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Book Review

K. Brad Wray: *Resisting Scientific Realism.* Cambridge University Press: Cambridge 2018, xii + 224 pp, £ 75.00 (Hardcover), ISBN: 9781108231633.

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K. Brad Wray has established himself as one of the authoritative voices in the ongoing, lively debate between scientific realists and anti-realists. His recent book *Resisting Scientific Realism* (2018) eloquently sets forth a methodical, composite argument for anti-realism that reboots older themes articulated by Kuhn, Laudan and, most notably, van Fraassen. Wray's argument centers around reflections on the past and future of scientific theorizing, as well as, the role of sociological and institutional determinants of scientific success (see also his first book [2011]). We are encouraged to "shift the focus slightly, away from the epistemic status of our current best theories to a consideration of their likely fate" (p. 1).

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The book consists of 13 chapters; divided into two parts: “Against realism” and “Strengthening Anti-Realism”. The negative component of Wray’s thesis can be distilled into two skeptical arguments against realism:

(1) *The argument from underconsideration*

(2) *The argument against theoretical values*

The positive component of Wray’s thesis involves the following three arguments for his version of anti-realism:

(3) *The argument for a selectionist explanation for the success of science*

(4) *The argument from false theory prediction*

(5) *The argument from the influence of research interests*

In sections 1 to 5 of this review, I will summarize the above-mentioned arguments in order; then, in section 6, offer some criticism of three aspects that appear problematic. In section 7, I will conclude by weighing up what has preceded.

(1) Chapters 2, 3, 4 and 6 of the book deal with the anti-realist’s argument from *underdetermination*, and derivatives thereof. Wray is mostly concerned with the argument from *underconsideration*. The realist presumes that scientists can, and are, picking approximately true theories, and thereby grants these scientists special inferential skills, i.e. undeserved “epistemic privilege”. However, although the best available theory may be more likely true *than its competitors*, this does not entail that it is more likely true *than not*. Comparative evaluations are not absolute evaluations; scientists could be picking from a *bad lot* (van Fraassen 1989, pp. 142–50). “Neither the background theories nor the methods used by scientists” allow the inference that scientists are epistemically privileged or that currently successful theories are (likely) true (pp. 66–67).

(2) As per Laudan (1981), a further complaint against realism is its appeal to so-called *theoretical values* (or epistemic virtues). These include parsimony, unificatory power, breadth of scope, fruitfulness, predictive accuracy and the like. In chapter 8 of the book, Wray argues that these values do not allow inference to the truth of scientific theories in the way that realists are inclined to do. "Such claims are dogmas of realism" (p. 133); theoretical values only allow ordinal ranking amongst theories. Comparative advantage over rival theories does not guarantee getting "us to the truth in the long run" (p. 139).

(3) Wray's primary positive argument for anti-realism – chapters 9 and 10 – involves a rearticulation of van Fraassen's *selectionist explanation for the success of science* (van Fraassen 1980, pp. 39–40). Science progresses analogously to the eliminative process of natural selection, not as a march towards truth or the ongoing revelation of what reality is *in itself*. As in Darwinian evolution, scientific theories are in competition for survival, and only the fit survive. "[A]ny theory that is still around […] that retain[s] a following […] is apt to be successful" (p. 148); fitness of theories need not have anything to do with tracking unobservables or with truth *simpliciter*. Successful theories are those that out-compete rival theories according to the various theoretical virtues discussed above, and in terms of reference to – or truth about – *observable phenomena* only. The selectionist explanation, continues Wray, can explain why once successful theories come to be discarded, *and* why two competing theories can both be predicatively successful. Each of two successful – yet possibly false – theories may be accepted by *some* scientists if both theories have institutional and predictive utility.

(4) In chapter 11 of the book, Wray explains how and why, on an anti-realist account, *false theories* can generate *accurate*, sometimes novel, predictions. Since success – *viz.* accurate prediction – is a function of (1) the goal-oriented choices of scientists, (2) the limited lot of available theories and (3) ongoing attempts to save the phenomena, there

is no reason to think that a successful theory has to be true. Scientists also have a tendency to accommodate theory to data, continues Wray. At times, they gloss over distortions in their models, ignore anomalies and utilize idealizations and abstractions (Kuhn 1970). These factors imply that theories are, at best, partial representations of the world. Sometimes the standards of success that scientists hold are relaxed to the degree that a false theory can slip through the net.

(5) The final positive argument for anti-realism involves an inspection of the changing *research interests* of scientists, and how these interests influence theory construction. Wray concludes in chapter 12 that as research interests change, scientists "are apt to develop new theories that make significantly different assumptions [from those] made by the replaced theories" (p. 6). Scientists' research interests determine which parts of theories are discarded. The progress of science is not fueled by considerations of truth or by attempts to secure reference to an underlying reality. After scientists achieve the research goals related to some institutional project, they move on to new interests. These new interests, in turn, determine which theories are now accepted and judged successful, and which are discarded. In this way, science evolves. As per Kuhn, scientists pursue their research goals within whatever paradigm is relevant to their interests at the time, and they "are determined to make nature fit into the conceptual boxes supplied by the accepted theory" (p. 190).

(6) Having summarized Wray's key arguments from the book, I will now offer some analysis. Wray's overarching case for anti-realism is a strong one, especially regarding arguments 1 and 2. Scientists are choosing from a limited lot of theories, and success is, therefore, comparative. Scientists utilize theoretical values when ranking theories, but these values can only be subsidiary to experimental confirmation and/or novel predictive power. Collating theoretical values into an ampliative inference to the best

explanation – as realists are inclined to do – is speculative at best. Wray's argument 4 is likewise convincing. What he calls false theories (i.e. partially representing theories) can make successful predictions, and this is problematic for realists. In fact, it is plausible that scientists' practical research interests, rather than a search for capital T truth, usually drives scientific progress. Scientists may even generally consider their subject matter to be something like the empiricist's notion of the phenomena, rather than an essential ontology. To boot, we can grant that successful theories are *empirically adequate* (van Fraassen 1980, pp. 12–13), rather than (approximately) true. All things considered, there appears to be no consequential difference between the two. As such, I am in general, tentative agreement with Wray's thesis. However, a few aspects appear to be problematic. I will discuss three concerns mostly related to argument 3, but also elements of argument 5. Firstly, the central concepts in Wray's account are *undefined* and/or *unexplained*. Secondly, apropos the first concern, his emphasis on scientists, and their interests and choices, cries out for a substantial account of *choice-making*. Lastly, I consider that Wray's notion of what constitutes an *explanation* is counter-intuitive.

First, the central concepts in the philosophy of science are arguably *theory, truth, knowledge* and *reality*. Wray, however, attempts to give an account of the success of science through a sociology-heavy *description* of what institutionalized scientists do with theories (along with an analogy to biological evolution). The problem with this approach is that it is not clear what Wray is talking about when he says, for example: "I will use the term 'theoretical truth' to denote the fact that a theory is true or approximately true with respect to what it says about unobservables" (p. 125 fn. 2). Here, in a footnote, he feels the need to define what he means by 'theoretical truth', yet 'theory' and 'truth' themselves are never analyzed and defined in the book. What is a

theory for Wray? It is unstated whether he takes it to be a list of propositions or, maybe, a structure of models. When he argues *against* the realist's appeal to the truth of successful theories, and *for* his own interpretation instead, it is unclear what we are being asked to reject and accept. It is unstated whether, for example, Wray holds to the syntactic interpretation (logical positivists), the semantic interpretation (van Fraassen 1980) or some other interpretation of theoretical truth (and falsity). Wray may respond that answering these questions would introduce exactly the kind of metaphysical inference that he rejects (see, e.g., p. 205). However, what are we to make of a supposedly philosophical account in which the central concepts are undefined? It is difficult to decisively agree or disagree with such an insubstantial thesis. Furthermore, as is standard amongst anti-realists, no definition or explanation is given of *reality* – *qua* the phenomena – in the book. More distinctly, we are never told exactly how to understand key scientific notions, such as *experiment*, *measurement* and (novel) *prediction*. In addition, Wray strangely neglects to specify where he draws the controversial observable/unobservable distinction so foundational to van Fraassian style anti-realism.

My second concern relates to the concept of *knowledge*, mentioned above. Wray stresses the role of the personal choices of scientists (e.g., pp. 195–98), but it is not clear what he takes *choice-making* itself to entail. Again, he may object that he need give no account of *deep* (therefore, metaphysical) psychology; a *shallow* sociological (or behavioral) explanation suffices (pp. 148–49).[2] However, as before, the question is what are we to make of an account that places emphasis on some notion, but then gives no definition or explanation of the very thing we are supposed to agree or disagree about. In response, perhaps Wray could opt to expand on van Fraassen's (2002)

[2] I draw on Kitcher's (1993) distinction between deep and shallow explanations here.

somewhat underdeveloped *voluntarist epistemology* (see, however, Chakravartty [2017] for a recent attempt). Wray's overarching account of science has agents, theories and (to a lesser degree) the phenomena as the central moving parts. However, none of these key notions is ever explicitly defined or explained. This leaves Wray with only a historical, descriptive story to tell of scientists going about their daily routines.

Now, the third issue becomes whether this is indeed an *explanation*. Much has been written on the topic of scientific explanation; it is beyond the scope of this review to give the topic proper coverage. I will merely suggest that to any reader of the book, not immersed in the intricacies of the scientific realism debate, Wray's use of the term 'explanation' is rather counter-intuitive. Unfortunately, as before, he is somewhat vague on what exactly he takes an explanation to be. This is odd, given that he evidently considers his account to have great explanatory power. Wray plainly allows that an analogy (to biological evolution) can be an explanation, but beyond that, it seems that an explanation involves a shallow, historical description of scientists, their interests and so on. Conventionally, if one requests an explanation of some process, one is asking for something deeper: an underlying explanans that accounts for how or why the overall process does what it does. Our common understanding of what is involved when giving an explanation does not gel with the book's presentation. Wray recognizes that

> realist critics are correct to insist on having more details about the mechanism responsible for the selection of our best theories in science. But indicating a need for further development is quite different from insisting that the explanation is bankrupt. (pp. 168–69)

Wray's selectionist explanation is, of course, not entirely false, but it lacks depth. The explanation is not bankrupt, but it has a very shallow portfolio, shall we say. It seems to be only a partial account at best.[3]

(7) Besides the secondary texts already cited, the following two authors contribute significantly to the relevant topics. Fahrbach (2011, 2017) argues convincingly that, due to the increasing precision and exponential growth of scientific activity, scientists are 'epistemically privileged' to some noticeable *degree* over past scientists. Harker (2010) links scientific progress – *viz.* ongoing comparative theoretical success – to approximate truth. Those parts of successful theories responsible for scientific progress (including those that describe unobservables) warrant inference from success to approximate truth of those parts. Wray critically discusses both these authors in his book. However, he somewhat misrepresents their views, and first-hand engagement with their work should provide a more equitable summation.

To conclude, as intimated above, Wray's carefully structured arguments are convincing in many ways. The argument from underconsideration, the argument against theoretical values and the argument from false theory prediction, in particular, carry much weight. As I have suggested, only the argument for a selectionist explanation for the success of science and the argument from research interests appear problematic in certain respects. In the former case, Wray's explanation is conceptually insubstantial; in the latter, he owes a substantial account of choice-making. One can, I am sure, avoid speculative metaphysics without giving up on explanatory power. Resisting scientific realism need not entail accounting for science merely in terms of *shallow*, descriptive sociology. Perhaps we can be *deep* anti-realists.

[3] See also French (2017) who urges those at the shallow end on a continuum of degrees of metaphysical commitment to venture into deeper waters.

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