

By P. Kyle Stanford

James Ladyman and Donald Ross's broadside against traditional analytic metaphysics embodies the most admirable characteristics of a good slap across the face: it is forceful, frank, and delivered in response to sufficient provocation. Ladyman and Ross are quite right to point out that much of analytic metaphysics, when it seeks to take the findings of the empirical sciences into account at all, appeals instead to what they call a "domestication" of those findings into a more intuitively comfortable picture of the physical world that appeals to "little things", "microbangings", and a "containment metaphor." And they are right to suggest that there is little point in trying to guide our metaphysics by, or reconcile it to, this unholy chimera of antiquated science, popular science, folk science, science fiction, and commonsense or philosophical intuition, an enterprise whose products they deride as "the philosophy of A-level chemistry." Worst of all, Ladyman and Ross are surely also right to point out that much of what happens in contemporary analytic metaphysics takes place with a complete lack of concern for the findings of the sciences at all, proceeding instead to attempt derive substantive results about ways the world is, might be, or must be simply by reflection on our intuitions and concepts.

Of course it is not an *a priori*, analytic, or necessary truth that such conceptual analysis is a misguided or hopeless strategy for investigating the most fundamental features of existence, but its use would nonetheless seem to require a convincing philosophical rationale. Descartes thought he had one, as did Kant. On these sweeping views of the universe and our place within it, such conceptual analysis is a weighty

business indeed, but for good and familiar reasons few contemporary analytic metaphysicians defend the interest and significance of what they are doing by declaring allegiance to such grand philosophical systems. It is sometimes suggested more prosaically that conceptual analysis tells us about the world because it is, after all, only by means of our concepts that we engage the world – it is then, in some sense, our concepts and the meanings we assign to the associated terms that determine what *counts* as a “material object”, an “injustice”, or a “peanut butter sandwich”. But bereft of something like the Kantian rationale, this is a very cheap respect in which our ideas determine anything about what the world is like. Instead, it seems more natural to say that such conceptual analysis at best tells us something about how we think and talk about the world, and not about the characteristics of the entities and events that make it up. And the significance of such inquiry is further diminished for those who think that these very concepts and meanings are subject to interpersonal variation and/or change over time at even the most fundamental levels. The picture of much contemporary analytic metaphysics that emerges is that of an admittedly sophisticated practice that has nonetheless almost literally lost its bearings – it continues apace despite the progressive deterioration into a crumbling ruin of the rationale that once grounded its interest and significance.

On the other hand, the conception of metaphysics that Ladyman and Ross seek to erect in place of the Cartesian idols they throw down also demands a convincing rationale, and here I think they are less surefooted. On their account of the matter the point of metaphysical inquiry is simply to unify what we have already (and

independently) learned about the world from science itself, for “the *raison d’être* of a useful metaphysics is to show how the separately developed and justified pieces of science (at a given time) can be fitted together to compose a unified world-view” (45). An early statement of their “Principle of Naturalistic Closure” tells us that “Any new metaphysical claim that is to be taken seriously should be motivated by, and only by, the service it would perform, if true, in showing how two or more specific scientific hypotheses jointly explain more than the sum of what is explained by the two hypotheses taken separately, where a ‘scientific hypothesis’ is understood as an hypothesis that is taken seriously by institutionally *bona fide* current science” (30).¹ Accordingly, the only standard of success for a metaphysical claim or proposal is its ability to unify what the various sciences have *already* told us: “one metaphysical proposal...is to be preferred to another to the extent that the first unifies more of current science in an more enlightening way” (66). Thus, although Ladyman and Ross are quite clear that we cannot simply read our metaphysical commitments off our best scientific theories but must instead first examine how those theories are “practically put to work” (119), it seems that they nonetheless intend for us to take quite literally their suggestion that metaphysical inquiry properly conceived is fundamentally derivative from and subordinate to that of scientific investigation. Indeed, they tell us that by the very term “metaphysics” they will “refer to the articulation of a unified world-view *derived* from the details of scientific research” (65, my emphasis).

I am not entirely sure how to pursue metaphysics so conceived despite the example they go on to set, but I suspect there is a better approach in any case. Quine

long ago suggested that there is only a single project of inquiry, and thus at least implicitly that any metaphysics worth its salt was neither prior nor posterior to the scientific investigation of the world, but indistinguishable from it. On this view we discover features of the world only by entheorizing it most successfully using *whatever* evidence is deemed relevant by the lights of the general picture of the world and our place in it that we inherit to begin this process and the one that results from developing it further in response to those evidential inputs. And on such a view, the only relevant categories into which reasons for holding a belief fall are *good* and *bad*, not scientific versus unscientific or philosophical or some other kind. Of course, this account no more suggests that we can simply read fundamental ontology off our best scientific theories than do Ladyman and Ross, for evidence from other sources – evidence from the history of scientific inquiry, for example, concerning characteristics of our theories and ourselves as theorizers no less than the results of controlled scientific experiments – must feed back to inform our view of what we are doing when we theorize about the world and of the character, reach, and epistemic status we should ascribe to the various products of that theorizing in different circumstances: a view of all this, too, must be part of any integrated account we accept of the world and our place in it. What is central here is neither radical holism nor any number of other Quinean idiosyncracies, but simply the insistence that *all* the (good) evidence matters, and the consequent refusal to begin by elevating science, history, philosophy, or any other restricted part of the overall project of inquiry into a privileged position. This approach is straightforwardly precluded by Ladyman and Ross' two-stage model of inquiry, in which we must first ascertain what

bona-fide science has independently concluded about nature before undertaking the distinctively metaphysical unifying project that tells us what these “separately developed and justified” findings really imply concerning the most fundamental constitution of the world.

The deep contrast between Ladyman and Ross’ “frank scientism” (61) and this broadly Quinean alternative is somewhat obscured by their claim to find confirmation for their Ontic Structural Realism (OSR) in the consilience of a wide variety of sources of support: by their lights, OSR is not merely the metaphysical view recommended to us by the cutting edge of contemporary physical theorizing, but also one that solves a wide variety of persistent problems in the philosophy of science itself, offering convincing accounts of laws, causes, classification, and explanation, while simultaneously resolving the dispute between scientific realists and their opponents in a way that is responsive to the central considerations advanced by both sides of the debate. Though I harbor concerns about its selectivity, I will not second-guess Ladyman and Ross’ complex technical discussion of whether OSR represents the view of ontology that fundamental physics counsels us to adopt. I do want to suggest, however, that there is no unequivocal notion of “structure” that can do all the jobs they want and need it to do. More specifically, I doubt there is a single *kind* of structure that is simultaneously recommended to us by fundamental physical theorizing, preserved in the transitions between all or most suitably successful past scientific theories, and sufficient to answer the realist demand to genuinely explain the success of our scientific theories.

Consider this final demand first. Ladyman and Ross suggest that there are aspects of the success of our scientific theories that really do demand or at least favor some form of scientific realism as their explanation: most importantly, the ability of our best scientific theories to (sometimes) predict novel phenomena whose existence we would have little reason to suspect absent the theory. They argue, however, that the historical record of radical ontological discontinuity between increasingly successful generations of scientific theories simply precludes us from embracing the traditional scientific realist's explanation that contemporary theories succeed in this way because they are approximately true. Happily, they suggest, such radical discontinuity does not afflict well-confirmed theories' claims about modal structure; instead "all the well-confirmed modal relations expressed by old theories are approximately recovered in their successors" (123). "By modal structure," they tell us, "we mean the relationships among phenomena...that pertain to necessity, possibility, potentiality, and probability" (153-4), and this supposedly gives us all we really need to explain even the novel predictive success of our best theories: "Since some theories have achieved novel predictive success our overall metaphysics must explain how novel predictive success can occur, and the explanation we favor is that the world has a modal structure which our best scientific theories describe" (79).

In the very next paragraph, however, Ladyman and Ross identify this same modal structure with van Fraassen's "relations among the phenomena", but conceived modally or nomologically, rather than as "extensional, occurrent regularities". This seems to me to involve a subtle sleight-of-hand. The idea seems to be that, contra van Fraassen, our

successful theories don't describe brute regularities in the relations among the phenomena, instead they describe modal structure, and it is because they describe such modal structure correctly that when they suggest the existence of a new phenomenon and we look for it, we (sometimes) find it. But it seems for all the world that to conceive of van Fraassen's "extensional, occurrent regularities" among the phenomena *as modal* would *just mean* to regard them as persisting throughout circumstances that are presently counterfactual, merely possible, or untested (see esp. section 2.3.2.3), even where this would require the existence of novel phenomena. If so, then to say that our theories correctly describe the modal structure of the world (in this sense) is simply *to redescribe or restate and not to explain* the fact that they enjoy novel predictive success (to whatever extent they do). Perhaps Ladyman and Ross are even within their rights to insist that such modal relationships between the phenomena are "ontologically basic" (128), but if there is a legitimate demand in the first place to *explain why* our best theories enable us to predict novel phenomena,² simply appealing to a modalized version of van Fraassen's "relations among the phenomena" does nothing to satisfy it – indeed this seems to have more the character of an incantation than an explanation.

Even if we suppose that modalized structural relations between the phenomena really do explain rather than simply redescribe novel predictive success, however, Ladyman and Ross must face an even more serious problem. According to their "Rainforest Realism", all that genuinely exists is "real patterns", and this is ultimately all there is to say about ontology: it is "real patterns all the way down" (228), we typically "track" or "locate" these real patterns by our agent-relative, merely pragmatic division of

the world into individuals, causes, events, and processes which do not truly exist (see 153-4 and Ch. 4 passim.).³ I confess it is not clear to me whether Ladyman and Ross think we can explain the novel predictive success of our best theories simply by appeal to the modalized structural relations uncovered by fundamental physics or whether those uncovered by the various special sciences are required as well: compare, for instance, their claim that “*From the point of view of those engaged in special science activity, fundamental physics gives the modal structure of the world*” (288, original emphasis) with “If science tells us about objective modal relations between the phenomena (both possible and actual), then occasional novel predictive success is not miraculous but to be expected” (153) and “The basis for our confidence that the special sciences often successfully track real patterns is the no-miracles argument...” (298). But neither option is ultimately attractive in any case. Let us see why.

The problem with taking the modalized structural relations described by fundamental physics to explain novel predictive success in other sciences is that the “scale-relativity” of ontology ensures that the real patterns identified or “tracked” by sciences operating at scales very different from those of fundamental physics are not connected by type identities, smooth reductions, or even supervenience to those recognized by fundamental physics itself (see esp. Section 4.4). Thus, even if we stipulate that the modalized structural relations we discover between phenomena in fundamental physics are genuinely explanatory, this will do little or nothing to explain how *other* sciences, by tracking or locating different scale-relative real patterns, which

simply cross-classify those of fundamental physics in a wide variety of heterogeneous ways, manage to achieve novel predictive success when they do.

It seems, then, that to explain novel predictive success in sciences other than fundamental physics we must appeal to modalized structural relations between the phenomena uncovered by those very sciences themselves. To serve the needs of Ladyman and Ross' OSR, however, these structural relations will also have to be of a sort that persist through the kinds of dramatic theoretical discontinuities that led Ladyman and Ross to demur from the traditional realist's explanation of those novel predictive successes in the first place, and such a broad claim of historical continuity for well-confirmed modalized structural relationships between the phenomena seems empirically implausible. To take just one example, well in advance of its experimental confirmation J. F. Meckel made the novel prediction that gill slits must appear at some point in human ontogeny on the basis of his fundamentally recapitulationist conception of the structural relationship between the phenomena of ontogeny and phylogeny. But as Steven J. Gould emphasizes in *Ontogeny and Phylogeny* (Cambridge, MA; 1977) such recapitulationism (famously embodied in Haeckel's Biogenetic Law that 'ontogeny recapitulates phylogeny') envisions ontogeny as the successive terminal addition of further developmental stages to the *adult* forms of phylogenetically earlier organisms and the "condensation" of those adult forms farther and farther back into the course of development. And this recapitulationist conception of the structural relationship between the stages of embryonic development and the history of life on earth is simply rejected by contemporary biology: contra Ladyman and Ross, the modalized structural relationship it

describes cannot be “approximately recovered” (123) or “recovered as a limiting case” (157) from that which contemporary biologists take to hold between the phenomena of ontogeny and phylogeny. Instead, to accept anything like the modern view of this matter is simply to hold the distinctively *structural* relationship between the phenomena of ontogeny and phylogeny asserted by its recapitulationist predecessor to be fundamentally mistaken, as the scientists evaluating them recognized clearly: T. H. Morgan described the widespread acceptance of the competing idea of “germinal variation” simply as “the death of the older conception of evolution by superposition” (*A Critique of the Theory of Evolution*, Princeton, 1916: 18), noting that

To my mind there is a wide difference between the old statement that the higher animals living today have the original adult stages telescoped into their embryos, and the statement that the resemblance between certain characters in the embryos of higher animals and corresponding stages in the embryos of lower animals is most plausibly explained by the assumption that they have descended from the same ancestors, and that their common structures are embryonic survivals” (1916: 23).

Thus the historical record promises a rude reception to Ladyman and Ross’ claim that “we know that well-confirmed relations among phenomena must be retained by future theories” (157).

We have by now, I think, begun to see *why* there is no univocal sense of “structure” that can do all the jobs Ladyman and Ross need it to do, for these various jobs pull in competing directions. Only a very thin conception of “structure”, for example,

seems to have any chance of surviving the challenge posed by historical discontinuity, while a much thicker one is needed to explain novel predictive success. But of course, this is simply an especially robust version of a challenge that remains unsolved by structural realisms more generally. It seems perfectly reasonable to suggest that in every transition from one scientific theory to another we can always find *something* plausibly described as “structural” that remains continuous between the two theories, but further historical investigation reveals it to be quite implausible to suggest that *one and the same* structural element remains continuous in all such successions, or (therefore) that we can project into the future the “structural” elements of current theories that will survive. In a similar fashion, it seems plausible enough to suggest that something fairly described as “structural” would suffice to explain the novel predictive success of our theories, and perhaps even that something fairly described as “structural” is what we find described by our most fundamental physical theories. But it seems very implausible, in ways suggested by the challenges above, to suggest that the very *same* structural element that remains continuous through theoretical transitions in the historical record (if there were one!) *also* suffices to explain the novel predictive successes of those theories and is *also* the one described as fundamental by our best physical theories. Seen in this light, even the modest claim that structural realism is supported by the historical record seems to trade on the inherent vagueness and ambiguity in what we are prepared to describe as “structural”, while Ladyman and Ross’ much more ambitious claim that their Ontic Structural Realism is supported by a consilience of many different sources of evidence

(including its ability to answer this historical challenge) threatens to simply turn the case for structural realism into a bad pun.

Notes

²Of course, Ladyman and Ross concede that novel predictive success is only “occasional” even for theories that correctly describe objective modal relations among the phenomena (153). And we might doubt that we know *what* we are trying to explain unless we know what rate of successful novel prediction we should expect not from fundamentally false theories *simpliciter*, but from just those fundamentally false theories *that have nonetheless managed to best explain, predict, or accommodate all the systematically related known phenomena at a given time in a given field of inquiry*.

³As in Leibniz’s monadology, the everyday world of objects and causes with which we are familiar reemerges from the metaphysical menagerie imposed on us by strict adherence to Christian theodicy or fundamental physics, but can only capture how things seem to us rather than how they really are. Mathew 6:24 tells us truly that no man can serve two masters.

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