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# On an Inconsistency in Constructive Empiricism\*

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I show that van Fraassen's empiricism leads to mutually incompatible claims with regard to empirical theories. He is committed to the claim that reasons for accepting a theory and believing it are always identical, insofar as the theory in question is an empirical theory. He also makes a general claim that reasons for accepting a theory are not always reasons for believing it irrespective of whether the theory is an empirical theory.

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According to Bas van Fraassen, the aim of science for the realist is to get true theories, so that to accept a theory is to believe the theory is to be true. He contends that the aim of science, according to a constructive empiricism, is to obtain an empirically adequate theory. A theory is empirically adequate if and only if what the theory says about the *observables* is true.

**1. Observability and Equivalence Thesis.** Observability plays a key role in van Fraassen's empiricist framework. So he must distinguish the

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observable from the unobservable. Assuming that a distinction exists between the observable and the unobservable, the obvious consequence of his thesis about empirical adequacy of a scientific theory is that truth and empirical adequacy coincide for theories that are entirely about observables. van Fraassen writes, “When the hypothesis is solely about what is observable, the two procedures [i.e., the realist and the anti-realist] amount to the same thing. For in that case, empirical adequacy coincides with truth” (van Fraassen 1980, 72). van Fraassen adds, “For remember, I *equate* the acceptance of a theory with the belief that it is empirically adequate” (1980, 20, emphasis added). I call (1) van Fraassen’s *Equivalence thesis*.

- (1) Acceptance of a theory is one and the same as believing it to be empirically adequate.

Consider a theory about observables alone. Suppose that the theory is true. Then what it says about observables is true, hence it is empirically adequate. On the other hand, suppose that it is empirically adequate. Then what it says about observables is true. The whole theory is about observables alone, hence the theory is true if and only if it is empirically adequate. Thus, van Fraassen concludes that reasons for believing a theory about observables as empirically adequate are also reasons for believing it as true and vice versa. It then follows based on van Fraassen’s *Equivalence thesis*—i.e., acceptance of a theory is one and the same as believing it to be empirically adequate—that believing such a theory to be true is also one and the same as accepting it. Hence, reasons for believing a theory solely about observables to be true are also one and the same reasons for accepting it as empirically adequate.

**2. Information Thesis.** We may accept a theory for several reasons: It may be more informative than the others in a given domain, or some features of it may make it more likely to be true than its rivals. Following van Fraassen, I call the first virtue of the theory “informational virtue” and the second one “confirmational virtue.” van Fraassen argues that there is an ongoing tension between informational and confirmational virtues of a theory; they cannot be jointly maximized. If I maximize informational content of a theory, then it will detract from its likelihood of being true. Conversely, if I maximize the likelihood of its being true, its informational content goes down. I call (2) the *Information thesis*.

- (2) There is an inverse relation between the informational content and the probability of a theory.

On the strength of the *Information thesis*, van Fraassen argues (1989,

1991) that reasons for accepting a theory are not always reasons for believing it to be true. Suppose T1 is a theory in a domain of discourse. Now T1 is extended to T2 which gives more information about the same domain of discourse. van Fraassen contends that, assuming all things being equal, if T2, the new theory, gives more information about the world than T1, the old theory, but not vice versa, then we have more reasons to accept T2. But, by giving more information about the world than T1, it becomes more liable to be falsified than T1. In other words, on van Fraassen's account, if we have more reason for accepting T2 because it is more informative than T1, then we possibly have less reason to believe T2 than T1, because the former has a greater chance of being false than the latter. Hence, some reasons for accepting T2 are not the reasons for believing T2.

The general result, that the informational content of a theory is inversely related to the likelihood of its truth, is applicable to all kinds of theories, no matter whether they are theories about observables or unobservables. For the sake of argument, consider two theories about observables. Suppose T1 and T2 are both theories entirely about observables in a given domain, where T2 is more informative than T1. The consequence of the *Information thesis* and van Fraassen's theory of acceptance is that even though both T1 and T2 are theories about observables, we accept T2 over T1 because T2 is more informative. However, this is not a reason to believe T2 over T1 as T2, being more informative, is less likely to be true.

Contrast this with the conclusion of the Section 1, "Observability and Equivalence Thesis." There we found that for van Fraassen, the reasons for accepting a theory are one and the same as reasons for believing a theory if the theory is entirely about observables. So, the two consequences of van Fraassen's views amount to holding the following joint assertions concerning empirical theories:

- (A) In case of purely empirical theories, reasons for accepting a theory and believing it are always one and the same.
- (B) For all theories, including empirical theories, reasons for accepting a theory are not always reasons for believing it.

**3. Responses to Objections.** Two attempts can be made to block the inconsistency. One attempt is that van Fraassen might be helped by distinguishing motivating reasons from justificatory reasons. To appreciate this point, consider the reconstruction of my argument. (1) *x* is van Fraassen's reason for accepting that P. (2) van Fraassen believes that P if and only if he accepts P (further he knows this). (3). Therefore, *x* is van Fraassen's reason for believing that P. Here, (3) is taken to be

an analogue of (A). It is alleged that van Fraassen is talking about motivating reasons (reasons in the motivational sense) both in (1) and (3), while he is talking about justificatory reasons in (2). Hence, it seems that I am mistaken in confusing justificatory reasons with motivational reasons. This objection attributes to van Fraassen a view which is clearly false, namely that van Fraassen is concerned with motivational reasons. In fact, he is solely concerned with justificatory reasons. Van Fraassen argues that when we accept the theory rather than another in a domain, we accept it based on justificatory reasons. For him, justificatory reasons include both epistemic and non-epistemic reasons for theory choice. This objection further claims that obviously justificatory reasons cannot but be reasons for belief. If one construes constructive empiricism in this way, then one's construal turns out to be inconsistent with van Fraassen's position. Justificatory reasons, according to van Fraassen, are reasons for action which are what, in the end, van Fraassen takes some reasons for acceptance to be. In short, the first proposal for defending constructive empiricism fails for two reasons. First, van Fraassen talks about justificatory reasons for theory acceptance, not motivational reasons. Second, justificatory reasons not only include epistemic reasons, they also include reasons for action, which are called non-epistemic reasons for acceptance.

The second attempt to save constructive empiricism is that one could doubt the *Information thesis* from which one derives (B). But it is the inescapable result of the argument about probability that van Fraassen (in Earman 1983) uses for deriving this thesis, i.e., the probability of the entailed proposition cannot have less probability than that of the entailing one<sup>1</sup>. Since this is a truth about logic, this truth holds for all theories, empirical and non-empirical theories alike. Hence we reject the second proposal because it commits us to violate the probability calculus. Based on these considerations, I reinstate my conclusion that constructive empiricism is forced to accept mutually contradictory theses concerning scientific theories.

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1. Consider  $T2 = T1 \ \& \ E$ , where "E" is the evidence.  $T2$  is more informative than  $T1$  and also the former entails the latter. The fact that  $T2$  is more informative than  $T1$  is a reason for accepting  $T2$ , but it is not a reason for believing  $T2$  to be true. Hence, some reasons for acceptance are not reasons for believing.