

Review

Reviewed Work(s): Images of Science by P. M. Churchland and C. A. Hooker

Review by: Howard Duncan and Andrew Lugg

Source: *Canadian Journal of Philosophy*, Vol. 18, No. 4 (Dec., 1988), pp. 795-804

Published by: Cambridge University Press

Stable URL: <https://www.jstor.org/stable/40231626>

Accessed: 10-09-2021 10:19 UTC

---

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



JSTOR

Cambridge University Press is collaborating with JSTOR to digitize, preserve and extend access to *Canadian Journal of Philosophy*

## *Critical Notice*

P.M. CHURCHLAND and C.A. HOOKER, eds. *Images of Science*. Chicago: University of Chicago Press 1985, Pp. viii + 309.

Nobody has done more in recent years to put the scientific realist on the defensive than Bas van Fraassen. Prior to the appearance of his argument for empiricism in *The Scientific Image*, philosophers of science tended to think of realism as being the only reasonable successor to logical positivism. Now, however, the situation appears much less clear-cut. While there are undoubtedly just as many proponents of realism as there have ever been, many fewer assume that their position can be easily established. Thanks to van Fraassen, empiricism in the philosophy of science no longer seems merely oldfangled and unsophisticated. His brand of 'constructive empiricism' poses a deep and serious challenge, one that no self-respecting realist can afford to ignore.<sup>1</sup>

*Images of Science* is one result of this shift in perspective. In Part I, ten scientific realists of various persuasions take on the task of defending the view that science provides us with information about the realities behind the appearances as well about the appearances themselves. Without questioning van Fraassen's skill and ingenuity in defending constructive empiricism and in challenging realism, they firmly reject his claim that justified existential commitment covers observable matters of fact and nothing else. In Part II, van Fraassen replies by expounding the epistemology that informs *The Scientific Image* and by

---

1 In what follows we take empiricism in van Fraassen's sense as involving the claim that the correct epistemic attitude towards theories about unobservable entities is one of 'acceptance as empirically adequate' rather than one of 'belief as true.' On this version of the doctrine, we are never justified in believing in the existence of entities postulated by deep-structure theories since transduction, inference to the best explanation and all other argument strategies designed to get us beyond the domain of the observable are epistemologically suspect. Moreover, we propose to follow van Fraassen in distinguishing empiricism from instrumentalism and other views that interpret scientific theories non-literally.

commenting on some of his critics' arguments. Needless to say, he takes their objections to prove much less than they suppose and he ends up reasserting his conservative approach to existential commitment.

Half of the essays in *Images of Science* are directly critical of the argument of *The Scientific Image*. Churchland takes issue with van Fraassen's views concerning observation and the role of pragmatic virtues such as simplicity and explanatory power. Gary Gutting insists that the limits of observability are wider than van Fraassen allows. Ian Hacking attempts to undermine the empiricist viewpoint by analysing how microscopes are used in actual scientific practice. Alan Musgrave maintains that the constructive empiricist is encumbered by the 'observation/theory distinction' and other 'philosophical excess baggage.' And Mark Wilson attempts to lure van Fraassen into the realist camp by carefully examining his view that the limits of observation are a subject for empirical investigation rather than for philosophical stipulation. For these authors, then, constructive empiricism is fatally flawed and realism remains the only viable alternative to logical positivism.

The remaining essays are primarily devoted to articulating versions of realism immune to van Fraassen's critical onslaught. Richard Boyd provides a characteristically subtle defense of his brand of realism against van Fraassen's strictures. Clark Glymour offers realist suggestions for appraising scientific explanations. Brian Ellis attempts to show that realism can be preserved by replacing the correspondence theory of truth with the pragmatic theory. Ronald Giere argues for what he calls 'constructive realism,' the view that models of science (as well as their empirical substructures) correspond more or less to reality. And Clifford Hooker insists that his 'evolutionary naturalistic realism' is superior in numerous respects to 'constructive empiricism' (and other forms of realism). Here the suggestion is that while the criticisms of realism that van Fraassen raises in *The Scientific Image* are undoubtedly interesting, there remain important versions of the doctrine that they do not touch.

The editors are right to suggest that the essays in *Images of Science* contribute considerably to the current debate about realism. The newcomer and the expert are indeed both provided with a great deal to ponder. But the book could also have been much better. A number of authors succumb to the temptation of dressing up simple points in high-flown technical terminology, and the general reader would certainly have been helped by an introductory essay outlining the main features of van Fraassen's position. (In lieu of the latter, Gutting's essay may be consulted for an account of some of the main philosophical issues involved and section III of Hooker's essay for some of the technical details.) Moreover, one can only regret that van Fraassen sometimes leaves significant objections unanswered. Had he confronted his

critics more directly and been less reticent about repeating arguments rehearsed elsewhere, the intricacy of his position would have been much more apparent. As it is, many issues are left dangling and the critics are all too often allowed to have the last word, deservedly or not.

In what follows, we focus on what we take to be the lynchpin of constructive empiricism, namely its account of epistemologically significant evidence. This means overlooking many intriguing aspects of van Fraassen's development of his viewpoint and many interesting observations that his critics adduce in support of their alternative positions. In particular, we do not propose to engage in what could be an instructive comparison of Boyd's confident endorsement of realism with Churchland's more tentative defence of it. Nor do we intend to consider van Fraassen's anti-reductionism, his pragmatic theories of explanation and modality, or his advocacy of the semantic conception of theories. The nub of the issue between the realist and the constructive empiricist lies in their differing views about observation and we shall not be able to find our way out of the impasse that we presently seem to be in without sorting this out.

For van Fraassen, as for any empiricist, the limits of significant evidence coincide with the limits of sense experience. Where he differs from earlier thinkers is primarily in the attention that he devotes to the question of the nature of these boundaries and how they ought to be scouted. For one thing, he is uncompromising in his insistence that experience should be taken to encompass the observable as well as the actually observed, his view being that theories about observable things may be accepted as true even though the things that they are about have never been observed. And for another, he emphasizes that the realm of the observable is delimited by the unaided sensory capabilities of members of the epistemic community and hence that it is properly investigated by physiologists and psychologists.<sup>2</sup> In van Fraassen's eyes empiricism so understood has the double advantage of being both faithful to scientific practice (because it is attentive to what science deems to be observable) and epistemologically sound (because it is antithetical to wanton speculation).

But is not such a view unjustifiably anthropocentric? According to a number of contributors to *Images of Science*, it is wrong to take the relevant sense of observation to be 'observation by members of the

---

2 This latter feature of van Fraassen's approach has been widely welcomed by realists, many of whom favour some version of naturalized epistemology. Indeed Wilson hazards the suggestion that 'many readers will have found this view of "observation" one of the most appealing ideas to be found in the first half of *The Scientific Image*' (223).

actual epistemic community.' Surely, they argue, our understanding of observation should not be constrained by contingent facts about our perceptual capabilities. Were we to encounter individuals equipped with electron-microscopic eyes (Churchland, 43, and Musgrave, 205) or individuals capable of directly observing things that we cannot (Gutting, 129), we could not dismiss their 'observations' as being without epistemological significance. Here the contention is simply that the relevant epistemic community comprises all who make observations, whether their observations are like ours or not.

Some contributors also challenge van Fraassen's position concerning the epistemological status of dinosaurs, unseen stars and other unobserved but observable things. In their view, his acceptance of the existence of such entities sits poorly with his insistence that the theory of the electron should be regarded as empirically adequate rather than as true or approximately true (see, e.g., Gutting, 129-30, and Musgrave, 205-6). For them, to go along with commonsense about dinosaurs and unseen stars is to accept possible observations as epistemologically significant, and to accept this is to acknowledge that the existence of some theoretical entities may be better confirmed than the existence of some observable things. In Musgrave's words, 'it is a curious sort of empiricism which sets aside the weight of *available* evidence on the ground that a casual observer might one day see [an as yet unobserved] mouse or a yeti, while the scientist can never see (but only detect) his electrons' (206).

Third, there is the question of where the limits of observation should be fixed once the issue is posed in the naturalistic way favoured by van Fraassen. While welcoming his move away from the traditional acquaintance view of observation, several commentators suggest that he does not go far enough or that he fails to recognize the full consequences of his position. How, they ask, can one possibly accept naturalism without conceding that detection is a form of observation and hence that the detection of electrons may on occasion warrant belief in their existence? As Giere puts the point, 'the operative scientific notion ... is not human observability but scientific *detectability* [and] if the requirement of empiricism is only that our scientific claims be restricted to aspects of our models that are, in the broad sense, *detectable*, then one major difference between constructive empiricism and constructive realism is removed' (82). (See also Musgrave, 206, and Wilson, 227.)

Finally, it is important to keep in mind the objection, well-developed in the present volume by Hacking, that technologically-assisted observation is no less observation for being technologically assisted. Van Fraassen's argument notwithstanding, we can be sure that certain microscopic entities exist if only because they can be observed using microscopes. The important question, argues Hacking, is not whether

such observations are epistemologically acceptable but whether they are real or merely artifacts of the instrumental apparatus. Furthermore, if we adopt an empiricist stance, how can we possibly account for the microscopist's use of tiny grids as references for the reidentification of objects? In Hacking's view, to think that what is being seen is something other than a grid – given that this was constructed (by means of a photoreduction technique) to serve as a reference – is to invoke 'a malign Cartesian demon of the microscope' (146).

If nothing else, such considerations indicate that naturalism and empiricism do not go together as a matter of course. When we examine science from a scientific point of view, our empiricist qualms fall by the way and the manner in which scientific practice happens to be conducted becomes crucial. If science tells us that certain individuals can make observations that we cannot, we would be well-advised to accept the new evidence that they are able to furnish. If scientists invoke similar kinds of evidence when studying dinosaurs and electrons, we should countenance the possibility of their establishing the existence of the latter no less than the former. If the relevant notion of observation is 'scientific observation,' detectability is presumably what matters, not observability using the five senses. And if we are confident that we understand the principles underlying the manufacture and use of electron microscopes, radio telescopes and the like, only misplaced skepticism can prevent our acknowledging that we do actually see with them. Contrary to van Fraassen, then, the case for realism seems to be open-and-shut.

When these arguments are examined from the perspective of the constructive empiricist, however, they appear considerably less compelling. There can be little doubt that the scientific attitude is more realist than empiricist, and it may well be argued that scientific methodology is fundamentally realist in character. But this no more refutes van Fraassen than Brownian motion refuted Mach, van Fraassen's primary aim being to clarify the question of the epistemic credentials of science (as opposed to the question of what can be legitimately believed once it is taken for granted). What interests van Fraassen is the justification of belief as such, not the justification of it from within the confines of science. As he reminds us, there is a sharp distinction to be drawn between epistemology and the study of scientific methodology, accepting and believing theories being two different things (see especially 246-7).

This noted, it is unsurprising that van Fraassen takes the objection that his view is anthropocentric to rest on an ambiguity (257). For either we accept humanoids with electron-microscopic eyes as members of the epistemic community, in which case 'we have already broadened the extension of *us*, and what is observable to them is observable,' or

we do not accept them, in which case we must make use of our science to check the reliability of their findings and ‘the extension of “observable” is, *ex hypothesi*, unchanged’ (256-7). The problem is that the realist critic conflates these two ideas and ends up incorrectly supposing that our concept of observability can be broadened without modifying our present conception about who belongs to the epistemic community. The fact of the matter is that the envisioned humanoids are epistemologically on a par with the ‘usual combination of human with electron microscope’ (257) and the relevant sense of observation is ‘observation for us.’<sup>3</sup>

Likewise the argument from the existence of dinosaurs and unseen stars appears far less persuasive when considered from the standpoint of constructive empiricism. Van Fraassen is well aware that his position becomes implausible when considerations of observability are held to be without special epistemological significance. In fact, he considers the question of whether epistemic commitment should be circumscribed by considerations pertaining to observability or by what has actually been observed to be ‘the crucial hinge or focal point of epistemological controversy’ (296). Nonetheless, he is convinced that his position is the only epistemologically reasonable one since further restricting the limits of experience results in extreme skepticism. ‘I could not,’ he tells us, ‘envisage a nonextreme rational policy that would make [the extent of legitimate belief] independent of our opinions about the range of possible additional evidence [i.e. accessible possible evidence in addition to actual evidence]’ (254).

Furthermore, how clear is it that observation ought to be extended to include detection? In answer to Musgrave’s rhetorical question ‘Can one truly say that one has detected an object without also believing it to be true that the object really exists?’ (206), van Fraassen would insist that one certainly can for the simple reason that detecting an object is no guarantee of knowing what it is. After all, the epistemic value of any observation that we might make depends essentially on our understanding what it is that we are observing, a point underlined by Wilson when he remarks that ‘a *checkable fact* needn’t be an especially *believable fact*’ (240). Obviously, it is one thing to detect something when one reacts to light, quite another to know that what is being detected

---

3 Van Fraassen also dismisses the problem of the ‘faithful dog and supersonic whistle’ (which turns on the observation that dogs can hear things that we cannot: see 256). Here he again digs in his heels and argues that the objection misses the mark since any conclusion about the ability of dogs to hear whistles rests on our previously having accepted certain theories about sound spectra and canine physiology as empirically adequate.

is a stream of photons. The detections of photons that we make by opening our eyes provide no evidence whatsoever for the current theory of light.

Nor, finally, do accounts of the use of microscopes, radio telescopes and the like pose much of a problem for the committed constructive empiricist. Van Fraassen can admit that microscopists attend to the question of whether phenomena are real or artifacts of their experimental apparatus yet still insist on the importance of considering whether and to what degree it is reasonable to take the entities that they deem to be real to be in fact real. Hacking may be right to hold that it is in the scientist's best interests to leave philosophy aside, but this does not exempt the philosopher from examining the epistemological credentials of what science purports to provide. Moreover, it is difficult to fault van Fraassen for alerting us to the fact that Hacking assumes without argument that photoreduction techniques result in microscopic grids (298) or for reminding us that 'the argument of the grid' is of limited scope, 'an electron [being] so unimaginably different from ... the little grid Hacking can hold with tweezers' (254).

What is puzzling is not so much that van Fraassen replies to his critics in the way that he does but that they devote so little attention to the epistemological foundations of his position. All too often they forget that the main concern of empiricists like van Fraassen is to curb speculative excess and to promote epistemic propriety. Had they cast their minds back to the discussions of the seventeenth and eighteenth centuries, they would have better appreciated the philosophical depth of his position. For empiricists have always proceeded anthropocentrically, and until recently at least they have generally taken possible experience to be epistemologically significant as a matter of course.<sup>4</sup> Van Fraassen is only the latest exponent of a perennially appealing doctrine. Even though his concerns are primarily philosophical whereas those of earlier empiricists were largely scientific, his position is no less difficult to dislodge.

Of course, none of this is likely to make much of an impression on scientific realists. To the contrary, in drawing attention to the empiricist underpinnings of van Fraassen's position, we would appear to be confirming their worst suspicion, namely that van Fraassen is wedded to old-fashioned philosophy. For the realist, the epistemological worries that motivate van Fraassen are now academic while his concern for epistemic integrity is fully taken care of by science itself. To

---

4 Recall that Berkeley accepted that things exist when not observed provided that they are observable and that Hume accepted the existence of the missing shade of blue.



profess a kinship with the French and German writers on science around the turn of the century and with fourteenth-century nominalists – as van Fraassen does (300) – is only to exacerbate the problem, the shaky character of their approaches having been demonstrated time and time again. What we need to do, the realist will argue, is put van Fraassen's qualms aside and get on with the business of understanding science using all the means available to us, scientific ones included.

This attitude is perhaps most clearly expressed in the present volume by Hacking. His implicit assumption is that the closer we attend to the details of scientific practice, the less concerned we will be with traditional philosophical concerns. Here, as in his recent book *Representing and Intervening*, his main aim is to change the subject and to get us to focus on what might be called internal philosophy of science. This is why he emphasizes the distinction between what is real and what is merely an artifact and why he stresses the actual ways in which microscopes are calibrated and deployed. Nothing could be further from his mind than explaining the success of science as a whole. Contrary to what van Fraassen suggests (see p. 298), his interests are not epistemological in any traditional sense.<sup>5</sup>

But is not this just the point? One cannot solve the problems that exercise the empiricist by changing the subject. Van Fraassen's uneasiness may be ill-founded, even jejune, but it deserves to be recognized and attended to. What we would like but do not find in the present volume is a delineation of the sources of the constructive empiricist's worries and why they should not be taken seriously (if this is indeed the case). No doubt such an investigation would involve a re-examination of much that has transpired in modern epistemology, but nothing less is likely to do the trick. In particular, the empiricist's fundamental principle that only experience provides information surely requires further examination, not because it is wrong but because it is so often understood in misleading ways. In this area, as in so many others, one must be wary of commonsense masquerading as deep philosophical truth.

Perhaps what is most in need of reappraisal in this regard is the picture of the epistemological subject as an isolated centre of consciousness and more generally what Wilson refers to as the 'metaphysics of

---

5 Here it should be noted that the issue of whether there is a non-circular, global justification of science – which van Fraassen takes to be especially important (see especially 258-63) – is largely irrelevant. Indeed, it is even debatable whether Boyd means to provide a justification of this sort, his position being far closer to the kind of naturalism often associated with Quine than van Fraassen allows.

acquaintance' (240).<sup>6</sup> It is indeed tempting to suppose that sense experience functions as the pivot around which everything epistemological turns, but it is far from clear that such a conception can be thought through in detail or that it provides us with anything that cannot be obtained by other means. Certainly much more needs to be said to clarify the traditional 'acquaintance view' than van Fraassen says in his reply to Wilson. In emphasizing that we 'understand Russell's distinction between acquaintance well enough in ordinary examples' (303), he does little to further the discussion, except possibly to remind us of the checkered history of the notion of acquaintance as developed by Russell and his followers. This old warhorse may be able to do all the work that the constructive empiricist demands of it but it is hardly something that can be taken for granted.

To his credit, van Fraassen explicitly recognizes that the plausibility of his view rests on his being able to supplement it with a satisfactory epistemological foundation (see especially the first half of his reply, entitled 'Sketch for an Epistemology'). As he sees the matter, the analysis of the concepts of belief and opinion are 'a proper part of the rise of scientific philosophy' and 'the death of epistemology, preached in such different ways by Rorty and Churchland, is only the fire in which the phoenix is being reborn' (247). Maybe so. But a theory of belief of the sort that van Fraassen envisages, which makes probability theory the logic of judgment, is undoubtedly a long way off and one may be forgiven for being wary. Moreover, how clear is it that any alternative set of concepts that van Fraassen may manage to forge will be more useful than the set that we already have?

Van Fraassen is surely right to insist that 'the philosophical justification of the scientific method is a morass, dead end, a false ideal, and a scandal' (263). The crucial question, however, is whether the kind of epistemology that he envisages is any different. If not, there is no point pursuing constructive empiricism, nor for that matter most of the versions of realism defended in this volume. We should instead attend to the question of how the terrain can be negotiated without the support that philosophy has been traditionally taken to furnish.

---

6 Wilson takes van Fraassen to have 'no truck with the acquaintance treatment of observability' (230) and to be committed instead to elucidating the observational content of theories 'internally' (222), which is a position that van Fraassen now rejects (see his reply to Wilson). This does not, however, detract from his point that 'many antirealist sentiments ultimately derive from [the acquaintance treatment of observability]' (230), still less from his observation that van Fraassen is often torn between an acquaintance conception of observation and a more sophisticated 'internalist' one.

But equally, the bankruptcy of epistemology is not something that can be simply assumed, however fashionable it may be to do so. As van Fraassen recognizes and takes to heart far more than many of his critics, the issues involved broach some of the deepest topics in philosophy. Failure to confront these matters head-on can only result in more of the 'empty strutting and posturing' that van Fraassen so rightly deplores (255).

*Received May, 1987*

HOWARD DUNCAN  
56 Beechmont Cres.  
Gloucester, ON  
Canada K1B 4A8

ANDREW LUGG  
University of Ottawa  
550 Cumberland  
Ottawa, ON  
Canada K1N 6N5