Science and Reality
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Richard Boyd (Cornell University) - *More correspondence, not less; and causation too*

Abstract: Stathis Psillos has emphasized the importance for scientific realists of correspondence truth and questioned the importance of realism about causation. I applaud the first point and argue that we need to acknowledge even more 'correspondence-ish' phenomena in order to account for the role of insight, hunches, tacit 'knowledge,' and similar phenomena in scientific practice and in order to explain how our non- (recursive) language-using ancestors deployed the representational resources from which our linguistic representational capacities were derived. Regarding causation I argue that the strategy of 'reductive globalization' characteristic of Humean accounts—reducing local causal facts to facts about property instantiations throughout space-time—makes it impossible to understand how we, or our ancestors, or our animal friends can successfully represent causal phenomena.

Craig Callender (University of California, San Diego) - *LOST IN SPACE Is the quantum state It or Bit?*

Abstract: Most discussions of this question have focused on interpretation-independent considerations. Here I'll ask the question from the perspective of "beable" based formulations of quantum theory, e.g., GRW, Bohm. Should such theories regard the quantum state as part of the furniture of the world? Based on a Humean conception of laws of nature and a comparison with classical mechanics (first in Hamilton-Jacobi form, then Koopmanian form) I argue that the answer is No. Lessons for the foundations of quantum theory and the interpretation of the PBR theorem are drawn. The message, in slogan form, is: one world, one beable. Or if you prefer rhyming slogans: one stuff, that's enough.

Bill Harper (Western University (Emeritus)) **–** *Isaac Newton's Scientific Method*

Abstract*:* Newton employs *theory-mediated* measurements to turn data into far more informative evidence than can be achieved by hypothetico-deductive confirmation alone.

This is exemplified in the classical response to Mercury's perihelion problem. Contrary to Kuhn, Newton's method endorses the radical transition from his theory to Einstein's. Newton's method is strikingly realized in the response to a challenge to general relativity from a later problem posed by Mercury's perihelion.

We can also see Newton's method at work in cosmology today in the support afforded to the (dark energy) cosmic expansion from agreeing measurements from supernovae and cosmic microwave background radiation.

Jenann Ismael (University of Arizona) **-** *Against Ontic Chances: three cheers for the third way on objective probabilities*

Abstract: There is a great divide in views about the metaphysics status of chance. According to ontic views, chances are beables, and beliefs about chance are beliefs about first-order matters of fact. According to epistemic views, chances are not beables. Beliefs about chance are either credences ,or beliefs about what credences one ought to have about categorical matters. Epistemic views are often thought to be attractive because they explain the connection between chance (if chances are beables in their own right, why should beliefs them guide credence in categorical matters?), and because they leave room for a complex and informative story about why should believers like us adopt the chances as their credences (why chance rather than any number of other functions that we can defined and which might play the same role). Ontic views are attractive because chances seem to play a fundamental role in physics. I provide a very simple argument for an epistemic view that takes its departure from familiar puzzles about the way that beliefs about chance interact with ignorance about categorical facts. I then draw connections to Hoefer's "Third Way on Objective Probability", and conclude with some remarks about how the argument bears on the interpretation of the quantum state.

Elaine Landry (Univerity of California, Davis) - *Structural Realism and Category Mistakes*

Abstract: In 2009, I argued against using set-theory as a background theory to "formally frame" the concept of structure that is used both to account for the shared structure of scientific theories and to underwrite claims for ontic structural realism (OSR). In 2011, I argued that even if one could show that category theory could be used to provide for a type of mathematical structuralism that dispenses with objects (or with relata), this would provide a silly answer to Psillos' (2006) question: "How can one speak of structures without objects (of relations without relata)?", because this answer is provided at the wrong level of philosophical analysis. In both cases, I argued against French *et al*'s set-theoretic partial structures approach by noting that to account for the structural realists' use of structure we do not need to formally frame either the structure of scientific theories or the concept of structure. Returning to French's own example of the role of group theory in quantum mechanics, I showed that the concept of structure that is used to "carve nature" can itself be made precise by appealing to the specific type of structure and specific type of morphism used; in this case, to the Lie-group structure and the group-theoretic

natural transformations. More generally, I argued that if we look to the actual practice of science, what we must note is that it is *methodological contexts* (and not any set- or category-theoretic formal framework) that determine the appropriate kind of morphism. This demonstration lead to the (2102) development of what I called *methodological structural realism* or MSR.

Despite my in-print claims, some have yet taken me to have argued that category theory provides a better formal framework for the claims of the structural realist than does set-theory. Let me now be clear: simply replacing a set-theoretic formal framework with a category-theoretic one is a mistake. Moreover, for the structural realist, it is a category mistake. That is, while there might be good reasons to suppose that category theory can offer a better framework for the concept of shared structure that is used to account for the *structure of scientific theories*, this use is *distinct from* that needed by the structural realist to account for the *structure of the world*. If then, as I suggested in my 2012 paper, we appreciate, *contra* French, that as structural realists we ought to be focused on the "object-level of scientific practice" and not on the "meta-level of the philosopher of science", then we can better see where our mistakes lie. To this end, I will critically consider more recent claims by Bain (2013) and argue that he too falls victim to a similar category mistake; in so far as his claims for a ROSR use of category theory are found at the "theoretical level", they are concerned with the *mathematical structure* of a *scientific theory* and not with the *physical structure* of the *world*. And consequently, are of little help to the structural realist, whether he be an advocate of Bain's preferred ROSR or Lam&Wüthrich's BOSR. However, along the way, and against the claims of Lam&Wüthrich, I will also argue, as Bain himself intends (despite his various category-theoretic mistakes) that at a *mathematical level* one *can* use category theory to answer Psillos' (2006) question. Moreover, I will also argue that category theory so considered can be used to *conceptually* show that there is no distinction between Bain's ROSR and Lam&Wüthrich's BOSR.

Marc Lange (University of North Carolina, Chapel Hill) **-** *Aspects of mathematical explanation*

Abstract: Unlike explanation in science, explanation in mathematics has received relatively scant attention from philosophers. Whereas there are canonical examples of scientific explanations (as well as canonical examples of arguments without scientific explanatory power, such as "the flagpole", "the eclipse", and "the barometer"), few (if any) examples have become widely accepted among philosophers as exhibiting the distinction between proofs that explain why some mathematical theorem holds and proofs that merely prove that the theorem holds. In this talk, I shall propose some very simple examples (drawn from

several branches of mathematics) and argue that they suggest a particular account of explanation in mathematics (at least, of those explanations consisting of proofs). I will compare this account of explanation in mathematics to two others that have been offered (by Steiner and Kitcher).

Margaret Morrison (University of Toronto) **-** *Why Perspectivism is Philosophically Idle*

Abstract: One of the main stumbling blocks to theory unification is the problem of having many incompatible models for the same phenomena. Not only is this a problem for unification but it raises the issue of how to epistemically assess the information these models contain. Perspectivism is often seen as a way around this problem but a closer look reveals that it only offers a solution in cases where the incompatibility isn't really a problem after all. I discuss some of the issues surrounding the use of inconsistent models and show that the problem can persist even in the presence of a seemingly unified theory. Unfortunately perspectivism, as a philosophical position, is of no help in solving these problems.

Elliott Sober (University of Wisconsin-Madison) **-** *Parsimony and Chimpanzee Mind-Reading*

Abstract: Do chimpanzees have beliefs about the mental states of other chimpanzees? There is controversy in cognitive ethology about what varioius experiments tell us about this question, and parsimony has been invoked both for and against the mind-reading hypothesis. After reviewing the controversy and the discussion of parsimony, I'll describe how Reichenbachian ideas about common cause explanations can be applied.

John Worrall (London School of Economics) - *Real ("Ramsey –Sentence") Structural Realism: Why Psillos is Wrong*

Abstract: In his [2006] Stathis Psillos writes (p.567):

> "In its Maxwellian-Worrallian stripe, [epistemic] structural realism … [endorses the view that] the world has excess structure over the appearances, [and claims that] this excess structure can be captured … by the Ramsey-sentence of an empirically adequate theory … The chief problem … is that, on a Ramsey-sentence account of theories, it turns out that an empirically adequate theory *is* true … . The supposed 'excess' structure of the world turns out to be illusory."

This claim (already implicit in Psillos [1999]) reflects the so-called "Newman objection" which is widely held to have refuted Poincaré's structural realism some 50 years ahead of the latter's "revival" by my [1985]!

In this talk I explain why Stathis's claim is incorrect. The main source of that claim's plausibility is the superficially attractive, but in fact plainly false, view that no sentence expressed in purely observational vocabulary is genuinely theoretical - or genuinely "goes beyond the appearances" (see my [2009]). And I explain, more generally, why the "Newman objection", when properly understood, is no objection at all, but simply a way of articulating the structural realist view: "Ramsey-sentence structural realism" is alive and well!

References:

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