
Realist Responses to Bas Van Fraassen (Musgrave & Boyd)

Recall (from Lecture X)

*“Science aims to give us theories that are empirically adequate; and acceptance of a theory involves as belief only that it is **empirically adequate.**”*

-Bas Van Fraassen, CC1998 (1069)

“[A] theory is empirically adequate **exactly** if what it says about observable things and events in the world, **is true**...such a theory has at least **one model** that all actual phenomena fit inside...**all the phenomena; these are not exhausted by those actually observed**, nor even by those observed at some time, whether past, present, or future.”
(ibid.)

- BVF holds on to the notion of ‘literal’ due to general issues stemming from realism¹ viz. philosophy of language, meaning (recall his definition of realism obtained from Hilary Putnam & Michael Dummett:
- In short, (contra anti-realists like Kuhn, Longino, etc., as well as realists like Kitcher) BVF assents to a “correspondence theory of truth.”

*“Science aims to give us, in its theories, a **literally true** story of what the world is like; and acceptance of a scientific theory involves the belief that it is true. This is the correct statement of scientific realism.” (1066)*

- BVF hedges his epistemics by arguing that the *aim* of science of empirical adequacy, (regardless of *individual aims* of practicing scientists). Epistemically, this presupposes the scientist *accept* such theor(ies) (distinguished from mere belief):
- BVF accuses Grover Maxwell of an equivocation (Recall Maxwell’s somewhat metaphysically and semantically naïve argument that theoretical/observational distinction of terms are theory dependent.)²

¹ Recall Lecture IX, the issues of truth, meaning, and representation as evinced in the issue of the realism versus anti-realism question certainly transcends this question as it appears in the philosophy of science.

² Hence Maxwell’s puzzle reduces to the unproblematic notion that “observable” is a *vague predicate*, i.e. functioning like ‘bald,’ or ‘heap’ (in which a precise logical distinction can’t be made between it and its negation. “[P]redicates in a natural language are almost all vague, and there is [certainly] no problem in their use; only in formulating the logic that governs them.” (1073)

Boyd	Musgrave
<p><i>Primary Bases of Objection:</i> <i>Epistemological & Methodological</i></p>	<p><i>Primary Bases of Objection:</i> <i>Metaphysical & Methodological</i>³</p>
<ul style="list-style-type: none"> Recall (Lecture IX) Boyd advertises his realist methodology as a ‘<i>virtuous circularity</i>’: Confirmation Theory underwrites the reliability of the (inevitable) <i>theory-dependence</i> of scientific method. Analogy with Celestine’s Scholastic theology: “<i>Lex orandi est lex credenti</i>”, ‘believe what is necessary for liturgical practice’” (translates to) “believe what is necessary to rationally reconstruct scientific practice.” (32) “The philosophical methods are not conceived of as <i>prior to</i> scientific methods in any sense...the reliability of the realist’s <i>philosophical</i> methods depends on logically and epistemically contingent facts about the about the actual scientific tradition...in insisting that the methods of the philosophy of science should be the methods of science...[a]pparently both in science and in the philosophy of science we must make do with Celestine...principles. For the philosopher who—in the name of science—objects to the <i>a priorism</i> of [Thomistic reasoning, this may not be an entirely unwelcome conclusion.” (33) Contra Van Fraassen’s notion of theory as subservient to experimental design: “The problem is not how background theories can <i>suggest</i> to us alternatives to...how we can design experiments which test proposed theories...The problem is why the alternatives...have a privileged epistemic status... 	<ul style="list-style-type: none"> BVF’s constructive realism (with its talk of ‘literal truth’ and its abstract model-therotic notion—also noted in Arthur Fine [see n. 27, CC1998, 1207]) appears to be ‘closet’ or weak-willed realism anyway! “van Fraassen firmly [is] in the realist camp as the far the <i>interpretation</i> of scientific theories is concerned.” (CC1998, 1089) (Recall the <i>TN(v)</i> models of Newtonian space objection, discussed in Note2 Lecture X., 1092-1093.) Re: <u>Simplicity (is it just a pragmatic virtue, as BVF maintains?)</u> Concedes partially to BVF, since “Nature is simple is a metaphysical principle that is hopelessly vague to boot...[though] I would not see this [vagueness] as the demise of scientific realism for...I cannot see why the realist is barred from invoking a pragmatic virtue to deal with the problem of empirical equivalence just as the constructive empiricist does.” (1094) Re: <u>Theory/Observation</u> (Recall BVF’s criticisms of Musgrave). “[H]e [BVF] wants to give the [theory/ observation] distinction an <i>epistemological</i> significance: humans should never believe to be true a theory about what they cannot observe; they should believe such theories only to empirically adequate, to tell the truth about what they can observe.” (1095) Yet, recall Note 1 Lecture X. Is BVF’s ‘subtle difference’ (between truth

³ Recall from **Lecture I: Metaphysics** is the systematic investigation of questions and concepts dealing with notions like ultimate or the (presumably) **fundamental nature of reality**. **Methodology** is the systematic investigation of questions and concepts dealing with notions of **method**, in the philosophy of science, **methodology** is the theory of (scientific) **method**.

⁴ The *Conjunction principle* is something we’ll see that Arthur Fine strongly attacks

<p>[e]xperimental design is ‘exceedingly difficult’ as van Fraassen says, but it would be substantially less difficult if one could legitimately test theories... [by] good scientific practice [which] requires...that one accept... suggestions that follow <i>by induction from the accepted body of theories</i>. What the empiricist apparently cannot do is to explain why it is <i>this</i> solution...which is instrumentally reliable.” (20-21)</p> <ul style="list-style-type: none"> • Unity of Science (Conjunction Principle⁴): Accepting the truth of (empirically adequate theories T and T' entails that on accepts the truth of $(T \& T')$. “The realist has no difficulty in explaining the...successful applications of the conjunction of T and T' ...[on the other hand] the antirealist ... [in general] cannot explain .. why ... confirmation of T and T' should constitute any significant evidence for the empirical adequacy <i>at all!</i> ...What van Fraassen’s insistence on the role of proper conjunction in the formulation of the unity principle indicates....the epistemic appropriateness of the inductive unity of science is something only a realist can explain.” (22-23) • Re: BVF’s ‘Darwinian mechanism’ : “The analogue to the issue of efficiency of the mechanism of biological selection is the issue of whether or not the important methodological principles which govern theory testing...of scientific practice can be explained without postulating theoretical knowledge. But these are just the theory-dependent mechanisms by which the problem experimental artifacts and of ‘sampling’ are solved, and...only a realist can explain 	<p>and empirical adequacy, <i>as he defines it, in the end difference which makes a difference?</i>)</p> <ul style="list-style-type: none"> • Empirical adequacy seems to evince a ‘philosophical schizophrenia.’ [According to BVF’s treatment] “scientists should believe in electrons or whatever while they are immersed in their scientific work, but should become agnostic about everything they cannot observe once they leave their laboratories.” (1097) • <u>Dethrone explanatory ‘essentialism’ renders BVF’s pragmatic virtues a non-starter</u>⁵ “Another realist response...is to demand that our deepest explanatory principles should somehow be ultimate or self-explanatory..[But] I think that essentialism and the intuitions which lie behind it should are to be rejected. And I think it is one of Newton’s chief claims to methodological fame that he was among the first to see this.” (1103) • <u>(Recall Boyd’s ‘virtuous circularity):</u> “[I]s van Fraassen right to say the ‘the interpretation of science, and its methodology, are two separate topics’ ? I think it preferable to have an interpretation of science which harmonizes with methodological pronouncements.” (1106) • <u>Causal notions of explanation (Mill, Mackie’s INUS conditions, what we’ll examine later in the course)</u> Though contextual factors can enter into such causal accounts, nevertheless (note discussion of contrast class in <i>why</i> questions) “[c]ontextual complications have little to do with explanation in science, if van Fraassen’s own ‘workaday examples’ are anything to go by.”
--	---

⁵ Recall BVF’s invoking Dummett’s criteria of realism. Essentialists argue that explanations, for instance, can be fixed ultimately by a finite set of *necessary and sufficient* conditions. Such predicates are the *essential properties* of what one is trying to explain.

<p>their contribution to the instrumental reliability of scientific methods.” (26-27)</p> <ul style="list-style-type: none"> • Re: BVF’s ‘pragmatic virtues’ : “The ‘rules’ governing...inductive inferences...are themselves theory-determined [though] [t]here no significant pretheoretical rules of inductive inference at either the theoretical or the observational level in science. [Recall Hawthorne’s <i>B</i> conditions as <i>H</i> – independent]...[Nevertheless] the realist investigation of the problems of experimental design shows...that theoretical considerations are merely pragmatic or heuristic [as BVF believes] dictates the absurd conclusion that the inductive inferences about observables which scientists make are without justification.” (29-30) 	<p>(1108)</p> <ul style="list-style-type: none"> • “The orthodox account says that explanations are arguments [recall Lecture II] ...which ...<i>contain descriptions, but are not like them.</i>” (1108) • “I can only repeat a hackneyed point. The realist values theoretical science as an attempt to <i>understand</i> the world...[t]he constructive empiricist, browbeaten...by the positivist emphasis on prediction... jettisons understanding and seeks to drive a wedge between theoretical science and commonsense... I conclude, undogmatically I hope, that realism emerges a little bloodied but unbowed from its encounter with constructive empiricism.” (1110-1111)
--	---

What about a ‘Constructive Realism’ Instead?
Ian Hacking “*Experimentation and Scientific Realism*”

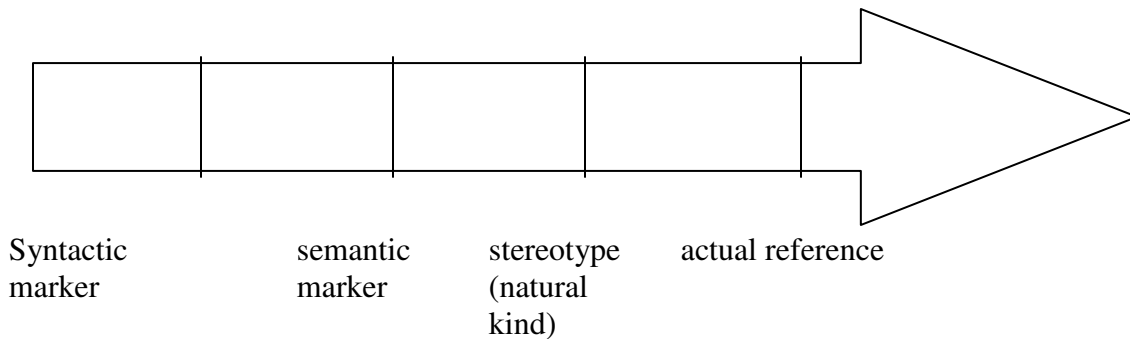
“No field in philosophy of science is more neglected than **experiment**...histories of science have become histories of theory...we lack even a terminology to describe the many varied roles of experiment.” (CC1198, 1153)

“Experimenters bring into being phenomena that do not naturally exist in a pure state....what physicists after the 1870s began to call ‘effects’ : the Compton effect, the photo-electric effect, etc.” (1154)

“In this paper I leave aside questions of methodology, history, taxonomy and the purpose of experiment in natural science. I turn to the purely philosophical issue of scientific realism (both entity and theory)...There is no agreement on the precise definition of either.” (ibid.)

- Experimenters (though perhaps harboring divergent theoretical accounts) all ascribe to a ‘self-vindicating realism’ (that can’t be dismissed as some sociological condition....it’s philosophically noteworthy.)

Hilary Putnam's theory of meaning and its answer to Kuhn's incommensurability



Meaning as a 'vector'

- Toy example: "Water" => **noun/physical object/clear colorless liquid/ H₂O**

"We need not accept the fine points of Putnam's account of reference in order to thank him for providing a new way to talk about meaning....Twenty-five years ago the experimenter who believed that electrons exist, without giving much credence to any set of laws about electrons, would have been dismissed as philosophically incoherent. We now realize it was philosophy that was wrong, not the experimenter." (1156)

- Experimentation as acts of representing and intervention

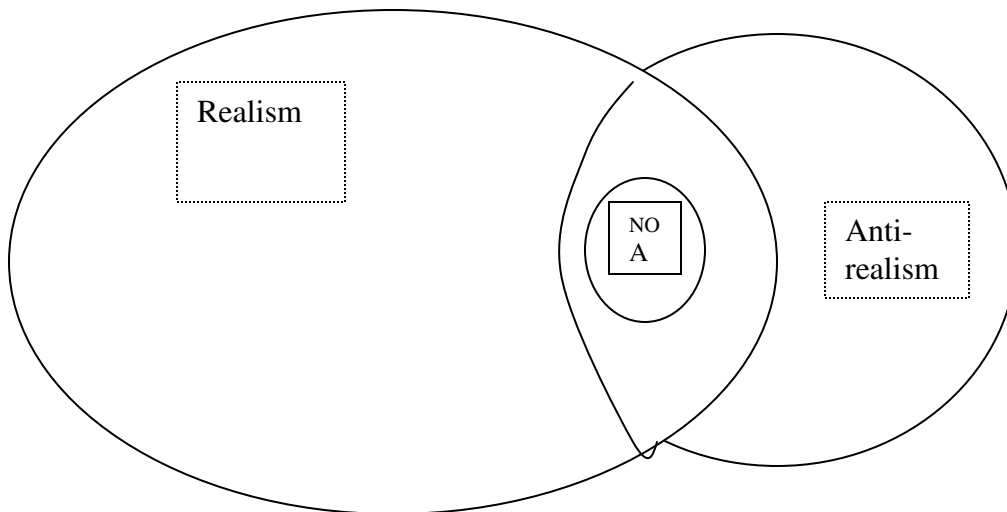
"Francis Bacon, the first and last philosopher of experiments, knew it well...the experimenter is convinced of the reality of entities some of whose causal properties are sufficiently well understood that they can be used to interfere *elsewhere* in nature...My own obsession with technology that manipulates objects is, of course, a 20th- century counterpart to positivism and phenomenology. **Their proper rebuttal is not a restriction to a narrower domain of reality...to what can be positivistically 'seen' (with the [unaided] eye), but an extension to other modes by which people can extend their consciousness.**" (1157)

"We are completely convinced of the reality of electrons when we regularly set out to build—and often succeed in building—new devices that use various well understood causal properties of electrons to interfere in other more hypothetical parts of nature." (1158)

"The experimentalist does not believe in electrons because,...they 'save the phenomena'. On the contrary, we believe in electrons because we use them to create new phenomena..." (1164-1165)

Arthur Fine's 'non-Realism' ("Just say no! to the realism/anti-realism debate)

The "Natural Ontological Attitude" (NOA)



"The source of the realist's failure is endemic to the methodological level, infecting all his[or her] arguments...repeated question-begging move from explanatory efficacy to the truth of the explanatory hypothesis." (1192) (*contra Boyd's virtuous circle*)

"Physicists have learned to think about their theory in a rightly non-realist way, and doing just that has brought about the most marvelous predictive success in the history of science." (1195)

NOA: A common-sense (WYSIWYG)

"I think that NOA has only this to say. If you believe that guessing based on some truths is more likely to succeed than guessing pure and simple, then if our earlier theories were in a large part true and if our refinements conserve the true parts, then guessing on this basis has some likelihood of success...[On the other hand] NOA takes to heart the great lessons of 20th century analytic and Continental philosophy, that there *are* no general methodological or philosophical resources for deciding [realism/anti-realism debates]" (1202-1203)