141–4).

Overall, this is a well-written, informed, and ambitious book, which defends an undoubtedly original thesis—nothing less than an updated, scientifically informed atomism in relationist clothes!—in a competent manner. However, at several points one is left wishing for a more detailed defence of the claims and theses that are put forward, both at the level of the 'small' details—if one may call them so—and at the level of the grand vision of things.

Questions of the former kind include the following: Are the authors' 'bare points which then are matter points [because connected by distance relations]' (p. 47) truly different from the bare particulars that they reject as obscure metaphysical posits? Why should we agree that primitive, non-relational identities *entail* haecceitism (p. 19)? (This may appear intuitive, yet there is near consensus in metaphysics that it is perfectly possible, for instance,

to have 'bare' intra-world identities, not determined by 'haecceitates' yet intrinsic, together with anti-haecceitism at the level of trans-world identity). On a different note, isn't the claimed holistic nature of dynamics and individuation (pp. 25–6, 40, 85) in conflict with the spirit of the Humean approach to ontology, notoriously based on modal independence and free re-combinability of truly local matters of fact?

Each one of these questions certainly requires careful discussion. Here, however, I will move on to three other issues, or families of issues, which I take to be more substantial.

The first concern is methodological, and in fact quite familiar to philosophers: how is simplicity to be evaluated, exactly? True, in the minimalist ontology advocated by Esfeld and Deckert, one only has two categories of fundamental entities. Nonetheless, primitives also include the following facts: that distance relations change; that matter points are exactly similar to one another, yet behave in different ways; that there is a preferred, yet undetectable, three-dimensional foliation; that entirely symmetric universes are irrelevant (and so are empty generally relativistic universes and, presumably, scenarios that are usually regarded as problematic for relationists—such as, for instance, those involving rotating spheres or dynamic shifts); that certain specific cut-offs must be postulated in the field-theoretic regime; that there is both retarded and advanced action; and possibly others too. Do all these elements not also have a weight when it comes to evaluating an ontological construal—albeit balanced by the weight of the drawbacks that they allegedly allow one to avoid? Let us focus, for instance, on the idea that in spite of the fact that all matter points are ontologically the same, they obey different laws (that is, move in space in different ways), giving us the impression that they come in several different families. Wouldn't it be simpler in terms of explanation, if not ontology, to trace the differences among particle-types to different intrinsic properties? The authors' argument against this is that it entails that properties have *quiddities* and may consequently swap causal roles in different possible worlds without any empirically relevant consequence. In response to this, one could claim that causal roles are essential to properties as dispositions. Esfeld and Deckert object that the latter, like Molière's *vis dormitiva*, really explain nothing. This may well be true, but if so, this seems to be a problem for all primitives. In particular, why exactly shouldn't it similarly count as a problem that configurations of matter points change because it is a primitive fact about distance relations that such relations change?

The second, closely related, issue concerns realism. First of all, Esfeld and Deckert explicitly claim that their super-Humeanism is a form of scientific realism, but no argument is given in the book in favour of realism *per se*. Instead, one is simply told that the proposed ontology is not affected by the pessimistic meta-induction on the history of science, nor by underdetermination of theory by the empirical data (p. 8). Given their explicit endorsement of ontic *structural* realism, it is plausible to think that Esfeld and Deckert share the idea that structure is (often) preserved across theory-change, adding to this that the ontological counterpart of such preserved structure consists of configurations of matter points. Be this as it may, specific case studies, or at least examples, pointing to the supposed preservation at the level of ontology would have been very helpful.

Regardless of this, two other worries remain. First, it is in fact not entirely clear how far the methodology adopted by Esfeld and Deckert meshes with scientific realism. Why should we think that the world is actually simple, and that it is simple in the specific way suggested by the authors? Recalling that, as Esfeld and Deckert acknowledge, simplicity in ontology and simplicity in representation pull in different directions, couldn't a scientific realist legitimately commit to what figures in the scientists' favourite explanation and representation of things, even at the price of increasing the number of ontological primitives? In this sense, again, the putative drawbacks of the alternatives to Esfeld and Deckert's minimal ontology may just be something we have to deal with en route to the discovery of the fundamental structure of reality. The second, perhaps more pressing, worry is the following: Given that Esfeld and Deckert's focus is squarely on empirical adequacy rather than on a more literal reading of physical theory, isn't it natural to opt for the sort of antirealism (paradigmatically exemplified by van Fraassen's constructive empiricism) according to which science aims at 'saving the phenomena', rather than worrying about the ontological

implications of our models? In other words, an antirealist may endorse exactly the same reconstruction of physical facts provided by Esfeld and Deckert based on exactly the same methodological tenets, but without the same potentially problematic metaphysical (and meta-metaphysical) commitments.

One last issue I would like to mention concerns the very ontology being put forward. Roughly put, how can space(time) reduce to relations between objects, as relationists normally have it, if the latter exist as those very entities only thanks to the relations themselves, as structuralists typically claim? The immediate rejoinder is, of course, that the form of ontic structuralism of choice is a moderate one, making relations and relata symmetrically dependent on each other, hence both are fundamental. However, while this is perfectly fine *per se*, I think it falls short of qualifying as a form of relationism. It is still the case that objects are not prior to distance relations, thus the latter cannot be regarded as a 'nothing over and above' as typically contended by relationists. Perhaps the issue is merely terminological, as suggested by Esfeld and Deckert's claim that they regard relationism as a form of structural realism. Nonetheless, the suspicion arises that in fact what Esfeld and Deckert really want to do is abandon absolutism about space(time), not necessarily the idea that space is a *sui generis*, irreducible sort of entity; and that, as a matter of fact, distance relations are indeed as substantial as matter points on the proposed construal.

In connection to this, and here simplicity comes again into the picture, the option of going for something even more modest emerges: a one-category ontology of primitively individuated objects (without haecceitates!—see above), whose existence and (persistence) as non-identical entities determine spatial (and temporal) relations as a truly free ontological lunch.

In conclusion, even though the authors are a bit too quick at points and may sometimes give the impression of making things too easy for themselves by invoking the 'purely representational' or 'merely dynamical', the book is very thought-provoking, and is to be praised for its combination of philosophical analysis and in-depth knowledge of physics. That many questions remain open is probably only to be expected given the authors' attempt to revive ambitious, systematic 'natural philosophy'—and not merely follow the trend of discussing a tiny epicycle of a well-worn debate.

In light of this, the book is definitely to be recommended to all those interested in metaphysical questions concerning objects, properties, identity, space, and time, and/or in the interpretation of contemporary physics. Both advanced students and researchers working in metaphysics and the philosophy of physics are likely to benefit from reading it, if only because in doing so, whether or not they agree with the authors, they will be forced to think carefully about many fascinating issues concerning the ultimate nature of physical reality.

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