SCIENTIFIC ONTOLOGY

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Reviewed by Kerry McKenzie

Scientific Ontology: Integrating Naturalized Metaphysics and Voluntarist Epistemology
Anjan Chakravartty
Oxford: Oxford University Press, 2017, £47.99
ISBN 9780190651459

According to Sayre's law, 'academic politics are so vicious precisely because the stakes are so small'. Though I anticipate the usual grousing over whether, strictly speaking, this really qualifies as a *law*, the last decade of dispute between armchair and naturalistic metaphysicians would nevertheless seem to confirm it. While all parties can at least agree that metaphysics can constitute a meaningful activity 'if done properly', the latter faction have alleged, in no uncertain terms, that analytic metaphysicians are going about it the wrong way. Since at least the publication of *Every Thing Must Go*, we metaphysicians of science have claimed, both in print and in private, that analytic metaphysics is 'irrelevant', 'frivolous', 'pseudoscientific', 'sterile or even empty', and overall the embarrassing uncle of an otherwise functional philosophical family.

[1] *Our* metaphysics, by contrast, is appropriately 'continuous with', 'informed by', and 'sensitive to' science, whose garments, it is taken to be generally understood, we are each obliged to fumble. As such, only ours exhibits the right balance of *a priori* and empirical content to be broadly deserving of intellectual respect.

While this is the sort of intellectual pillow-fight I myself find impossible to resist, it seems that Anjan Chakravartty will not be seduced into enlisting anytime soon. For to him, the very terms we naturalists deploy to describe this debate—for example, a metaphysics sufficiently 'continuous with' or 'sensitive to' science to be intellectually respectable—suffer from a 'debilitating vagueness' that makes the naturalistic critique ill-defined (p. 79). Moreover, once we put in the effort required to sharpen up the relevant terms, we will see that the very idea that there is some unequivocal 'sweet-spot' to be hit when it comes to respectable metaphysics is a fundamentally misguided notion. And though he does not put words in our mouths regarding the consequences of this contention, presumably one of them is that it is time for us metaphysicians to let go of the eiderdowns and declare an amicable truce.

These, in any case, are just some of the ideas Chakravartty will defend in this rich and provocative new book. In more detail—and among many other things—he sets out to do the following: first, more adequately articulate the structure of the relation that defines what it is for one claim to be 'more' metaphysical than another, with 'naturalized' metaphysics being thought of as some kind of virtuous middle ground, by implication this is to articulate naturalistic metaphysics itself; second, make plausible the claim that everyone engaged in the philosophy of science routinely deploys 'metaphysical inferences' of some sort at least and hence has substantive metaphysical commitments, so that the only question is how far down the spectrum from an idealized 'metaphysics-free' limit they are; third, convince us that there is no one objective point on this spectrum where we can 'draw the line separating out aspects of putatively scientific ontology, worthy of belief' (p. 93) from 'empty metaphysical pursuits' (p. 70) and that how much metaphysics one should be willing to tolerate is fundamentally a matter of subjective tastes, values, and preferences, all of which are ultimately matters of voluntary choice.

Now, regarding the claims that are the focus of the second and third aims, my instinct is to immediately concur with both of them. The idea that even what seems to be highly empirical science is up to its eyeballs in *a priori* commitments is surely well received by now, thanks to the work of Quine, Friedman, Sklar, and countless others—although Chakravartty does give a welcome refresher on some of the reasons for thinking this (Section 2.5). And that the acceptability of any claim, be it metaphysical or otherwise, is a function of certain subjective values is an idea that I'm also well disposed towards, thanks to my penchant for the pragmatists and much of the classic work on inductive risk. Yet for all that, I came away from the book with the conviction that what I would call 'naturalistic metaphysics' is in fact far less voluntary than Chakravartty would have us believe. And I think that is because I just have a very different conception of 'naturalistic metaphysics'. How, then, do I think naturalistic metaphysics should be articulated, if not as Chakravartty takes pains to do so here? I admit that I'm not sure. But what I do know is that the taxonomies laid out in this work will be indispensable in constructing any alternative. For this is a richly rewarding work, peppered from the get-go with thought-provoking observations, philosophical insights of all sorts, and a wealth of apt examples drawn from across the scientific spectrum. As such, it should be a centrepiece of the continuing debate on what we should ultimately aspire to in metaphysics.

As noted, a central purpose of the book—and a prerequisite for everything else it aims to do—is to better characterize 'naturalized metaphysics'. The very existence of the debates recalled above shows that this is a project that is understood to have some normative significance. It makes sense, then, for Chakravartty to characterize it as that which conforms to the 'norm of naturalized metaphysics'—namely, 'the principle that scientific ontology is properly delimited by metaphysical inferences and propositions that are sufficiently informed by or sensitive to scientific-empirical investigation as to provide or constitute ontological

knowledge relating to the sciences' (p. 67), as opposed to being 'so attenuated that they are no longer good bets for scientific ontology' (p. 70). However, and as Chakravartty is the first to admit, determining what should be classified as 'naturalistic metaphysics' was never going to be straightforward, not least because how best to characterize metaphysics *simpliciter* is hardly a question with an obvious answer. For van Fraassen ([1980], p. 69), the mere embrace of scientific realism is enough to ensnare us in 'metaphysics' and is to be avoided for that reason. But there are also defenders of scientific realism—those housed in such post-positivist hotbeds as Munich, perhaps—who would presumably reject the moniker. *That* term, for them, would be reserved for the work of those self-identified metaphysicians who argue about such rarefied matters as the nature of properties and objects, the reality of haecceities or tense, or the correct analysis of modality—that is, of the 'deep metaphysical ontogoria' that make their way onto the syllabi of courses called 'metaphysics' (Magnus [2012], p. 119).

When the laws, properties, objects, and so on are those that feature in the sciences, such theorizing would constitute, in Chakravartty's terminology, theorizing about the 'implicit commitments' of science: those 'things whose natures are not the face-value targets of scientific work, but which are rather mentioned in passing' (p. 69). These are to be contrasted with its 'explicit commitments': those aspects of the world that scientists are competent to profess upon. In keeping with an idea tacit in the rejection of the term 'metaphysics' by many scientific realists, theorizing about science's implicit commitments is presented as an activity located 'further along' the metaphysical spectrum than debates about its 'explicit commitments' (see, for example, pp. 86, 100, 160–62, 211–13)—the latter characterizing the debate between the realist and instrumentalist. Since, as Chakravartty argues at length in Chapter 2, every protagonist in this debate makes non-trivial non-empirical commitments of some sort, the move along the spectrum from the commitments of the instrumentalist through to those of the scientific realist and all the way down to those of the professional metaphysician takes us not from something that is unambiguously non-metaphysical to something that unambiguously is, but just from what Chakravartty will call 'small-m' to 'big-M' metaphysics. One aim of the book, then, is to think about what this new metaphor amounts to and where in the spectrum the 'naturalized' properly belongs.

Now I don't regard it as entirely obvious that theorizing about science's 'implicit commitments' is necessarily an activity at greater empirical remove than science itself (as I'll say more about below). And we know from Friedman's criticisms of Quine's 'web of belief' that the very choice of the metaphors with which we express the relation between metaphysics and science can prejudge many of the most important questions at issue. [2] For now, however, let us run with the idea that metaphysics of science can be usefully thought of as a 'spectrum' in something like the way presented here; what parameter, then, are we varying as we traverse between its extrema? For Chakravartty, it is the 'magnitude of metaphysical inference' involved in the justification of the claim concerned (p. 67), where a 'metaphysical inference' is one that has a 'significant *a priori* dimension, being fuelled by non-empirical considerations, namely, considerations that are not themselves directly informed by or sensitive to empirical investigation' (pp. 52–3). So far, of course, this is just to repeat the familiar metaphors of being 'informed by' or 'sensitive to' empirical findings that he promises to clarify for us. And the way he does this is to codify the 'magnitude' of these inferences in terms of the degree of 'epistemic risk' involved. As the term is intended here, 'epistemic risk is a feature of propositions (and the inferences generating them, as conclusions) that determines how confidently one is able to judge whether they are true or false; that is, whether and to what extent they are conducive to knowledge' (p. 84). The greater the 'magnitude' of such an inference, then, the less confident we are in the semantic value of the inferred claim.

Since it is the semantic indeterminacy alleged to be associated with metaphysics that has largely fuelled scepticism about it historically, identifying the parameter that dials us deeper into metaphysics with epistemic risk, so defined, would seem to have sound motivations. Now, given that the 'magnitude' of metaphysical inference is in terms of epistemic risk, and given that an inference is metaphysical to the extent that it has a 'significant *a priori* dimension', one might have thought that the 'epistemic risk' of a proposition is co-extensive with its empirical vulnerability—that is, 'how susceptible a proposition is to empirical testing' (p. 85). However, according to Chakravartty there is another variable that contributes to the epistemic risk, and this is the explanatory power. This is 'a measure of how well a metaphysical inference or resulting proposition satisfies the criteria typically associated with good explanations of the data of observation and experience [...] including simplicity, internal consistency, coherence with other knowledge, and the capacity to unify otherwise disparate phenomena' (p. 87). Chakravartty admits that if all there were to epistemic risk were empirical vulnerability then 'scientific ontology would be a much simpler thing to grasp than it is, in fact' (p. 87)—the reason being, he claims, that both the degree and the significance of explanatory power are 'indefeasibly in the eye of the beholder' (p. 92).[3] As one might then predict, the inclusion of this highly subjective feature 'plays a dramatic role in disputes' (p. 87) concerning 'where the line should be drawn, in the spectrum of metaphysical inference', consistent with adherence to the norm of naturalized metaphysics. Indeed—and while Chakravartty is to my mind not entirely explicit on this point—the voluntarism with respect to metaphysics for which he ultimately wants to argue seems to rest entirely on the subjectivity involved in judgements of explanatory power (see, for example, pp. 87, 93). [4]

Now, it seems to me that if the resulting characterization of naturalism is to improve upon the 'debilitating vagueness' plaguing hitherto-existing approaches, then something precise about the nature of explanatory power will need to be said. And it also seems to me that if part of the role of explanatory power is to quantify 'how *a priori*' an inference is, it seems there must be at least some connection between it and empirical vulnerability—raising the question of whether we do in fact need both to characterize risk. Unfortunately, however, both his account of what constitutes explanatory power and how it connects with vulnerability strike me as rather under-developed given their centrality to the project as a whole.

Chakravartty's claim that epistemic risk must be a function of explanatory power in addition to epistemic vulnerability rests on repeated assertions that our assent to certain paradigmatic scientific and philosophical claims—certain landmarks on the spectrum—is grounded in assessments of such power and such power alone. Regarding the more scientific of these examples, he suggests that 'the awe-inspiring unificatory power of the idea of natural selection in evolutionary biology [...] is undoubtedly the primary reason for its acceptance as scientific fact' (p. 91), before reminding us that unification 'is one of the hallmarks of good explanation' (p. 92). Regarding more distinctively philosophical claims, he states that the debate between the instrumentalist and the scientific realist precisely concerns their differing assessments of significance of explanation (p. 93). Moreover—and more relevantly for our purposes—he states that most claims regarding science's 'implicit' commitments, such as those concerning the metaphysical nature of properties, are 'completely invulnerable to empirical testing' (p. 92). Something other than empirical support must govern our acceptance of these claims, and this again is taken to point toward their explanatory power.

Now—and though I'll grant that things are often presented this way—it is unclear to me that scientific realism has to be preferred over instrumentalism via an explicit endorsement of certain policies on

explanation (as opposed to, say, a broader philosophical naturalism that may or may not have explanation at its core). And although no philosopher of biology, I suspect that many will take issue with the idea that the theory of evolution must be preferred over its rivals solely by appeal to its explanatory virtues and not its more straightforwardly empirical credentials. After all, the same feature of unification (or 'consilience') held to increase a theory's 'explanatory power' can enhance its degree of confirmation as well.[5]But since I imagine that much of the audience for this work will be most interested in its reflections on science's 'implicit' commitments, it is the assertion that these claims are generally 'completely invulnerable to empirical testing' that I want to focus on here.

Again the strategy is to proceed by example, with Chakravartty presenting a pair of key debates in the metaphysics of science as turning crucially on assessments of explanatory power: the debate over dispositional essentialism versus other theories of properties, and that over ontic structural realism versus other theories of objects. Regarding the latter (and although I would classify them differently), this he fractures into the debate over 'eliminative' structuralism—the thesis that there are no particles, only relations—and 'non-eliminative' structuralism—the thesis that all particle properties are extrinsic. For Chakravartty, what one believes here can only boil down to 'cost-benefit analysis' as applied to the qualities of explanation each thesis offers (pp. 152–3, 157–8). But here there is no 'straightforward calculus of assessment' (p. 157): some will choose to adopt entities with only extrinsic properties on the grounds that some greater conceptual unity and hence explanatory power is thereby achieved (for example, in theories of causation); others will refrain from doing so on the grounds that such entities do too much violence to received wisdom to be coherently integrated within our extant worldview.[6]Hence 'decisions one way or the other cannot be forced by any presumptive canons of ontological reasoning' (p. 152; also see p. 158); rather, the question of which to plump for 'splits the world into two kinds of people' (p. 152; also see p. 158) whose affectations simply lean different ways. Something similar is true, according to Chakravartty, of our grounds for adopting dispositional essentialism—his own favoured option for the metaphysics of properties. For this is presented as advocated, by those who do advocate it, on the grounds that it has the effect of 'unifying the best insights of entity realist and structural realist approaches to scientific knowledge' (p. 106)—the former, by locating causal power in objects; the latter, by emphasizing the importance of relations in metaphysics. This unifying feature is, he holds, a key part of what makes dispositional essentialism's adherents apt to believe it.

If this was how argument in scientific metaphysics were to work, it would indeed be hard to argue that decisions about what is and isn't legitimate are mere matters of personal taste (Ladyman and Ross [2007], p. 17). And there are certainly metaphysicians—such as Lewis and his many acolytes—who do explicitly adopt the conception of metaphysics as an exercise in cost-benefit analysis independent of empirical concerns.[7]The problem is that Lewis is precisely the sort of metaphysician that naturalistic metaphysicians such as myself have been known to take turns baiting and taunting—largely because we just deny that theory assessment in either science or (acceptable!) metaphysics of science actually works that way (Ladyman [2012]).

Indeed, the debate over ontic structuralism as presented here was quite unrecognizable to my eyes at least. For rather than arguing for (what Chakravartty would call) non-eliminative structuralism by appeal to explanatory virtues, Steven French and I (French and McKenzie [2012]) have done so by arguing that the intrinsicality of particle properties seems to be straight-up inconsistent with the fact that fundamental

theories must exhibit gauge symmetries (or at least must do according to our current best physics).[8]Indeed, Tim Maudlin ([2007], Chapter 3) has argued that something about the fact that our current most fundamental theories are gauge theories requires a theory of properties distinct from a theory of universals—including (I take it) the Platonic theory that Chakravartty asserts, albeit without argument, to be 'completely invulnerable in the face of empirical inquiry' (p. 87).

Now, one can of course question the success of these arguments—many already have. But the very fact that metaphysicians of science routinely attempt to argue that empirically supported science can rule out metaphysical propositions suggests that canonical metaphysical commitments might be far less insulated from empirical developments than Chakravartty presents them here. And that means that explanatory power might not be decisive in the acceptance or rejection of even 'deep' metaphysical propositions, so that voluntarism with respect to judgements of such power will not, in general, translate into voluntarism with respect to metaphysics.[9]Furthermore, it seems to me that were explanatory power to give a measure of 'epistemic risk' when it comes to propositions of metaphysics, then little would be gained with respect to Chakravartty's intention of improving upon the 'debilitating vagueness' associated with previous characterizations of what makes metaphysics 'naturalized'. It has, after all, been argued many times that the notion of 'unification' and other supposed virtues of theories are themselves horrendously vague notions, meaning that any conception of 'explanatory power' predicated on them may be expected to be so as well.[10]Indeed, if dispositional essentialism can be said to 'unify' two philosophical doctrines logically incompatible with it, in anything like the same sense as natural selection can 'unify' the phenomena of beaks and bauplans, one wonders if the term hasn't been stretched to breaking point here.

Given that the voluntarism central to this book is predicated on judgements of explanatory power, conceived of in terms of the possession of 'virtues', and given that I just reject that doctrines of scientific metaphysics are generically and necessarily adopted in the light of such judgements, I can't say that the argument for voluntarism as presented here succeeded in convincing me. But that doesn't mean that there aren't perfectly analogous considerations in the neighbourhood that could do the same job. For example, voluntarism could instead be grounded simply in how much inductive risk we are prepared to sanction, grounding voluntarism solely in personal preferences concerning our willingness to be proved wrong. Furthermore, nothing I've said here has bearing on the sort of neo-Kantian claim that presents metaphysics as 'prior' in some important sense to empirical science, and hence, it turns out, is in no obvious sense falsifiable by it (Friedman [2002], Part 2, Chapter 2). But for all that—and for all that this book is shot through with insight on every page—it remains that I am going to stubbornly reject any view of naturalistic metaphysics that presents it as more akin to an artistic interpretation of science, bound only by our aesthetic sensibilities, than something that must stand or fall with the deliverances of the laboratory. And with that, I once again take up my feather pillow and ready myself for the fight.

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Notes

[1] (Ladyman and Ross [2007], p. vii; French and McKenzie [2016], p. 28; Ladyman and Ross [2007], p. 17; Callender [2011], p. 34).

[2]See, for example, (Friedman [2001], Lecture 2).

[3]Note that I could not pin-point exactly where an argument was given for the claim that the degree of explanatory power is in the eye of the beholder—perhaps he simply takes it to be obvious, as I suspect others do too.

[4]I'm a little hesitant about this, as he writes that 'different assessments about the relevance and impact of what I called empirical vulnerability' (p. 202) also result in different assessments of epistemic risk, although he nowhere states that the degree of empirical vulnerability is open to interpretation. But whatever the subjectivity involved in judgements of epistemic vulnerability, it is clear that he takes the subjectivity with regard to explanation to be sufficient to establish voluntarism.

[5]See, for example, (Myrvold [2003]).

[6]Precisely how 'coherence' and 'conceptual unity' differ I am admittedly unsure.

[7]See (Paul [2012]) for a particularly explicit example.

[8]This argument was criticized in (Livanios [2012]); we subsequently attempted to improve upon it in (French and McKenzie [2015]) and (McKenzie [2016]), though presumably this book was already written by the time these appeared in print.

[9]Somewhat ironically, the one place where I recall seeing an IBE-type explanation explicitly invoked in the service of ontic structuralism is in Steven French's argument against Chakravartty's favoured dispositional essentialism on the basis of considerations of symmetry (French [2014], Section 9.8). Perhaps this example would have served Chakravartty's purposes better.

[10]See especially (Maudlin [1996]).