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Essay Review

Scientific pluralism and metaphysics

David J. Stump

University of San Francisco, 2130 Fulton Street, San Francisco, CA, USA

Scientific Pluralism Reconsidered: A New Approach to the (Dis) Unity of Science, Stéphanie Ruphy. University of Pittsburgh Press, Pittsburgh, PA (2016). pp. xxi + 186, Price US$40.00 hardback, ISBN-978-0-8229-4458-4

What makes someone a scientific pluralist? One path is to aim at a unique and objective description of the natural world, but to find that the world is itself disunified and plural. Accurate description then would require multiple accounts. It is also possible to be a metaphysical monist, believing in the unity of nature, and still argue for pluralism on the basis of the limitations of our knowledge and viewpoint. We do not know, with certainty, that our representations of the world are accurate, so it would be good, it could be argued, to hedge our bets and leave open multiple lines of inquiry. Furthermore, whether or not our representations are successful or not depends on our goals and our interests. We have then, realist epistemology with pluralistic metaphysics on the one hand, or pluralist epistemology and monistic metaphysics on the other. In addition to these extremes, there are mixed accounts that provide a basis for scientific pluralism. The recent literature on scientific pluralism is itself quite heterogeneous, taking different stands on both the epistemological and the metaphysical issues.

Ruphy's book is a compilation and reworking of material, much of it originally published in English in journals and then unified as a book in French (Ruphy, 2013) before being reworked again to become the current work in English. The overall question is whether contemporary arguments for scientific pluralism reach too far, making metaphysical claims that cannot be justified. Ruphy aims to clarify issues and to present her own thesis of scientific pluralism, without claiming to have presented an exhaustive analysis of all possible positions. Thus, while the presentation in the book is structured, it analyzes the works of major players in the contemporary literature on scientific pluralism, rather than positions. The extent to which she engages the work of what has been called the Stanford School of the Philosophy of Science is striking. Ruphy not only mentions Patrick Suppes' very early article on scientific pluralism (Suppes, 1978) and discusses the central works of Dupré (1993) and Cartwright (1999), but she also relies heavily on Ian Hacking's styles of reasoning in developing her own view (Hacking, 1982; 1992; 2012). Hasok Chang's work (2012) is also mentioned but not really engaged with, since it appeared later, but the Stanford *Disunity of Science* volume (Galison and Stump 1996) plays an important role. Of course the focus on Stanford is in part simply because of the topic, which is central to the Stanford School. She also discusses Philip Kitcher's work extensively (Kitcher, 2003; 2011), as well as that of Mitchell (2003; 2009) and Longino (1990; 2002; 2013).

Ruphy divides the book into three chapters. The first begins with the classic notion from Logical Positivism that science is unified by its language, as well as Carnap's pluralism. She moves on to briefly dismiss the idea that science is unified by its method and to discuss Hacking's styles of reason in order to develop her own view, which she calls foliated pluralism. The key point is that styles serve to define what there is in the world (Ruphy, 2016, 32). Ruphy's point throughout the book is that our interests define what counts as explanation (leaning on the work of Garfinkel (1981)) and define styles of reasoning. This epistemological point overrides any metaphysical arguments. Rather than making metaphysical claims, pluralism should be based on these considerations, according to Ruphy: "… a more pertinent starting point for pluralists is, I suggest, the contention that the representations delivered by science depend on our practical and epistemic interests" (Ruphy, 2016, 82).

Still in chapter 1, Ruphy then considers the key claim of whether or not there are different kinds of things that can be known only in different ways, an argument that seems central to John Dupré's argument for pluralism. Ruphy argues that we are not in a position to make this claim. It simply does not follow from the fact that we cannot make a reduction now that no reduction will ever be possible. Following Ernest Nagel, Ruphy says that the only claims that we can make about the lack of a reduction are temporally qualified.

Chapter 2 considers the question of intertheoretic reduction and its metaphysical implications. Ruphy includes a discussion of Kitcher and Fodor and the multiple realizability arguments against reduction (Ruphy, 2016, 45), but the central argument is about the universality of scientific laws. Cartwright makes a positive metaphysical claim that the world is dappled, that is, parts of reality are unruly and do not fit our models and laws. Here Ruphy goes beyond the kind of skeptical argument that she raised against Dupré. We can certainly ask how we know that the world is dappled in this way, but Cartwright has an argument that many phenomena that naturally belong to the domain of physics are not describable in it.

E-mail address: stumpd@usfca.edu.

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We can only have laws for phenomena that are idealized. Ruphy points out that whether a phenomenon is unruly or part of a nomological machine depends on what questions are asked, and these questions are relative to our interests. Therefore, Ruphy can say that "I guess that I am a more radical heathen than Cartwright: I do not believe that bits of the world are nicely ordered because I am at a loss to make sense of what it means for a real-world system to be ordered without reference to my cognitive and practical expectations" (Ruphy, 2016, 65). The upshot is that once again, epistemology triumphs over ontology. We cannot make sense of parts of the world in themselves being well-ordered or unruly, they are only well-ordered or unruly relative to our interests. The major claim through all of the discussion is that the general antireductionist claim has not been justified adequately.

I wonder if it is not possible to use a burden of proof argument here against the reductionist, something along the lines of arguing that if we cannot even imagine what an adequate reduction would look like, it is up to the reductionist to show up how it can work. Furthermore, the reductionist would simply be begging the question to say that there must be a reduction, given the unity of nature. The unity of nature is in question in this debate. Thus, there must be positive reasons given for why it will eventually be possible to give a reduction, even if we cannot now. Therefore, in cases where we do not yet have a reduction, there is still a case to be made for pluralism. Finally, I will argue below that we have reason to be scientific pluralists even if we accept the metaphysical unity of the world; all we need is fallibilism to make the argument.

Chapter 3 discusses representation in relation to the arguments over scientific pluralism, opening with a discussion of maps as representations. Ruphy discusses the idea of pluralism given either compatible and incompatible representations of reality, noting that only the existence of incompatible representations can really count as an argument for pluralism. Ruphy also has a nice little argument to show that it is sometimes possible to split phenomena to make incompatible accounts compatible again (Ruphy, 2016, 91). The example involves incompatible accounts of how social insect colonies divide labor, but in this case, we can simply say that there are two kinds of social insect colonies with different mechanisms.

Ruphy has a background in astrophysics, and she includes two examples of pluralism from that field, galactic models and stellar kinds. Given that the question of the existence of natural kinds is central to some debates over pluralism, her second example especially makes an interesting addition to the discussion. Basically, natural kinds seem to exist in physics and chemistry but not in biology. Ruphy argues that the classification of stars is not an example of natural kinds, in part because stars evolve through their history from being one kind of star to being another kind. One might think that these examples would lend themselves to a piecemeal approach—that we have reduction or unification in some cases and plurality and diversity in others. On the one hand, Ruphy argues that scientists are opportunistic and will argue for whatever works in a given situation (Ruphy, 2016, 52). However, Ruphy seems to dismiss such an account as at odds with the philosophical urge to generalize. A local solution would be at odds with the metaphysical ambitions of both those arguing for unity and those arguing for plurality (Ruphy, 2016, 111). It nevertheless seems an attractive solution, especially given that Ruphy bases her argument on epistemology rather than metaphysics. Of course, this is just asking again for a kind of pluralism. Ironically, we could be pluralist in saying that some should pursue reduction, while others pursue scientific pluralism. Indeed this seems the right thing for a pluralist to say. This is not unlike a thoroughgoing fallibilist leaving open the possibility that some knowledge will turn out to be certain. Otherwise, the fallibilist is inconsistent, saying that they are certain that nothing is known for certain. So yes, we can be pluralist enough to leave open the door to reductionism. After all, it seems to work in some limited cases, as Ruphy notes, citing among others work from Morrison (2000; 2011). Indeed, Ruphy highlights recent unification schemes, which "should at least invite pluralists to be wary of claims of permanent, irreconcilable plurality" (Ruphy, 2016, 134). Of course, there is a very big question about how resources should be allocation under any pluralist scheme. How do we know which research program to fund? Ruphy does not address these practical issues. She is not so much defending scientific pluralism as clarifying the arguments for it.

Ruphy has made a good case that metaphysical claims do not follow from the failure of reduction. I am very sympathetic with her argument and indeed think that it can be carried further to show that pluralism does not necessarily imply relativism or any form of anti-realism. Fallibilism, even when conjoined with the metaphysically realist idea that there is one independent world, opens the door to one kind of argument for pluralism. Even if we accept that "the ultimate aim of science is to establish a single, complete, and comprehensive account of the natural world" (Kellert, Longino, and Waters 2006, x), pluralism may be the best way to get there, given that we are in a position of being unable to know the world with certainty. From that starting point, we can argue that we are better off leaving multiple accounts of the world open to investigation so as to hedge our bets. Thus, if pluralism is thought of epistemically, it is compatible with even a strong form of metaphysical realism—if there is one world and only one correct interpretation of it.

Furthermore, there is no reason to hold that the alternative accounts of the world to be left open are all equally valid, as a relativist might argue. Rather, we could see them as approaches that may or may not be shown to be workable—as possibilities. Even if we will never gain certain knowledge of what the world is, we may be able to differentiate alternative accounts as better or worse. Even if we accept that science should aim at one true picture of the world, fallibilism implies that we might accept multiple attempts to create such a picture, especially if they satisfy different criteria, or work better in different contexts. We do not need to make any metaphysical claim in order to argue for pluralism, as long as we hold that we have not yet attained knowledge of the one correct theory. Fallibilism implies that we will never reach such a view. Chang takes a somewhat different approach but, as Ruphy notes, also rejects the necessity of a leap to metaphysics (Chang, 2012, p. 257).

Ruphy rather quickly dismisses relativism when discussing Hacking's styles of reasoning. She is correct in her analysis (Ruphy, 2016, 26) but not everyone accepts this so readily, so a bit more discussion may be required to separate pluralism from relativism. In a long and excellent discussion of Hacking's styles of reasoning, Martin Kusch makes a case for reading Hacking as a relativist and indeed endorses relativism himself.

> "Fundamental disagreements over the rationality and justification of beliefs can motivate a reaction of 'epistemic ambivalence': we recognize that our interlocutor on the other side has—seen from her perspective—perfectly legitimate and rational reasons for her judgements, and we appreciate that we can argue for the superiority of our position only by begging the question against her. This does not mean that we abandon our own judgements, but it means that we come to see them in a new light: as relative to our epistemic system" (Kusch, 2010, 167).

So far, I would claim, all that we have is a polite fallibilism, not relativism. I can surely think that my interlocutor is rational but wrong, while recognizing the fallibility of my own judgments and

the fallibility of my own methods of argument. I can also recognize the situated nature of my own judgments, but there is no reason that I should be led to think that opposing positions are equally valid, which I take to be the hallmark of relativism (Boghossian, 2006). (Kusch denies that relativism includes this claim and points to the literature on ethical relativism for support, but all this means is that the term 'relativism' is used differently in different areas of philosophy. In philosophy of science, Boghossian seems to me to be correct.)

As for the idea that my views are (merely) relative to my own epistemic system, I would follow Hacking and say that the answer is yes in one sense and no in another. Of course, it is true that my judgments can only be formulated in my style of reasoning, but once that style is adopted, the grounds of the judgment is objective—in pragmatist terms: it either works or it does not, and whether it does is not built into the style of reasoning in advance. The key point is that Kusch does not take seriously enough Hacking's insistence that styles of reasoning tell us what is up for grabs as true or false, rather than what is true.

Does pluralism lead to relativism? I suppose it depends on why one is a pluralist and what one means by relativism. For example, if someone holds that there are incompatible and irreducible explanations of a given phenomenon, a pluralist might be seen as holding that they are equally valid. But one could be a fallibilist about one's own view and therefore see a reason for not closing off inquiry without taking the opposing explanation to be equally valid. Chang explicitly denies that pluralism leads to relativism (Chang, 2012, p. 261).

Relativism is not only unnecessary, it does not even guarantee the pluralism that many advocate. Chang remarks that "Curiously, although it may seem that relativism is a stronger and more radical doctrine than pluralism, relativism does not necessarily imply pluralism. If relativism only insists on the equal treatment of any alternatives that do exist, there is no requirement that there should be multiple alternatives. If everyone actually agrees on something and no one seeks any alternatives, relativism has no strong way to oppose that state of affairs" (Chang, 2012, p. 261).

Ruphy's book is an important contribution to the growing literature on scientific pluralism. It should be read and discussed widely.

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