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A new twist to the No Miracles Argument for the success of science

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ABSTRACT

J. D. Trout has recently developed a new defense of scientific realism, a new version of the No Miracles Argument. I critically evaluate Trout's novel defense of realism. I argue that Trout's argument for scientific realism and the related explanation for the success of science are self-defeating. In the process of arguing against the traditional realist strategies for explaining the success of science, he inadvertently undermines his own argument.

J. D. Trout has recently developed a new defense of scientific realism. It is a new version of the No Miracles Argument. Unlike the traditional No Miracles Argument, Trout not only aims to explain the success of science, he also wants to explain the rise of modern science.[1] As Trout explains,

> the central idea of [*Wondrous Truths*] is that science in selected areas of Europe rose above all other regions of the globe because it hit upon successive theories that were *approximately true* through an awkward assortment of *accident and luck*, geography, and personal idiosyncrasy. (Trout, 2016, 5; emphasis added)

My aim is to provide a critical evaluation of Trout's novel defense of realism. I argue that Trout's argument for scientific realism and the related explanation for the success of science are self-defeating. In the process of arguing against the traditional realist strategies for explaining the success of science, he inadvertently undermines his own argument. I also argue that my criticisms of Trout's argument aid us in seeing why the prospects of a compelling explanationist defense of scientific realism are not very good.

1. Trout's new argument

Trout argues that

> the best explanation for the empirical success of contemporary mature science is the approximate truth of our scientific theories, or at least the intellectual reliability of scientific methodology *given* the high quality of our background theories. (see Trout, 2016, 154; emphasis in original)

At first glance, Trout's argument appears to be no different than the classic No Miracles Argument, presented by Hilary Putnam (see, for example, Putnam, 1978, pp. 18–19). Realism is alleged to be the only view that does not make the success of science a miracle.[2]

But in fact Trout's argument is different. Crucial to his argument is the qualifying claim "*given* the high quality of background theories." What is novel about Trout's defense is that he insists that it is an *accident* that we ever did hit upon high quality background theories in the first place (see Trout, 2016, p. 5, cited above). He wants us to see that it was quite improbable that scientists ever developed *high quality theories*. This conviction is reflected in the sub-title of Trout's book: *The Improbable Triumph of Modern Science*.

Indeed, many anti-realists seem to suggest that it is highly improbable that scientists will develop theories that reflect the unobservable structure of reality, given the history of science. The various pessimistic inductions are alleged to show that most

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[1] This is a standard concern for historians of science, explaining the rise of modern science (see, for example, Merton, 1938/1973; Koyré, 1957; Ben-David, 1971/1984; and Westfall, 2000). Some focus on significant conceptual innovations, others on sociological factors.

[2] There have been attempts to refine and improve the No Miracles Argument. For example, Alan Musgrave suggests that it is only predictions of novel phenomena that are best explained by appeal to the truth or approximate truth of our theories (see Musgrave, 1988, p. 249). These are the successes that seem most *miraculous* if our theories are not approximately true.

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theories accepted in the past were ultimately rejected, and are thus false with respect to the claims they make about unobservables.[3]

Part of Trout's aim is to show just how improbable it was for scientists to develop high quality theories in the first place. His case for this claim is quite interesting, and novel, and consequently deserves our attention. Trout argues that scientists — and, in fact, people in general, for that matter — often seek understanding. They get a ***sense*** of understanding when they are able to explain some phenomenon. Trout draws on research in neuroscience to support his analysis of the sense of understanding, and the feelings associated with it (see Trout, 2016, Chapters 1–3). Importantly, according to Trout, one achieves this sense of understanding when an explanation makes sense to oneself, and the sense making of explanations is largely a function of the background assumptions one makes, tacitly or explicitly.[4] When an explanation fits with one's background assumptions, one is apt to feel a sense of understanding.

Here is where things get interesting and complicated. Trout claims that if scientists are working with false background assumptions, then they may get the sense of understanding they seek even when the explanations they develop are false. The key point Trout wants us to see is that our sense of understanding does not track truth (see Trout, 2016, p. 42 and 56). As a consequence, our sense of understanding *in itself* is unreliable. Only in conjunction with approximately true background theories can our sense of understanding be given much credence.

This line of reason may *seem* to pose a serious challenge for realists appealing to an explanationist strategy in defense of realism, like those who appeal to the No Miracles Argument. But Trout is not put off by this challenge. He takes it upon himself to build a case for believing that scientists do in fact have sufficiently high quality background theories. Trout argues that at least since Newton, and perhaps earlier, European scientists luckily hit upon theories that were at least approximately true. The theories he has in mind are the various corpuscular theories that were developed in the early modern period, the period that has traditionally been identified as *the* Scientific Revolution (see Trout, 2016, p. 160).

According to Trout, once scientists hit upon these approximately true theories, the methods scientists employ could aid them in refining these theories, developing theories that are even closer to the truth, as evidenced by the increasing accuracy with which scientists are able to make predictions.

Importantly, Trout is less sanguine than most other realists about the efficacy of scientific methods in securing true or approximately true theories. He does not think that methodology itself can account for the success of our best theories. As noted above, Trout insists that "scientific method only works well when you have a good enough background theory" (Trout, 2016, p. 182). Further, he notes that many of the methods typically cited as responsible for the success of science were in use in Europe and elsewhere before the dawn of the Scientific Revolution (see Trout, 2016, pp. 184–185; also 188–189).[5] Consequently, they can hardly be the cause of the success of science that we see beginning in the 17th Century. In fact, Trout notes that though "the Newtonian hunch turned into a significant advance … it didn't arise from the secure, tried-and-true application of the scientific method" (Trout, 2016, p. 180).

Thus, even though it was an accident that scientists developed approximately true theories when they did, the subsequent refinements made since the 17th Century were no accident. The methods of science are effective means to improve theories provided they are applied to theories that are approximately true.

But Trout insists that contingency played a crucial role in causing the rise of modern science. The contingency that made possible the "triumph of modern science" helped us break out of "our naturally conservative hypothesizing" (Trout, 2016, p. 182). This same contingency plays a crucial role in any plausible explanation of the success of science. Our naturally conservative hypothesizing tends to lead scientists to accept explanations that are apt to prove false.

2. Critical examination

In the remainder of this paper I want to raise some challenges for Trout's new defense of scientific realism.

My first concern is with his claim that Newton and others finally hit upon a theory that is — or set of theories that are — close enough to the truth. The evidence for this is pretty thin. He cites the fact that there was a significant increase in the number of discoveries beginning in the middle of the 16th Century (see Trout, 2016, pp. 159–162; see also Figure 6.1 on page 161).[6] This sort of evidence is problematic for a number of reasons. First, it is far from obvious that the discoveries are evidence that our scientific theories are approximately true with respect to what they say about unobservable entities and processes. But that is just what is at issue between realists and anti-realists. Anti-realists, after all, do not deny that science is successful. They just do not believe that the truth or approximate truth of our theories is the best explanation for this success (see Van Fraassen, 1980; Wray, 2007; and Wray, 2010). After all, there have been numerous false theories that have yielded true predictions, in fact, even vindicated predictions of novel phenomena (see Carrier, 1991; Laudan, 1981; Lyons, 2002; Vickers, 2013). Tim Lyons has identified 13 theories that both were capable of generating novel successes and are false, including the caloric theory, Newtonian Mechanics, Dalton's Atomic Theory, and Bohr's theory of the atom. Some of these theories are responsible for a number of novel predictions (see Lyons, 2002, pp. 70–72).

Further, there are reasons to believe that the corpuscularian theories of the 17th Century *may* in fact be far from the truth, and thus not aptly characterized as even approximately true.[7] These theories hardly reflect the picture of the world that physicists have developed since the early 20th Century, with the development of the general and special theories of relativity, and Quantum Mechanics. Even some realists seem to recognize this. Ernan McMullin, for example, notes that

> the denizens of the microworld … can hardly be said to be imaginable in the ordinary sense. At that level, we have lost

[3] It is now widely recognized that there are numerous versions of the pessimistic induction (or meta-induction) (on the variety of versions see Wray, 2015). Related to these arguments is the widely, though by no means universally, held view that false theories outnumber true theories. Larry Laudan, for example, has suggested a ratio of 6:1 of false theories to true theories (see Laudan, 1981). This ratio is widely discussed, but the important point for our purposes is that true theories may be relatively rare. If this is in fact the case, then it is not so surprising that scientists have not had much success in developing theories that accurately describe the unobservable structure of reality.

[4] The important role that Trout attributes to background theories in scientific reasoning and explanation is similar to the role Richard Boyd gives to background theories in his defense of realism (see Boyd, 1980). This is not surprising, as Trout was a student of Boyd's at Cornell.

[5] Other realists have put greater stock in the development of methods in their defenses of realism than Trout does. See, for example, Richard Boyd (1985) and Michael Devitt (2011) .

[6] There are similarities between Trout's appeal to the growth of science in his defense of realism and Ludwig Fahrbach's and Seungbae Park's recent attempts to defend realism (see Fahrbach, 2011; also; Park, 2014).

[7] The challenges of defining "approximate truth" in a clear and unambiguous way are great. See Psillos (1999, Chapter 11) for a discussion of the difficulties.