Studies in History and Philosophy of Science 54 (2015) 74–79

Contents lists available at ScienceDirect

Studies in History and Philosophy of Science

journal homepage: www.elsevier.com/locate/shpsa

The methodological defense of realism scrutinized

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ARTICLE INFO

Article history:
Received 22 July 2015
Received in revised form
7 September 2015
Available online 30 September 2015

Keywords:
Anti-realism;
Methodological defense of realism;
Feyerabend;
Popper;
Copernican revolution;
Risk spreading

ABSTRACT

I revisit an older defense of scientific realism, the methodological defense, a defense developed by both Popper and Feyerabend. The methodological defense of realism concerns the attitude of scientists, not philosophers of science. The methodological defense is as follows: a commitment to realism leads scientists to pursue the truth, which in turn is apt to put them in a better position to get at the truth. In contrast, anti-realists lack the tenacity required to develop a theory to its fullest. As a consequence, they are less likely to get at the truth.

My aim is to show that the methodological defense is flawed. I argue that a commitment to realism does not always benefit science, and that there is reason to believe that a research community with both realists and anti-realists in it may be better suited to advancing science. A case study of the Copernican Revolution in astronomy supports this claim.

I would like to revisit an older defense of scientific realism, the methodological defense. This defense was advanced by both Karl Popper and Paul Feyerabend. Roughly, the methodological defense is as follows: a commitment to realism leads *scientists* to pursue the truth, which in turn is apt to put them in a better position to get at the truth. In contrast, scientists who are anti-realists, for example, conventionalists and instrumentalists, lack the tenacity required to develop a theory to its fullest. As a consequence, they are less likely to get at the truth.

It is important to note that in this particular argument for realism, the sort of realism that is at issue is a realism that scientists might adopt. Typically, realism and anti-realism are identified as *philosophical* positions. But the guiding question in this debate is: should *scientists* be realists or anti-realist?

My aim is to show that the methodological defense of realism is flawed. Specifically, I argue that there is little evidence to support the claim that a commitment to realism rather than anti-realism *generally* benefits science. Further, there is reason to believe that a research community with both realists and anti-realists may be better suited to advancing science. I support this latter claim with a case study of the Copernican Revolution, with special attention to the role played by the Wittenberg astronomers. The Wittenberg astronomers worked with Copernicus' theory, even though they did not accept key cosmological claims associated with his theory, specifically, Copernicus' claims about the motions of the Earth.

1. The methodological defense

Feyerabend is the most explicit in endorsing the methodological defense of realism. In fact, the name for this argument comes from Feyerabend (see Feyerabend, 1964/1981, 201). Feyerabend's worry is that the alternative to realism, instrumentalism, encourages scientists to be satisfied with theories that are merely "*instruments of successful prediction*" rather than "*descriptions of reality*" (see Feyerabend, 1981, 200).

Crucial to Feyerabend's normative philosophy of science is a commitment to theoretical pluralism (see Feyerabend, 1988, chap. 3).[1] When scientists are confronted with alternative theories they

[1] Both Ian James Kidd (in press) and Elizabeth Lloyd (1997) provide valuable correctives to the popular, but uncharitable reading of Feyerabend as the arch-enemy of rationality and science. Kidd and Lloyd both rightly emphasize that Feyerabend wants us to have realistic expectations of science.

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http://dx.doi.org/10.1016/j.shpsa.2015.09.001
0039-3681/

are able to evaluate the theories more thoroughly. Alternative theories, he argues, often disclose evidence that the accepted theory obscures. Indeed, Feyerabend even suggests that scientists could benefit from considering "*hypotheses that contradict well-confirmed theories and … well-confirmed experimental results*" (Feyerabend, 1988, 20; emphasis in original). And to get the full benefit of the alternative theories, Feyerabend argues that it is crucial that the alternative "theories *be developed in their strongest form, i.e. as descriptions of reality*" (Feyerabend, 1981, 200). The instrumentalist, on the other hand, will be satisfied with her theory provided it enables her to make accurate predictions. Provided her theory fulfills this role, she has no motive to improve the theory. The realist, though, in consciously developing his theory as a description of reality, will develop his scientific theory more fully.

Feyerabend is thus suggesting that scientists could take either an instrumentalist attitude toward theories, regarding them as instruments for generating true predictions, or a realist attitude toward theories, regarding them as descriptions of reality. And he maintains that scientists of the latter sort are apt to develop stronger theories, which is better for science in the long run.

Popper develops a similar defense of realism in *Logic of Scientific Discovery*. But his defense is a little more oblique and he has a different opponent in mind than Feyerabend had. Rather than explicitly arguing *for* realism on methodological grounds, Popper argues against *conventionalism* on methodological grounds. The failings of the conventionalists' methodology are discussed in order to show indirectly the superiority of the realists' methodology.[2]

The sort of conventionalism that Popper has in mind is a view he attributes to Pierre Duhem, Henri Poincaré, and Hugo Dingler (see Popper, 1935/2002, 57, Note 1). It is worth clarifying Popper's understanding of his opponents' view. "According to this conventionalist point of view, laws of nature are not falsifiable by observation; for they are needed to determine what an observation and … what a scientific measurement is" (Popper, 2002, 58). Thus, on Popper's view, the conventionalist believes that laws of nature are stipulated rather than discovered by observation.[3] Popper explains that

> for the conventionalist, theoretical natural science is … merely a logical construction … It is this construction which determines the properties of an artificial world: a world of concepts *implicitly defined* by the natural laws which we have chosen. (Popper, 2002, 58; emphasis added).

And because they are definitions, laws become impervious to refutation.[4]

On the one hand, Popper grants that conventionalism is a plausible view (2002, 59). But, on the other hand, he argues that conventionalists endorse a methodology that is detrimental to scientific progress. Specifically, the conventionalist says that when scientists encounter recalcitrant data they can make adjustments to their theory however they see fit in an effort to reconcile the data with the theory. Popper claims that the conventionalist "will eliminate [inconsistencies] by suggesting *ad hoc* the adoption of certain auxiliary hypotheses" (60). By adjusting background or auxiliary hypotheses, a scientist can reconcile recalcitrant data with her theory. The conventionalist does not believe it is contrary to the canons of rationality to make such adjustments; there is nothing inherently unscientific about this practice. Popper, though, believes that following the conventionalist methodology "any hypothesis [can be made to] agree with the phenomena" (Popper, 2002, 61-62). Popper's concern is that the resulting theory "will please the imagination but [will] not advance our knowledge" (Black cited in Popper, 2002, 62). Popper's falsificationism bans these conventionalist stratagems for dealing with anomalies, thus ensuring that scientists stay on task in their pursuit of the truth (Popper, 2002, 64). The scientist, according to Popper, must be prepared to abandon her favorite hypothesis or theory.

I want to emphasize again that Popper does not argue in support of the realists' methodology directly, as Feyerabend does. Rather, Popper's strategy is to attack the conventionalists' methodology. But his argument is a tacit defense of the realists' methodology, a methodology that strictly prohibits *ad hoc* adjustments to save a law, hypothesis, or theory from falsification.

Popper and Feyerabend were not the first to defend the view that a realist commitment on the part of scientists has a positive impact on science. Max Planck (1909/1992) held a similar view. Planck claimed that the realism of Copernicus, Kepler, Newton, Huygens, and Faraday played a crucial role in leading them to make their important contributions to science. According to Planck, the scientific progress that these scientists were responsible for is attributable in part to the "rock-solid belief in the reality of their world picture" (Planck, 1909, 131-132). When Planck wrote this, he was concerned about what he regarded as the pernicious affects that Ernst Mach's positivism was having on science. Specifically, Planck argued that Mach's positivist principle of economy would "disturb the thought processes of leading minds" (131). Regarding theories as merely a means by which to economically organize scientists' thinking, they would be less likely to develop a theory to its fullest. Planck insisted that "the physicist, if he wants to promote science, has to be a realist, not an economizer [of thoughts], which means … he must search above all for that which is lasting, unchanging, independent of everything sensory" (Planck, 1910/1992, 146).[5]

There is such a wide range of realist positions involved in the contemporary debates, including convergent realism, selective realism, entity realism, and structural realism. This list is not exhaustive, and each of these labels has been used to identify a variety of different views. So, it is worth briefly considering the nature of the realist position that is being defended by those advancing this argument. Bas van Fraassen suggests that scientific realism involves two claims: "[I] *science aims to give us, in its theories, a literally true story of what the world is like; and* [II] *acceptance of a scientific theory involves the belief that it is true*" (van Fraassen, 1980, 8; numerals added). Popper's brand of realism is unusual, at least compared to the most popular contemporary views. Though Popper accepts [I] above, he rejects [II]. Popper argues that "the acceptance by science of a law or of a theory is *tentative only*" (Popper, 1957/1963, 72). Thus, on Popper's view acceptance of a theory does not necessarily involve belief that it is true. Indeed, Popper is emphatic that theories always retain their hypothetical form (Popper, 1974/1992, 90). Feyerabend and Planck are also

[2] Popper says little about instrumentalism in the first edition of *Logic of Scientific Discovery*. One of the few explicit references to instrumentalism in *LSD* is the following remark: "science … might be described as a tool, or an instrument, comparable to some of our industrial machinery" (Popper, 2002, 81). Here he is comparing different ways in which we might look at science. The instrumentalist way is contrasted with the epistemological way of looking at science. Instrumentalism, though, would become a target of Popper's criticism in his later writings (see especially Popper, 1956/1963, 133–134).

[3] Popper's own view of laws of nature is that they are bold conjectures that are tested against experience (see Popper, 1957/1963, 68). "All laws, all theories, remain essentially tentative, or conjectural, or hypothetical" (68).

[4] For example, Popper claims that Poincaré believed that "Newton's theory … is nothing but a set of implicit definitions or conventions" (see Popper, 1963, 326).

[5] It is worth noting that Planck believed that positivism was a popular view among his contemporaries. He asks: "How has it come about that Mach's epistemology has become so widely spread among natural scientists"? (Planck, 1909, 130).