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Essay Review

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Every thing must go: metaphysics naturalized

James Ladyman & Don Ross (with David Spurrett & John Collier); Clarendon Press, Oxford, 2007, pp. x+345, Price £45.00 hardback; ISBN 978-0-19-927619-6.

Every thing must go is an exercise in what James Ladyman and Don Ross (with substantial contribution from David Spurrett and John Collier) call 'naturalistic metaphysics'. Negatively construed, this consists in the systematic rejection of what the author's regard as overly scholastic theorising; the marks of the modern day schoolman being a tendency to ignore the relevant science, using outdated or 'domesticated' science rather than cutting edge research, and an implausible (not to say, arrogant) faith in the powers of their own a priori intuitions (p. 17). David Lewis, with his cost-benefit approach to ontological commitment, and his Humean Mosaic of 'perfectly natural properties of points, or point-sized occupants of points' (Lewis, 1999, p. 226) is a prime example of just such a philosophical villain, committed as he was to systematising his own intuitions without due deference to scientific authority, and labouring as he did under a long since discredited atomistic conception of the physical world. Kim's (1998) defence of physicalism, van Inwagen's (1990) ontological atomism, and Armstrong's (1983) doctrine that 'everything that exists is in space and time, despite the fact that contemporary physics takes seriously the idea that space-time itself is emergent from some more fundamental structure' (Ladyman et al., 2007, p. 23) also feature prominently in the naturalistic metaphysician's rogue gallery. By contrast, Ladyman et al. 'are not concerned with preserving intuitions at all, and argue for the wholesale abandonment of those associated with the image of the world as composed of little things, and indeed of the more basic intuition that there must be something of which the world is made' (p. 12), and go on to 'deny that a priori inquiry can reveal what is metaphysically possible' (p. 16), citing non-Euclidean geometry, non-deterministic causation and non-absolute time as possibilities ruled out by philosophical reflection, but ultimately established by scientific research.

More positively, the programme is a commitment to take science seriously; so seriously in fact that the only legitimate role left for a thoroughly naturalised metaphysics is to provide an (empirically well confirmed) unification of existing scientific theorising. This is captured in what Ladyman et al. refer to as the Principle of Naturalistic Closure, which states that:

Any new metaphysical claim that is to be taken seriously at time t should be motivated by, and only by, the service it would perform, if true, in showing how two or more specific scientific hypotheses, at least one of which is drawn from fundamental physics, jointly explain more than the sum of what is explained by the two hypotheses taken separately. (p. 37)

where a hypothesis is considered 'scientific' on grounds of institutional consensus, potential for *bona fide* investigation/confirmation, and is pursued for the sake of truth rather than mere utility. This methodology is further constrained by the Primacy of Physics Constraint, which specifies that:

Special science hypotheses that conflict with fundamental physics, or such consensus as there is in fundamental physics, should be rejected for that reason alone. Fundamental physical hypotheses are not symmetrically hostage to the conclusions of the special sciences. (p. 44)

Ladyman et al. assure us that the Primacy of Physics Constraint 'is a regulative principle in current science, and should be respected by naturalistic metaphysicians' and that 'the first, descriptive, claim is reason for the second, normative, one' (ibid.).

The overall result is ontic structural realism—the view that there are no things, only (objective, modal) structure—a position that has been developed by French and Ladyman over the past several years in a number of papers (e.g. French, 1989, 1998; French and Ladyman, 1997, 2003; Ladyman, 1998). More concretely, ontic structural realism is explicitly motivated from two directions: firstly, as the most plausible reconciliation of competing intuitions over both the no-miracles argument and the pessimistic meta-

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induction, and moreover, as the dialectical synthesis of traditional scientific realism and constructive empiricism (Chapter 2); and secondly, as the correct metaphysical picture forced upon us by considerations in the philosophy of physics—interpretative issues in quantum mechanics and the general theory of relativity here taking centre stage (Chapter 3).

The second half of the book is subsequently devoted to the promised project of scientific unification, and the attempt to show how an ontology consisting solely of structure-without-individuals can be made consistent with a naturalistic approach to the special sciences. The problem here of course is that the special sciences appear to deal heavily in individuals: the naturalistic metaphysician therefore faces the dilemma of either treating the special sciences instrumentally (i.e. that they are mistaken over their own ontology) and thus violating his own naturalistic constraint, or abandoning unification in favour of a fundamentally disordered world (à la Dupré, 1993) and thus failing to provide the proposed unification, one of the central desiderata of his project (p. 196).

The solution (Chapter 4) is to construe the ‘individuals’ that feature in the special sciences instrumentally, but to show how they are supported and legitimised by objective structures correctly identified and investigated by the discipline in question; as Ladyman et al. put it ‘individual objects, events, and properties are devices used by observers (when these observers aren’t making mistakes) to keep cognitive books on what science finds to be sufficiently stable to be worth measuring over time, viz. some but not other patterns’ (pp. 228–229). The appropriate patterns are ‘real patterns’, in the sense originally proposed by Dennett (1991)—counterfactually robust and providing a suitable degree of informational compression—and suitably elaborated, in information-theoretic terms, to be fully compatible with the Principle of Naturalistic Closure. It follows then that since ‘some of these patterns are indeed conceptualised as individuals in some special sciences, while simultaneously *not* being so conceptualised by other special sciences making projections at other scales of resolution’ (p. 229), Ladyman et al. are committed to what they call the scale-relativity of ontology; or in the phrase originally coined by Ross (2000), ‘rainforest realism’. Finally (Chapter 5), an account of causation is developed along similar naturalistic lines—as a heuristic for tracking real patterns—that legitimises its role in the special sciences, yet also respects the Russellian suspicion over the existence of such processes in fundamental physics.

The book is both engagingly pugnacious and clearly argued; it covers a broad range of topics from the philosophy of science, the philosophy of physics and the philosophy of the special sciences, and although a passing familiarity with a large number of often technical debates is frequently assumed, it remains commendably accessible. The overall position is also quite compelling: although many will still harbour substantial misgivings over the central metaphysical notion of a relation *sans* relata (pp. 154–156), it is in terms of the overall attractiveness of the position, and in particular its ability to reconcile and resolve outstanding debates within the philosophy of science, that Ladyman et al. ultimately stake their case.

In particular, the invective against so-called neo-scholastic metaphysics seems well founded: if you’re going to appeal to ‘contemporary science’ as a major premise in your philosophical argument, you should at least get the science right. The same principle presumably holds for the *history* of science too; here however Ladyman et al. are on shakier ground. As with all structuralists, their solution to the pessimistic meta-induction is hostage to whether or not successive scientific theories really do display substantive structural continuity (pp. 93–95). A handful of references are duly supplied to this effect: Worrall’s (1989) well known account of the structural continuity between Fresnel’s ether theory and Maxwell’s electromagnetic field; Saunders (1993) on the

structural continuity between Ptolemaic and Copernican astronomy; Brown’s (1993) study of classical and relativistic mechanics; Bain and Norton (2001) on descriptions of the electron; and Lyre (2004) on Maxwellian and quantum electrodynamics. Yet as with most philosopher’s histories, these are accounts that abstract from any kind of realistic historical context. And without further argument, it is far from clear how these retrospective recoveries of previous structure (invariably only as very special limiting cases) is supposed to constitute a demonstration of structural preservation. Moreover, any such ‘preservation’ must also be shown to be *transitive* if it is to provide any support for the structuralist’s case, something the current piecemeal approach goes nowhere near addressing. In response to the challenge that sometimes structure is actually *lost* in theory-change (e.g. Stanford, 2003, pp. 570–572), Ladyman et al. are content to note that ‘the problem is surely not analogous to the one the [traditional, full blown] realist faces with respect to ontological discontinuity’ (p. 157), but otherwise dismiss the issue. To be fair, the authors are not committed to something as implausible as formal/syntactic continuity: mathematical structure is merely a *representation* of the real, ontic structure. But without clearer criteria for what exactly is supposed to be preserved on this account, and how this representational relation is supposed to be construed, one begins to wonder what it would be for theory-change to *fail* to preserve structure.

A more substantial worry concerns the naturalistic agenda of the project. Constraining one’s metaphysical ruminations in accordance with the Principle of Naturalistic Closure and the Primacy of Physics Constraint seems both well-motivated and in many cases eminently sensible. However, there are two substantial issues here which Ladyman et al. fail to address. The first is the extent to which background metaphysical assumptions may in fact be an important impetus to scientific research. This may be the case when super-empirical assumptions suggest and make plausible new avenues of scientific investigation (consider the often explicitly philosophical agendas at play in early debates over the completeness of quantum mechanics), or when such presuppositions help provide the sort of institutional conservatism that Kuhn argued is necessary for effective ‘normal science’. By stipulating that the relationship between metaphysics and science be asymmetrically constrained by the Primacy of Physics Constraint, Ladyman et al. risk constructing their philosophical position at the expense of an impoverished account of actual scientific practice.

My first worry then is that the pursuit of a thoroughly naturalistic metaphysics threatens to reject *too much* philosophical presupposition. My second worry is that such a pursuit also threatens to reject *too little* philosophical presupposition, and is based on the simple observation that many contemporary scientific theories are *themselves* ‘neo-scholastic’ insofar as they contain (naturalistically unjustified) metaphysical assumptions. Take for example the special theory of relativity (SR), and the philosophical debate over the nature of time to which it relates. It is sometimes argued that since SR entails the observer-relativity of the present moment, any irreducibly tensed theory of time must be abandoned (Putnam, 1967, is a classic example of this kind of argument). However, the core components of SR—the equivalence of inertial-frames and the constant speed of light in a vacuum—only entail the relativity of the present *in conjunction with* a specific definition of simultaneity, which in its traditional formulation is an explicit expression of Einstein’s background verificationist assumptions. Bourne (2006, pp. 160–186) argues this point at length; as he puts it, this definition ‘is an *operational* definition: it is a reductive analysis of simultaneity in terms of observations of light signals under certain specified conditions, and so satisfies [Einstein’s verificationism]. But operationalism is untenable, and any independent support it has derives from accepting [verificationism], which has been rejected’ (ibid., p. 172). The point then is that this is a

component of SR that one can reject without doing damage to the theory proper (as Bourne subsequently goes on to do) and thus SR is not incompatible with a tensed theory of time. Although Ladyman et al. ultimately draw no metaphysical conclusions from SR, on the basis that it is only ‘a partial physical theory that cannot describe non-inertial frames of reference, or gravity’ (p. 164), they do explicitly reject any attempt to reconcile a tensed theory of time with SR in the manner outlined above on the grounds that ‘The [Principle of Naturalist Closure] forbids the revision of scientific theories on purely philosophical grounds, so the proposal of a privileged [present] contra SR requires a scientific motivation’ (ibid., n. 61). Presumably however, one does not need a scientific motivation to overhaul someone else’s fossilized (not to mention, long since discredited) metaphysical assumptions. Yet without a more discriminating conception of the properly empirical components of a scientific theory, this is exactly what the afore-mentioned principle commits us to: naturalistic metaphysics therefore threatens to reduce to *conservative* metaphysics.

A similar hint of the metaphysical *status quo* can be found in the alleged synthesis of scientific realism and constructive empiricism that provides the first substantive argument for ontic structural realism. According to Ladyman et al., the analytical balancing act forced upon us by the competing intuitions of the no-miracles argument and the pessimistic meta-induction shows us that full blown realism is unsustainable.¹ The natural retreat is to a more selective attitude of scientific belief, as for example advocated by van Fraassen. Yet constructive empiricism is also unsustainable insofar as it dispenses with an objective account of modality. The problem here—as originally developed by Ladyman (2000)—is that the constructive empiricist restricts his beliefs to the observable consequences of his accepted scientific theories, a modal distinction that stretches to encompass what we might have observed, had the circumstances been different. Yet according to van Fraassen, there are no objective modal facts: something counts as observable (roughly speaking) insofar as it can be represented in the right way in our scientific models, an ultimately subjective and conventional fact about the scientific community. But this makes the distinction between observable and unobservable entities too arbitrary to do the metaphysical heavy-lifting required of it. The constructive empiricist should presumably then adopt a more objective account of modality; yet this violates his basic epistemic principles, and collapses the position into a form of structural realism.

Unsurprisingly however, van Fraassen disagrees with this diagnosis. In their reply to Ladyman, Monton and van Fraassen (2003) argue that their proposed metalinguistic account of modality is far from arbitrary: the truth-conditions for their account may indeed turn on conventional decisions of the scientific community, but this will itself be constrained (and, arguably, justified) by the demands for empirical adequacy. The basic point however is that for empiricists who deny the notion of objective modality altogether, to demand with Ladyman et al. that only an objective account of modality is good enough to ground their distinction is simply to beg the question against them. Moreover, even if one sympathises with the objection mounted here, it must be conceded that the demand for a more robust account of modality on the part of the constructive empiricist is a purely *metaphysical* demand: the extent to which one finds the metalinguistic approach to counterfactuals advocated by Monton and van Fraassen unsatisfactory will be determined by the sort of pre-scientific cost-benefit analysis of ontological commitment that one brings to the debate, the sort of thing championed by Lewis and supposedly renounced by the nat-

uralistic metaphysician. Indeed, a purely philosophical debate over the attractive features of a theory of modality is something that floats quite freely of any naturalistic constraint; and no debate over the appropriate semantics for modal statements is going to make any headway in a unified, naturalistic metaphysics.

A similar tension—between the pursuit of a thoroughly naturalistic agenda and the ineliminable appeal to metaphysical presuppositions in defending their version of it—can also be found in the chapter on the philosophy of physics, where Ladyman et al. provide their strongest case for ontic structural realism. Take for example the problem of individuality in quantum mechanics (pp. 132–140; simplified to exclude considerations of field theories). According to the authors, the fact that when in an entangled quantum state individual particles can be individuated by neither their intrinsic nor their extrinsic properties means that we are faced with a choice between either individuating each particle with respect to some distinct metaphysical ‘this-ness’, or abandoning the notion of individuality altogether in favour of a structuralist ontology. Unsurprisingly, the authors opt for the latter option, and all but the most committed neo-scholastic would presumably feel some sympathy here. Yet all this is a debate over the *interpretation* of quantum mechanics; it is therefore hard to see how a naturalistic injunction to reject any hypothesis that ‘conflicts with fundamental physics’ could decide the matter either way, as the naturalistic metaphysician would have us believe. If primitive this-ness *conflicted* with fundamental physics, it would never have been a potential *interpretation* of fundamental physics in the first place.

Ladyman et al. go on to argue that a structuralist ontology also provides a reconciliation between quantum mechanics and general relativity (p. 182), which the more metaphysically spurious option does not, on the grounds that metaphysical problems in both disciplines are dissolved by moving to an ontology of structure (thus fulfilling the aim of unification encoded in the Principle of Naturalistic Closure). But the reconciliation here is conceded to be nothing more than analogical (p. 143)—both quantum particles *and* space-time points are to be denied individuality in favour of structure. Yet it remains mysterious how exactly such structures are supposed to relate to one another. Pending such a development, one feels that one could just as well argue that haecceities provide a reconciliation between quantum mechanics and general relativity, on the grounds that both quantum particles *and* space-time points are to be individuated by a primitive this-ness. Of course, a metaphysics of haecceities and their like may well strike one as empirically surplus and ontologically extravagant; but again, these are *metaphysical* desiderata, not something one finds encoded in scientific methodology. David Lewis, our favourite neo-scholastic stalking horse, can offer us good grounds here (in terms of a good old fashioned cost-benefit analysis of ontological commitment) for rejecting an ontology of haecceities in favour of an ontology of structure; yet awkwardly, the naturalistic metaphysician cannot.

To reiterate: Ladyman et al. provide a compelling case for ontic structural realism, especially with respect to the philosophy of physics, and an ingenious reconciliation of fundamental and special science. Their invective against neo-scholastic metaphysics is also well taken. My concern however is with the compatibility of these two central themes: metaphysics without science may indeed be blind; yet without its guiding presumptions, institutional constraints, theoretical entrenchment and methodological arbitration, one wonders whether science without metaphysics is also empty.

¹ Ladyman et al. refreshingly give shortshrif to any realist appeal to an increasingly baroque causal theory of reference here; as they put it, ‘the debate about whether the world is really how it is described to be by scientific theories is not an issue in the philosophy of language. No matter how the realist contrives a theory of reference so as to be able to say that terms like “ether” refer, there is no doubt that there is no elastic solid permeating all of space’ (p. 92).

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