

A MOUSE IN THE WAINSCOTING, AN INFERENCE TO EMPIRICAL ADEQUANCY†

JOHN MILANESE

ABSTRACT. This paper argues that van Fraassen's own skepticism of abduction is at odds with his thesis that empiricists ought to be constructive empiricists.

1. MOTIVATING THE DISCUSSION

One might wonder, *what* is the task of science? For the philosopher offering a *realist* conception of science, it is not enough to say that scientists construct theories which work instrumentally for making accurate predictions and strong bridges; the incredible success of modern science seems to suggest that scientists are not only getting something right about the world, but that their theories are *true*, or at least approximately so. Thus, the realist holds that the task of scientists is to make true claims about the world, and further that one ought to believe that the best theories of the mature sciences are at least approximately true.

However, some philosophers, who observe that successful scientific theories of the not-so-distant past are now known to be false, seek an account of science which both takes seriously the success of science while abstaining from the thought that science must be discovering truths about the nature of things. Bas van Fraassen offers such a conception, a view he calls *constructive empiricism*, according to which scientists try to develop theories which are *empirically*

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adequate, that is, theories which stand up to all past, present and future observational evidence. On this view, there is no required belief about whether the theories of the mature sciences are true, though there is an independent fact about the truth-value for every theory. The task of science then, according to constructive empiricism, is to arrive at empirically adequate theories.

There are at least two projects van Fraassen hopes to accomplish concerning constructive empiricism. The first, which has drawn the most of his colleagues' attention, is to deliver a coherent and acceptable alternative to realism. His second project, which Alspector-Kelly notes has received far less attention, is to argue that philosophers who subscribe to an empiricist epistemology (broadly speaking) ought to be constructive empiricists, since it is the position which seeks to satisfy to the greatest extent the success of science while at the same time not taking overindulgent leaps and bounds beyond the preview of experience. In this paper, I examine this thesis in light of van Fraassen's critique of abduction and argue that his critiques, if sound, undermine his ability to hold on to his thesis that empiricists ought to be constructive empiricists.

2. UNOBSERVABLES AND INFERENCE TO THE BEST EXPLANATION

At the heart of van Fraassen's constructive empiricism and his critique of realism are two crucial and related distinctions: whether the entities of a theory are *observable* or *unobservable*, and whether one is warranted in *believing* as opposed to *accepting* a theory. He says that an entity is observable just in case if a human was in its presence under normal conditions, then that human could have sense experiences of it unaided by instruments of science. So, for example, the entities of theories in astronomy are generally observable, such as planets and galaxies, since if a human were near them, they could be seen with the unaided eye. Thus, these entities are unobserved but observable.

However, the entities of particle physics are unobservable. When a successful theory posits unobservable entities, van Fraassen holds that one should at most *accept* the theory, that is, believe the theory to be empirically adequate. Importantly, van Fraassen thinks that if a successful scientific theory contains only observable entities, then belief in its truth is permissible; as he puts it, “when the hypothesis is solely about what is observable, the two procedures amount to the same thing. For in that case empirical adequacy coincides with truth” [7, p.72].¹

A famous example van Fraassen offers of this lining-up between belief in the truth and empirical adequacy of a theory is an everyday inference to best explanation (IBE):

“I hear scratching in the wall, the patter of little feet at midnight, my cheese disappears - and I infer that a mouse has come to live with me... For the mouse *is* an observable thing: therefore ‘There is a mouse in the wainscoting’ and ‘All observable phenomena are as if there is a mouse in the wainscoting’ are totally equivalent; each implies the other” [7, p.20-1].²

This inference to *there being* a mouse, which one might say ‘does the same work’ as inferring to the empirical adequacy of the mouse-theory, is contrasted with what van Fraassen would consider unwarranted inferences to unobservables. In his article *To Save the Phenomena*, van Fraassen provides an example of what such an unwarranted inference to truth would look like, using Newton’s theory of mechanics and gravitation:

“It is part of [Newton’s] theory that there is such a thing as absolute space, and that motion is relative to absolute space... He offered, in addition, the hypothesis (his term) that the centre of gravity of the solar system is at rest in absolute space. But, as he himself

¹As quoted in Richmond [5, p. 88-9].

²As quoted in Ladyman, Douven, Horsten and van Fraassen [2, p.312-3].

noted, the appearances would be no different if that centre were in any other state of constant absolute motion” [6, p.83-4].

The idea here is that if the center of gravity of the solar system was at rest, then if Newton’s theory were empirically adequate, then so would any other theory which is Newton’s theory plus the center of gravity of the solar system having some positive constant velocity. So, it seems that one could not be justified, on the basis of even all (possible) observational evidence, in inferring that *there is no* such absolute velocity. Thus, even if Newton’s theory were the *best* explanation of *all* observable phenomena, the inference from this to its *truth* is illicit. Therefore, one ought only (at most) *accept* Newton’s theory - believe that the theory is empirically adequate - and abstain from any further belief about the truth of the matter.

One might be tempted to conclude from these two examples that what van Fraassen wants to do is simply deny that one can use inference to the best *unobservable* explanation. In fact, Psillos [4] argues this. Calling ‘horizontal IBE’ inference to unobserved but observable entities and ‘vertical IBE’ inference to unobservables, Psillos notes that van Fraassen holds a “selective attitude towards IBE, [since] van Fraassen does not doubt horizontal IBE. ...In other words, van Fraassen claims that IBE does not warrant belief when the potential explanation of the evidence stretches to the unobservable world” [4, p.34]. Psillos, calling into question van Fraassen’s arguments against the realist’s abduction to claims about unobservables, points to the previously quoted ‘mouse in the wainscoting’ example as evidence of van Fraassen’s only partial denial of IBE.

Psillos turns to consider two arguments van Fraassen gives in *Laws and Symmetry* [8] for thinking that vertical IBE is illicit: the ‘best of the bad lot argument’ and the ‘argument from indifference.’ The best of the bad lot

argument is the following. Say \mathcal{T}_1 is the best among a range of theories which have been proposed as explanations for some evidence e . One cannot say that this best theory approximates the truth of e , since \mathcal{T}_1 “may well be the best of a bad lot. So, in order for the advocate of IBE to argue that IBE leads to truth, ...he must assume that ‘nature predisposes us to hit on the right range of hypotheses” [8, p.142-3].³ Psillos agrees, at least in part. He observes, however, that a similar argument applies to constructive empiricism: who can say whether the empirically adequate theories fall outside our currently proposed set of theories? The idea here then is that van Fraassen would have to assume a similar ‘Principle of Privilege’ in order to justify a belief in a current best theory being empirically adequate. I will simply note at this point that that it is not clear that van Fraassen disagrees, though I will return to this point in the next section.⁴

The ‘argument from indifference’ is this: since there are an infinite number of theories which explain e at least as well as \mathcal{T}_1 but are inconsistent with \mathcal{T}_1 , it follows that it is very improbable that \mathcal{T}_1 is true. Psillos sympathizes with a comment made by Armstrong’s about this line: “I take it that van Fraassen is having a bit of fun here” [4, p.43].⁵ Though Psillos harshly criticizes this argument, he also comments that if van Fraassen’s intuition was sound, one would be left wondering why the constructive empiricist could ever hope to have a justified belief in some current best theory \mathcal{T}_1 being empirically adequate. Psillos’ idea here is that there could be an infinite number of theories which

³As quoted in [4, p.36-7].

⁴The worry if van Fraassen agrees becomes how he could then argue why empiricists ought to be constructive empiricists instead of skeptics.

⁵See Armstrong, D. “Discussion: Reply to van Fraassen,” *Australian Journal of Philosophy*, 66 (1988), p. 228.

are observationally *different* than \mathcal{T}_1 in some *unverifiable* way. For example, a theory \mathcal{T}'_1 which is observationally equivalent to \mathcal{T}_1 except for “in the mouth of the first black hole to the west of our galaxy there is a white raven, ...or that $[\mathcal{T}'_1]$ involves *gruesome* predicates” [4, p.45]. Thus Psillos is calling into question how the constructive empiricist could ever negotiate the inference from a theory being the current best explanation of all phenomena to that theory’s empirical adequacy.

Though Psillos seeks to undermine van Fraassen’s critique of the realist’s use of vertical IBE, it is most noteworthy for the purposes of this paper to simply note that if van Fraassen’s arguments from the bad lot and indifference are sound, then these points hit just as hard against the constructive empiricist as they do the realist. This is because they call into question the justification of horizontal IBE as well. By his argument from the bad lot, van Fraassen has it that the empiricist would be unwarranted in believing that an empirically adequate theory falls inside the range of proposed theories, unless they already assumed something like a ‘Principle of Privilege.’ It then becomes unclear how the empiricist would ever agree to hold the belief that some best theory is empirical adequate. Similarly, the argument from indifference leads one to wonder why an empiricist would agree to commit to some best theory being empirically adequate when it is entirely possible that the theories which are really empirically adequate cannot be further differentiated from some current best theory. We can see Psillos then as warning the empiricist about a ‘symmetry’ between van Fraassen’s arguments against inference to best *explanan*’s truth and inference to best *explanan*’s empirical adequacy.

I take it that Psillos sees van Fraassen as facing the following dilemma. Certainly van Fraassen wants to argue that realism and its reliance on vertical

IBE - inference to truths about unobservables - not only seems less desirable for the empiricist, but is epistemically problematic. Yet, constructive empiricism is similar to realism in that it just replaces talk of truth with talk of empirical adequacy, and more than that, the two ‘processes’ amount to the same thing when theories are of observables. Now, either van Fraassen opts to reject just vertical IBE (to unobservables) or all forms of IBE. If van Fraassen opts for the second horn, then “commitments to unobserved but observable entities (e.g. the mouse in the wainscoting) would be left unsupported,” and, after all, rejecting all forms of IBE would not mesh with his previously held claim that inference to best explanation’s truth and inference to the best explanation’s empirically adequate converge on theories about observables and are ‘equivalent’ in this case [3, p.370].

Assuming then that van Fraassen wants belief in empirical adequacy and belief in truth to converge on theories only about observables, it seems that van Fraassen is committed to denying only vertical IBE, inference to an unobservable *explanans*. In arguing for this being the case, however, the constructive empiricist, who replaces the realist’s talk of truth with talk of empirical adequacy, finds themselves left to deal with the same criticisms van Fraassen posed to realism.

Calling into question van Fraassen’s arguments against the realist’s vertical abduction, Psillos took it for granted that van Fraassen was not skeptical of IBE in general and thus committed to the first horn of the dilemma, pointing to the previously quoted ‘mouse in the wainscoting’ example as evidence of this. However, when Psillos’ article was met with a united front of criticism in a response article by Ladyman, Douven, Horsten and van Fraassen [2], Psillos was ‘surprised’ to learn that van Fraassen accepts the *second* horn of the dilemma:

he is skeptical of *any* form of IBE. I suppose Psillos was surprised because, for example, “positing extinct animals is surely reasonable” in explaining the presence of fossils, and yet according to van Fraassen, though extinct animals are observable (albeit unobserved), one is not warranted in connecting them with fossil evidence to a belief in the empirical adequacy of a palaeontological theory in which they are posited, *especially* if the animals are believed to have walked the earth on the grounds of their being the best *explanans* of the presence of fossils. Psillos simply observes that at this point “we are left with a poor epistemology,” which, strangely enough, seems to be acknowledged in the response article to Psillos: “Three of the four authors of this paper see the issue as possibly raising serious problems for constructive empiricism and for van Fraassen’s steps toward a new epistemology” [2, p.320].

At one point in van Fraassen’s response, he appears to ‘retrench,’ seeking a slightly less skeptical stance on horizontal IBE. He explains that although horizontal IBE is an everyday inference form, vertical IBE is different because “we do not routinely introduce new ontological commitments. In the case of the earlier example, *we already believe that mice exist*” [2, p.316]. However, as Psillos points out, positing an “extinct animal type” *does* introduce new ontological commitments, though such an observable posit could well be the conclusion of a horizontal IBE [3, p.371]. The result is that van Fraassen, in an attempt to prevent his own arguments against IBE from undermining the ability to *accept* a theory, has found his alternative to realism teetering on the brink of a collapse into skepticism. His reattempt to legitimize horizontal IBE on the grounds that this type of abduction does not posit new ontological commitments fails, since evidently it is just false that horizontal IBE is different from vertical IBE in this respect.

3. SELLING CONSTRUCTIVE EMPIRICISM TO THE EMPIRICIST

I now turn to the examine more directly the question of whether van Fraassen can insist that the empiricist ought to be a constructive empiricist. It is noteworthy that this thesis is put slightly differently in the response article by Ladyman *et al*: “van Fraassen, however, is content to argue that *empiricists* should not be realist but should adopt constructive empiricism, because realism has no more *empirical* goods to offer than his position has” [2, p.316-7]. This weaker version of the thesis seems a likely one. There are at least *prima facie* reasons why the empiricist, who holds that all knowledge of real existence is grounded in experience, ought to choose constructive empiricist *over realism*. For if the empiricist is asked to choose to believe either that the successful theories of the mature sciences are true (at least approximately), or empirically adequate, it seems that *stronger* claim of the realist, as Alspector-Kelly puts it, “admits of no *additional test*” against any evidence than would a belief in empirical adequacy [1, p.415]. The *prima facie* case for constructive empiricism over realism then is that there is no clear reason why the realist thesis could ever “enjoy *more* empirical support” than a belief in empirical adequacy [1, p. 415]. Thus, upon inspection of the empiricist’s epistemic resources, there are no additional *grounds* available for the empiricist to affirm the stronger realist claim instead of the constructive empiricist’s, *unless*, of course, the empiricist succeeds in grounding vertical IBE as a justified inference.

In arguing that empiricists ought not be realists but instead constructive empiricists, it no longer suffices for van Fraassen to just provide an alternative to realism, as he is commonly understood as doing; it is not enough to say ‘realists can still be realists.’ For if vertical IBE remains unscathed, an empiricist, who might be committed to some strong account of explanation,

might well think it worth the risk in arguing for the *a priori* stronger claim that some theory is not only empirically adequate but true, though the theory posits unobservables. It therefore seems that van Fraassen must provide reasons for thinking that at least vertical IBE is problematic. If van Fraassen fails at this task, then the empiricist may very well keep good reasons for wanting to infer to beliefs in unobservables, as some famous empiricists have (Alspector-Kelly cites Reichenbach and Salmon as names that come to mind) [1, p.422]. It is contentious, evidently, that empiricism implies a suspension of all judgment concerning unobservable entities, and so van Fraassen is committed to defending this claim - hence, the argument from the bad lot and indifference.

I have argued that these charges van Fraassen raises against vertical IBE and realism are equally worrisome for the constructive empiricist. If my arguments are sound, the issue then is that the more convincing van Fraassen's critique of inference to unobservables, the less likely the empiricist's hope at being able to eventually *accept* some theory, no matter its success - put stronger, to believe a theory is *acceptable* would be unreasonable *in the same respect* as the realists' belief of truth through vertical IBE. Why then ought the empiricist adopt constructive empiricism, instead of something more skeptical? Alspector-Kelly has this criticism in mind when he says that "there are a variety of logically weaker positions that [constructive empiricism] that are also compatible with all the empirical evidence that we will ever have," citing such examples as having the belief "in the empirical adequacy of the theory only from the moment humans began to make observations to the moment they cease doing so," or more skeptical yet, asserting "the observed evidence itself" [1, p.416].

I think van Fraassen might reply by saying that constructive empiricism strikes a balance between capturing as much as possible of the ‘success of science intuition’ touted by the realist, while also providing a more epistemically responsible alternative. The selling point of constructive empiricist then might be that one gets access to many of the same benefits the realist enjoys by simply substituting the realist’s commitment to a theory’s truth with its empirical adequacy, while letting go of the ‘supererogatory’ commitments.⁶ Yet, to convince the empiricist that they ought to be constructive empiricists rather than realists, van Fraassen must give reasons for thinking that the extra cost of inferring to truths about unobservables is indeed costly, swaying the empiricist away from the (allegedly) illusory benefits of realism. As Gideon Rosen says, “the trouble is that for many of us our realism does not seem to depend on arguments against the various more skeptical stances [and so] the mere availability of van Fraassen’s view does not give me reason to go over to it.”⁷ So, although van Fraassen’s thesis that empiricists should be constructive empiricists requires giving arguments like those from the bad lot and indifference. But these arguments, if they are sound, suggest that it is not epistemically permissible to *accept* a theory. Thus the very arguments which van Fraassen would like to affirm turn prospective constructive empiricists towards a more skeptical position.

Another response available to van Fraassen is to argue that constructive empiricism is *not* committed to the permissibility of accepting a theory. In fact, Ladyman et al offers such a reply, up-selling constructive empiricism as a

⁶Alspector-Kelly credits van Fraassen’s use of this appropriate term; see [van Fraassen, Bas. “Empiricism and the Philosophy of Science,” in Churchland and Hooker 1985, p.255].

⁷As cited in Alspector-Kelly [1]; see [Rosen, Gideon. “What is Constructive Empiricism,” *Philosophical Studies* 74 (1994): p.159] for the original quote.

descriptive account of the task of science as opposed to a normative epistemology: “In fact, [van Fraassen] nowhere says that empirical adequacy is within the reach of science - nor that it is not. It is simply an issue van Fraassen does not address and need not address in order to make his point against the realist” [2, p.317]. While this reply may do some work in arguing the claim that empiricists should be constructive empiricists *instead* of realists, it does little to prove the general thesis that empiricists should be constructive empiricists *tout court*.

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