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CONSTRUCTIVE EMPIRICISM AND EPISTEMIC MODESTY: RESPONSE TO VAN FRAASSEN AND MONTON

ABSTRACT. Bas van Fraassen claims that constructive empiricism strikes a balance between the empiricist's commitments to epistemic modesty – that one's opinion should extend no further beyond the deliverances of experience than is necessary – and to the rationality of science. In "Should the Empiricist be a Constructive Empiricist?" I argued that if the constructive empiricist follows through on her commitment to epistemic modesty she will find herself adopting a much more extreme position than van Fraassen suggests. Van Fraassen and Bradley Monton have recently responded. My purpose here is to contest their response. The goal is not merely the rebuttal of a rebuttal; there is a lesson to learn concerning the realist/anti-realist dialectic generated by van Fraassen's view.

1. INTRODUCTION

According to Bas van Fraassen's Constructive Empiricism (CE), science "aims to give us theories which are empirically adequate; and acceptance of a theory involves as belief only that it is empirically adequate" (van Fraassen 1980, p. 12), where empirical adequacy only requires accurate representation of observable phenomena. Van Fraassen insists that CE is not an epistemological position but a view about science (Ladyman et al. 1997, p. 318; van Fraassen and Monton 2003, p. 405–406). But van Fraassen is an empiricist, which standpoint[1] encourages a certain epistemic modesty: one's opinion should extend no further beyond the deliverances of experience than is necessary. The empiricist is also committed to the rationality of science. "Necessary" consequently becomes "necessary in order to make sense of science as a rational endeavor." CE then emerges as the view of science that best strikes a balance between the commitments to epistemic modesty and to science's rationality; it "finds an equilibrium point between the two extremes, thus respecting both desiderata" (van Fraassen and Monton 2003, p. 407).

In "Should the Empiricist be a Constructive Empiricist?" (Alspector-Kelly 2001; SECE hereafter) I argued that if the

constructive empiricist follows through on her commitment to epistemic modesty she will find herself adopting a much more extreme position than van Fraassen suggests. In the course of responding to a different challenge in a recent paper,[2] van Fraassen and Bradley Monton contest that argument. My purpose here is to contest their response. The goal is not merely the rebuttal of a rebuttal; there is a lesson to learn concerning the realist/anti-realist dialectic generated by van Fraassen's view.

2. TWO DESIDERATA

CE postulates an aim for science that is intended to satisfy two desiderata. It should make sense of what scientists actually do. And it should involve no further commitment beyond the deliverances of experience – on the scientist's part, presumably, but also on the part of those who take science to be successful in pursuit of its aim – than is required by satisfaction of the first desideratum. Van Fraassen and Monton (2003) suggest that my critique of CE in Alspector-Kelly (2001) failed to take the significance of the first desideratum into account.

> Alspector-Kelly suggests that the belief that a theory is empirically adequate goes well beyond the deliverances of experience, and hence by the epistemic modesty of empiricism that belief too should be rejected. Instead one could just believe, for example, that a theory is true in what it says about what has actually been observed, or that a theory is true in what it says about what is, has been, or will actually be observed [the view Peter Railton called 'Manifestationalism' (Railton, 1990)].
> If Alspector-Kelly is right, then the central term 'observable' could be replaced with 'observed' ... But Alspector-Kelly is not right. He pays insufficient attention to the fact that constructive empiricism is a doctrine about the aim of science. The doctrine that science aims to give us theories which match what we actually observe is incompatible with what it is virtually universally agreed about scientific practice (van Fraassen and Monton 2003, p. 407).

The universal agreement in question is that scientists "perform experiments pushing beyond the limits of what has been observed so far" (van Fraassen and Monton 2003, p. 407), an activity in which scientists would not engage if their interest were only in theory that squares with what has been observed.

I had, in fact, already responded to this in SECE, albeit in a footnote (Alspector-Kelly 2001, fn. 3). The footnote concerns a paper by Gideon Rosen in which Rosen makes essentially the same point on van Fraassen's behalf that van Fraassen and Monton make against me (Rosen, 1994, pp. 161–163). Archeologists concerned with the truth about (observable) Etruscan urns, whether observed or not, will

dig in the last uninspected patch of ground, but would not do so, Rosen points out, if their only concern was accommodation of the observed. Making sense of that activity therefore rules out manifestationalism as an account of science's aim.[3]

In SECE I proposed a counterexample to Rosen-*qua*-van Fraassen, one that van Fraassen and Monton do not address. Construe science's aim as discovering the truth about everything observable from the moment humans[4] began to make observations to the moment they cease doing so. Scientists will, then, dig in that last uninspected patch, and continue in like manner for as long as there are scientists. That aim therefore makes as much sense of science as does CE, with fewer commitments beyond the deliverances of experience. Indeed, since experience cannot deliver information if nobody exists to whom it can be delivered, such a restriction of science's aim would be an obvious move in light of a commitment to epistemic modesty.

The beliefs involved would be a gerrymandered lot, and a collection whose membership is, for us, uncertain. We have some idea when humans appeared on the scene (and so concerning what prior epochs we will reserve judgment); but who knows when our time on the world's stage will end? The constructive empiricist's commitments, however, are similarly disorderly: observables exhibit no natural kinship among themselves outside of their relation to our perceptual capacities.[5] And we cannot now be certain which entities are observable by us, because we have more to learn about our own perceptual abilities, and because our future selves might conceptualize entities – and so candidates for observability – whose possible existence we have yet to contemplate.

There are also many other candidate aims to consider. We know that we will never survey the fiery interior of Alpha Centauri with the unaided eye. We can categorize such entities – ones the viewing of which would place human observers in environments that entail instantaneous death, say – in a way that will clearly indicate why scientists will, as it were, leave *this* uninspected patch of ground alone. We therefore need not construe science as aimed at representing those entities correctly, notwithstanding their observability in van Fraassen's sense.

We also know that we will never, now and hereafter, observe past phenomena. Our relation to the past is and will always be a matter of inference from record, remains and memory. Set science's aim as maximization of present and future accuracy regarding observables; we would still unearth that patch of ground. The resulting commitments will, of course, vary with the passage of time in a way that they

do not if the aim is empirical adequacy. But that is a mark in its favor from the point of view of epistemic modesty. Our epistemic relationship to the phenomena itself changes with the passage of time, after all: when a phenomenon occurs, our experience's relation to it is (or can be) direct; but experience can afterward only give us traces as clues for us to make of what we can. And as for our knowledge of the future, that too is a matter of correctly reading portents. Perhaps the aim of science is only to maximize the observable-now, epistemic modesty forbidding more.

The reader can no doubt concoct many other such aims for science, each of which still makes as much sense of scientific experimentation as does CE while manifesting greater epistemic modesty. The empiricist's commitment to the rationality of science – at least as that commitment is seen as satisfied by the constructive empiricist[6] – is a rather light burden, it turns out. It does not leave CE as the position that best respects epistemic modesty and scientific rationality.

The point is worth emphasizing. There are a great many phenomena that are observable in van Fraassen's sense that we now know we will never observe, and so that we can only know indirectly. We know this about them as well as – in some cases, better than – we know it about the entities van Fraassen classifies as unobservable. So the constructive empiricist's commitment to scientific rationality can no more license belief in them – or setting science's aim as their accurate representation – notwithstanding her commitment to epistemic modesty than it can with respect to unobservables.

Van Fraassen and Monton might be tempted to respond that the aim of accurately representing the observable while humans exist fails to appropriately restrict candidate theories. The theory that the sun will sing "Auld Lang Sine" after the last human expires is, for example, compatible with this aim; but it is not a theory that a scientist will seriously contemplate. However, it is compatible with the aim of empirical adequacy that it is not molecular constitution that underlies the observable characteristics of water but instead the manifestation of telekinetic powers wielded by dolphins. And no scientist would seriously consider that theory either. CE does no better a job of isolating serious theoretical contenders.

3. MAKING SENSE OF "MAKING SENSE OF EXPERIMENTATION"

I have so far assumed – as I did in SECE – that CE does, in fact, make sense of experimentation, in that it enjoins scientists to

"actualize" as many observable phenomena as possible. But does that really make sense of experimentation?

Cyclotrons are very expensive, and take a lot of time, space, and effort to build. The observable products of all this prodigious exertion are scattering patterns, images of lines intersecting other lines. Those products are observables, and they would not be actualized if the cyclotron were not built. But was it worth it? It surely does not make much sense of the activities of the physicists and engineers who built the cyclotron to say that they did all that only to realize those patterns. There are so many other unactualized observables waiting in the wings to be realized at far less effort, after all, if the aim is to check as many of a theory's observable predictions as possible. We could assign a scientist the task of deriving predictions concerning the likely effect on a light bulb of turning a particular switch on and off, checking those predictions, and doing it all again and again, to the end of her days.

Perhaps the idea is that we are interested in generating entirely new *kinds* of observable phenomena in the lab, the creation of which will throw light on similar phenomena naturally occurring outside the lab, and so "extend our knowledge of what the world-wide natural observable phenomena are like" (van Fraassen and Monton 2003, p. 408). We have, however, already turned on many a light bulb, and so know what to expect in similar cases.

But scattering patterns – that is, those predictable by theory rather than those drawn by my three-year-old – are only produced by cyclotrons and other particle accelerators. The grant-application proposing construction of a cyclotron only to determine whether the theory correctly predicts phenomena generated by cyclotrons would be a pretty hard sell. And even if the phenomenon in the lab also appears outside – where "phenomenon" is now taken to refer to types of events grouped according to their observable characteristics – this will hardly account for the tremendous resources poured into scientific experimentation. Patterns of colored lines, numbers marching across computer screens, wavy lines on oscilloscopes and so on – the observable phenomena created in the lab – are pretty uninteresting when contemplated solely in terms of their phenomenal characteristics.

The physicists overseeing the cyclotron's construction will, of course, tell a very different story: they have no interest in the scattering patterns themselves, except insofar as those patterns provide information about the sub-atomic. This, the constructive empiricist will insist, is the scientist's "immersion" in the "scientific world-picture" (van Fraassen 1980, p. 82), an immersion to be recommended for its payoff in empirical success.

I leave it to the reader to decide whether an aim for science at such direct variance with the purposes that the physicists expressly affirm for their cyclotron really counts as one that makes sense of scientific behavior. But notice that this is an entirely different attempt to make sense of science. The first was that scientists conduct experiments to verify the theory's predictions about observable phenomena that would not be created without the experiment. The second, now being appealed to, is that the creation of the esoteric phenomena that sophisticated experimentation produces contributes to the development of empirically successful theories.

So understood, the scientist's interest in the experiment is not to test a theory's prediction of this particular scattering pattern or of patterns of a visually similar kind. But nor is it the testing of the theory's accuracy concerning the sub-atomic. Experimentation, so conceived, is part of the theory-development phase rather than the testing phase: it is an important aspect of a complex human endeavor that, for whatever reason, has demonstrated its ability to generate theories that are successful in their empirical predictions overall. Van Fraassen and Monton point out that "competition is one of the keys to success" (2003, p. 408) in science, and the creation of new phenomena that the competitor has a hard time accounting for is a sensible tactic, perhaps even at the price of building a cyclotron.

But why not take the success to which competition is key as success in generating theories that accurately represent the *observed*, rather than the *observable*, phenomena? Recall again the constructive empiricist's account of why "immersion" in the scientific world-picture is recommended: it conduces to the development of empirically adequate theories. The manifestationalist can play the same game. Science has vastly improved its track-record in getting the phenomena that end up being observed right. One of the keys to that improvement, it seems, has been the development of theories whose models include considerably more than is observable. *And another key* has been the creation of certain esoteric phenomena within the lab[7] that the theory must accommodate. We should not, the constructive empiricist insists, take the first key to suggest that scientists are concerned with the accuracy of the unobservable aspects of their models. Nor should we, the manifestationalist can similarly insist, take the second key to suggest that scientists are interested in the accuracy of the models' observable but unobserved aspects either.

The pragmatic gambit – interpreting aspects of scientific theorizing that seem directed at exploring the unobservable (or unobserved) as a kind of game the playing of which is "really" directed at something

else entirely – is a dangerous tool. So long as some external goal for science can be identified that science seems to succeed at – that of accurately representing van Fraassen's experiences tomorrow afternoon, say – the gambit can be employed, all the putative evidence to the contrary having been shunted inside the scientific game and rendered merely pragmatic from the outside. If that is the tool that the constructive empiricist uses to implement her epistemic modesty, she will find it shaving off far more commitments than will be to her liking.

4. CONCLUSION

In sum, the empiricist committed to both epistemic modesty and scientific rationality is not thereby brought to CE as the equilibrium point between them. If the goal is to generate an account of science that maximizes epistemic modesty insofar as it can be maximized consonant with a commitment to scientific rationality, then positions involving far less commitment than does CE will be favored. If, on the other hand, epistemic modesty is not so imperative a commitment as to rule out positions like CE that violate it, then the constructive empiricist is in no position to argue that realism is ruled out for the same violation. Contrary to popular assumptions concerning CE, therefore, the constructive empiricist has no argument to show that realism is not a respectable position for an empiricist to adopt.

Critics, I think, implicitly concede that CE is the most reasonable position from the empiricist standpoint – that it deserves its reputation as contemporary heir to the empiricist legacy – and that therefore empiricism itself is an inherently antirealist orientation. This impression is bolstered by the fact that CE shares the inherent instability of many of its empiricist predecessors. Arguments offered in its favor, when taken to their logical conclusions, lead to far more severe (and unattractive) positions than the empiricist endorses. But attempts at mitigating those arguments in response end up licensing those more liberal standpoints that she intended to exclude, leaving her more constrained position unmotivated.

I nevertheless do not think that this spells the end of empiricism in general, but only of van Fraassen's antirealist version of it. CE is shaped by his conception of the information that experience brings and its limitations. There are, however, other ways to underscore the epistemic significance of experience than van Fraassen's, ways that are less hostile to the wealth of information concerning worlds

beyond the naked eye that empirical science has brought into view. But that is a story for another time.[8]

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NOTES

[1] Empiricism is, van Fraassen contends, a "stance", a constellation of attitudes that does not reduce to a doctrine. See van Fraassen (1993, 1994, 2002). See Alspector-Kelly (2001) for discussion.
[2] van Fraassen and Monton (2003, p. 407). They are responding primarily to James Ladyman's challenge (Ladyman, 2000) that CE's concept of observation presupposes objective modality.
[3] I should make it clear that Rosen does not endorse this response. "If there are solid grounds for regarding experience alone as a source of information about the world, why compromise?...On the other hand...[i]f it is a constraint on an adequate philosophical stance toward science that it brand what scientists *do* as rational, why should it not also have to brand the way scientists typically *think* as rational, even if that thinking involves wild departures from the principles of empiricism?" (Rosen 1994, p. 163).
[4] Or the epistemic community in general, if it should so widen in the future as to include non-human animals, machines or aliens.
[5] Nor is clear that they exhibit kinship even in light of our perceptual capacities. See Alspector-Kelly (2004).
[6] See the next section for explanation of the qualifier.
[7] Such phenomena have little in common except when characterized as the scientist will characterize them, namely, as phenomena that will reveal a great deal about the sub-atomic realm she is interested in investigating. The scientist must, it seems, be immersed very deeply indeed in her world-picture.
[8] See Alspector-Kelly (2004).

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