
THE SYMBOLIC UTILITY
AND HEURISTIC VALUE
OF SCIENTIFIC REALISM.
A PRAGMATIC DEFENSE

ARMANDO CÍNTORA

ABSTRACT. A pragmatic defense of scientific realism is offered; this vindication hinges on the likely superior heuristic force of a realist stance, a superiority that outcomes from the symbolic value that the search and attainment of truths has for many scientists.

KEY WORDS. Scientific realism, agnostic empiricism, symbolic utility, heuristic value, observables, unobservables.

Nothing in science is going to *compel* the adoption of a realist attitude towards theories [...] But this leaves open the possibility that some form of scientific realism, while strictly speaking unnecessary, is nonetheless the *most reasonable* position to adopt.

... After all, to take an analogy with *physical* realism, I know that in order to make sense of my sense perceptions I am not *compelled* to assume the existence of a real, external world; nonetheless, physical realism seems not only a reasonable position to take, but the only reasonable position to take.

J. Worrall 1984, pp. 67, 69.

INTRODUCTION

Epistemic arguments in favor of scientific realism have been inconclusive; I will exemplify this argumentative impasse with the collection of arguments that Philip Kitcher has called the “Galilean strategy.” Agnostic empiricism appears then to be a rational alternative to scientific realism.

I argue that scientific realism is, however, a better—or more reasonable—rational alternative than an empiricist agnostic position, because scientific realism bears a more fruitful position for scientific practice, since

it has symbolic utility and heuristic value for scientists, something that empiricist agnosticism, if not altogether lacking, has in a weaker form.

This essay will not address what should be the content of a scientific realist metaphysics: one of abstract mathematical structural relations or equations, one of entities or relata, one of fundamental laws, or whatever.

I will offer here only the skeleton of an argument, one that surely demands fleshing out, something that I intend to accomplish in the future.

I. TWO INCOMPATIBLE RATIONAL POSITIONS

Consider the following two assumptions, amongst several others, of an influential contemporary restrictive empiricism (van Fraassen's):

a) That rationality is a permission term and not an obligation term, that is, that rationality allows anything that it does not specifically forbid,

(...) What it is rational to believe includes anything that one is not rationally compelled to disbelieve (van Fraassen 1989: 171-72).

If so, the realist's abductive inferences (plus the realist's aesthetic, metaphysical and conceptual canons) may not be rationally compulsory to this restrictive empiricist, thus,

Someone who comes to hold a belief because he found it explanatory, is not *thereby* irrational. He becomes irrational, however, if he adopts it as a rule to do so, and even more if he regards us as rationally compelled by it (van Fraassen 1989: 132, emphasis added).

b) That the observable-to-us¹/unobservable-to-us distinction, even though vague, is epistemically significant.

If, for the sake of argument we were to grant (a) and (b), then a stance that rejects or remains agnostic to beliefs that go beyond what our epistemic community can possibly and *directly* confront with experience could be a *rational alternative* to a scientific realist metaphysics, since rationality would not compel us to be realists. On the other hand, this constrained empiricist stance or attitude does not have normative force for the realist. We reach then a stalemate, and both scientific realism and agnostic empiricism would be *voluntary rational positions*; they would be different legitimate cognitive preferences. If so, would both of these putative *rational* alternatives be equally *reasonable*?

II. THE GALILEAN STRATEGY AND SCIENTIFIC REALISM

To illustrate the nature of the argumentative dissension between these two putative rational positions consider the argumentative strategy devised by Galileo to argue for the reliability of the telescope as a source of truths not only for the terrestrial, but also for the celestial domain as well. Galileo's argumentative strategy can be summarized as follows²:

- a. The telescope (or some other instrument or method M , such as electron microscopes, X-ray and radio telescopes, cloud chambers, spectrosopes, etc.) provides correct observations in the terrestrial realm (or some other domain, depending of the M in question) and we can verify the correctness of these terrestrial observations independently of the telescope (or independently of M).
- b. *The reasons to doubt the reliability of the telescope's celestial observations (or the reliability of M in some other unobservable domain) are insufficient*, because: i) there is continuity between naked eye and telescopic observations; ii) a supposed crucial difference between the celestial and terrestrial domains is spurious given that it can be shown that the heavens change and then the differences between the terrestrial and celestial domains are as irrelevant as the differences between, say, Florence and Rome.
- c. Furthermore, Galileo demonstrated, and increased, the consistency of the astronomical telescopic observations by distributing telescopes to many scientists.

From *a.* to *c.* we conclude that the telescope provides *reliable* observations for both the terrestrial and celestial domains, since the reasons offered to doubt the reliability of telescopic celestial observations are insufficient. Or *mutatis mutandis*, M can be taken to provide reliable results for the unobservable domain if we lack sufficient reasons to doubt M 's unobservable results, even if we cannot verify the correctness of M 's unobservable results independently of M .

Galileo's strategy once generalized to various other instruments seems to undermine the epistemic relevance of the constrictive empiricist distinction between the observable and the unobservable. Thus, one could argue *à la* Galileo that there are *not* good reasons to think, for example, that X-ray telescopes or electron microscopes are not in general reliable, and in this way, we could extend the domain of the observable.

The epistemic debate between the realist and empiricist centers, however on where the burden of proof lies:

- a. Is it enough *not to have sufficient reasons against the reliability of various instruments in the unobservable realm?* Or,
- b. *Do we need to provide some significant positive reasons to generalize the reliability of M from the observable to the unobservable realm?*

The realist sides with the first position, he claims that the difference between the observable and unobservable *is irrelevant until proven relevant*. While the empiricist claims that,

The realist must argue for reliability rather than presume it, that the realist must give positive reasons for thinking *M* will remain reliable in the unobservable domain.

The realist could try to comply by offering as a positive reason the following facts:

i) The results produced by various instruments show continuity between the observable and unobservable domains;

ii) The results of different instruments are mutually compatible and often they partially overlap. For example, the results obtained with optical microscopes show continuity when used to view observable and unobservable objects and their results partially overlap and are compatible with those obtained with the help of other instruments, such as an electron microscope.

iii) Moreover, aren't our own eyes instruments of sorts that include a biological lens of variable focus? If so, why should the results produced by our naked eyes (i.e., the observable) be epistemically superior to those results obtained only with the help of an instrument?

These reasons, however, are apparently insufficient, not significant, for the empiricist, thus,

... Among philosophers at least there appears to be a conviction that in science, when certain images are produced by instruments, and these can be conceived of or identified as pictures of real things, we *must* (if we accept the associated theories) believe that they are, i.e., that there are real things of which they are the pictures. I contest the "must" (van Fraassen 2001, p. 160, emphasis added).

Van Fraassen insists that agnostic empiricism is a rational alternative, thus,

How much we believe, going beyond our evidence, is to some extent up to us. Poisson was not irrational to believe as he did [i.e., to believe that light had a corpuscular nature], *but to have been agnostic would not have been irrational either* (van Fraassen 2001, p. 162, emphasis added).

The agnostic empiricist claims that the Galilean strategy doesn't undermine the observable-unobservable distinction, because the realist in general does not provide *significant* positive reasons in favor of the reliability of *M* in the unobservable domain. We could imagine the following dialogue:

REALIST: There are not *sufficient* reasons to doubt, therefore I do not doubt.

EMPIRICIST: There are not *significant positive* reasons not to doubt, therefore I doubt.

Then we have two conflicting epistemic standards, and which one is preferable depends on different intuitions on what rationality requires, and it depends on different standards on what is a *reasonable* epistemic demand; on different standards on what constitutes significant reasons.

However, what is reasonable is in turn a function of our background knowledge, of our conception of the world. Thus, in some logically possible world *grue* could be a more reasonable predicate to use than *green*. Alternatively, in some other logically possible world, Bayesian *a priori* probabilities—absurd to most of us in our world—could be the most reasonable ones. If so, when Worrall says that scientific and physical realisms are the “most reasonable” or the “only reasonable” positions to adopt, he is presupposing a conception of the world, but he is also presupposing realist epistemic intuitions where the burden of proof lies concerning the reliability of our instruments and abductions. And these are epistemic intuitions—which the restrictive empiricist does not share—then impasse.

Given this epistemic impasse, I will not try to argue *epistemically* for the greater reasonableness of some version of scientific realism; rather, I will argue for its greater reasonableness via its symbolic, motivational and heuristic value. I will argue that a realist stance provides benefits for the practice of science, profits that agnostic empiricism does not supply, and if it does, it will be a lesser measure.

III. THE SYMBOLIC UTILITY OF SCIENTIFIC REALISM

R. Nozick has generalized a decision theory by introducing a symbolic utility as a separate item in the formula for decision value. Thus, the symbolic utility of an act,

(...) incorporates the utility of the various outcomes and actions *symbolized* by the act (...) The symbolic utility of an action A is determined by A's having symbolic connections to outcomes (and perhaps to other actions) that themselves have the standard kind of utility...

[For example] Ethical action can symbolize (and express) being a rational creature that gives itself laws (...) these symbolic meanings become part of one's reason for acting ethically. Being ethical is among our most effective ways of symbolizing (a connection to) what we value most highly, and that is something a *rational* person would not wish to forgo (Nozick, pp. 48, 62).

For example, a serious Christian who searches perfection *qua* a Christian does it, besides the putative value of the goal itself and other reasons³, because that search provides him with symbolic utility, i.e., with self-respect and self-esteem. Now, numerous scientists have highly valued and searched, at least *prima facie*, for explicative truth; for example, Garré of Basel, a disciple of R. Koch, risked his health and life by inoculating himself

with *staphylococci*; he did so to find out whether the hypothesis of a bacterial cause for anthrax was *true*.

It would be arrogant to suppose that the explicit pronouncements of many great scientists about their epistemic goals and the purpose of their experiments have been uniformly wrong. It would be grossly uncharitable to suppose that many great scientists have never really understood what they are doing, but that some philosophers do. It would be implausible to suppose that all those numerous great scientists have been deluded or the victims of an enormous amount of collective false consciousness. It is dubious to suppose that contra these scientists' numerous explicit pronouncements they were really aiming only at empirical adequacy. Let us then grant that many scientists have genuinely considered the search and attainment of explicative truth *valuable*.

Then, why have they?

My answer is that truth besides its epistemic value has symbolic utility, that is, its search and procurement symbolizes to many scientists the kind of person they want to be: genuine explainers and deciphers of the mystery of the world and not mere controllers or predictors of its behavior. One may speculate that those scientific communities that aim at truth—and that believe to have attained some relevant empirical truths—even if fallibly, gain in self-respect and therefore in motivation.

IV. THE HEURISTIC VALUE OF SCIENTIFIC REALISM

Van Fraassen distinguishes between belief in the truth of a theory and acceptance of a theory, an acceptance that stops short of belief. If we accept a theory then,

I believe that it is empirically adequate, and I also *commit* myself to seeing nature through that theory's eyes (van Fraassen 2001, p. 164, emphasis added).

And

This 'commitment' concerning future phenomena is intended to supply the potentially missing heuristic force [a heuristic force frequently thought to be lacking in an empiricism stance.] (Worrall 1984, p. 66, emphasis added).

However, the heuristic impetus that scientific realism motivates is likely to be *stronger* than that which the agnostic empiricist's commitment can provide, because the search for the truth—or to believe to be engaged in its search—and to believe to have found, or to have got closer to, some truths provides symbolic utility to the realist⁴. The realist then has reasons (beyond any epistemic grounds) to believe he is searching truths and getting closer to truths, and as result he is also likely to take his theories, models and principles more seriously and enthusiastically (that is, he is likely to have a stronger commitment to them) than the empiricist would

do, with his more modest belief in empirical adequacy. Therefore, the scientific realist is likely to squeeze his theories and models of more of their heuristic juice than what the restrictive empiricist might do.

Due to these extrapragmatic benefits, scientific realism is a more reasonable, a more fruitful position to take for the practice of science. And this would be the case, even if the realist stance were epistemically on a par with agnostic empiricism, even if the realist stance were as rational as the agnostic attitude.

Anyhow, of course, from this possible heuristic superiority of scientific realism *it does not follow anything about the truth value of its ontological beliefs.*

NOTES

- 1 That is, observable to our epistemic community.
- 2 Cf. P. Kitcher (2001) and in particular P.D. Magnus (2003) reconstruction of the Galilean strategy.
- 3 Cf. Cíntora for more on these other reasons.
- 4 Thus, the realist takes various principles and models as true or as approximately true—if not, he considers them to be, at least, the best candidates to be true for the time being. Principles such as those of correspondence, Lorentz covariance, least action, and Hamiltonian formulations which were used heuristically by, for example, H. Poincaré (cf. Zahar, p. 40) and models such as the fluid model of electricity.

REFERENCES

- Cíntora, A. (2000), "L. Laudan's theory of scientific aims," *Ludus Vitalis*, VII (14):103- 129.
- Kitcher, P. (2001), "Real realism: the Galilean strategy," *The Philosophical Review* 110 (2): 88-109.
- Magnus, P. D. (2003), "Success, truth and the Galilean strategy," *British Journal for the Philosophy of Science* 54: 465-74.
- Nozick, R. (1993), *The Nature of Rationality*, Princeton: Princeton University Press.
- Van Fraassen, B. C. (1989), *Laws and Symmetry*, Oxford: Oxford University Press.
- Van Fraassen, B. C. (2001), "Constructive empiricism now," *Philosophical Studies* 106 (2): 151-170.
- Worrall, J. (1984), "'An unreal image', review article of van Fraassen (1980)," *British Journal for the Philosophy of Science* 35: 65-79.
- Zahar, E. (2001), *Poincaré's Philosophy: From Conventionalism to Phenomenology*, Chicago: Open Court.