Pragmatism and Science

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Abstract

Logical empiricism gave rise to a powerful paradigm and it took some decades to overthrow it, even though it should be judged respectfully since, after all, philosophy of science and logic as we know them stemmed from that ground. The basic assumptions on which the paradigm of the "received view" rested are essentially the following. In the first place, verificationism seemed almost a truth of faith. Secondly, logical empiricists never offered good arguments in support of their thesis that assertive discourse must be preferred to more *pragmatic* forms of language. Thirdly, they too easily assumed that something like "objective truth" really exists. Last but certainly not least, the logical empiricists did not fully recognize the *historical* dimension of the scientific enterprise, which subsequently turned to be something different from the "universal science" they were talking about.

In the paper it is argued that scientific realism (and the nature of scientific knowledge at large) is a theme where the originality of pragmatist positions clearly emerge. Nicholas Rescher, for example, claims - against any form of instrumentalism and many postmodern authors as well - that natural science can indeed validate a *plausible* commitment to the actual existence of its theoretical entities. Scientific conceptions aim at what really exists in the world, but only hit it imperfectly and "well off the mark". What we can get is, at most, a rough consonance between our scientific ideas and reality itself.

This means that the scientific knowledge at our disposal in any particular moment of the history of mankind must be held to be "putative", while its relations to the truth (i.e. how things really stand in the world) should be conceived in terms of tentative and provisional estimation. Even the optimistic visions that see science as growingly approaching the "real" truth have, at this point, to be rejected on pragmatic grounds.

Keywords: Pragmatism; Science; Scientific Realism; Ideal Science; Final Theory; Relativism

It is only too natural that when the man of the street reads about the results of scientific discoveries he takes them to be descriptions of "real" nature. Why should different thoughts come to his mind, given the impressive results that science was able to attain in the last few centuries? It should be noted, however, that not only philosophers, but even many scientists have often denied the validity of the picture that the man of the street takes more or less for granted. Many examples could be provided in this regard,

as any standard text on the history of science or the philosophy of science might easily confirm.[1] In our century uncertainty about the content of our theories has grown fast, together with the feeling that there are *alternative* theories that can account equally well for all possible observations. Clearly the threat of relativism arises at this point, even though many authors nowadays no longer take relativism to be a threat, but just a fact of the matter. A good definition of it has been given by Larry Laudan, who writes in this regard: "Relativism [...] can be defined, to a first order of approximation, as the thesis that the natural world and such evidence as we have about that world do little or nothing to constrain our beliefs. In a phrase, the relativists' slogan is 'The way we take things to be is quite independent of the way things are.' It is this view that many current writers take away from the study of philosophy of science."[2]

Obviously things were different when logical positivism still was the dominant - and, in many cases, even the only - doctrine in philosophy of science (i.e. the "received view"). In that case the main purpose was to individuate the immutable models that lie *beyond* concrete scientific practice, because it was commonly held by the main representatives of neopositivism that science is objective and progressive in the cumulative sense of the term. Intersubjectivity was granted through recourse to the scientific language, purportedly believed to be neutral, free of errors and misunderstandings and, thus, available to every observer. Formal logic became then somethimg much more important than a simple instrument, since its task was supposed to be that of "capturing" intersubjectivity by means of a language constructed in the purest form possibly available to human beings, leaving aside all the unpleasant distortions that our natural languages bring with them.

Today we see many pitfalls in this conception, but it is worth noting that we came to see them only *a posteriori*. Logical empiricism gave rise to a powerful paradigm and it took some decades to overthrow it, even though we believe that it should be judged respectfully since, after all, philosophy of science and logic as we know them stemmed from that ground. The basic assumptions on which the paradigm of the "received view" rested are essentially the following. In the first place, verificationism seemed almost a truth of faith, while it is indeed difficult to equate meaningfulness with what can be verified from a perceptual viewpoint. Secondly, logical empiricists never offered good arguments in support of their thesis that assertive discourse must be preferred to more *pragmatic* forms of language. Thirdly, they too easily assumed that something like "objective truth" really exists and, moreover, that it can be transmitted by using the aforementioned logical language (supposedly pure and neutral). Last but certainly not least, the logical empiricists did not fully recognize the *historical* dimension of the scientific enterprise, which subsequently turned to be something different from the "universal science" they were talking about.

[1] See for instance D. Oldroyd (1986).

[2] L. Laudan (1990), p. viii.

At this point we can note that scientific realism (and the nature of scientific knowledge at large) is a theme where the originality of pragmatist positions clearly emerge. Nicholas Rescher, for example, argues - against any form of instrumentalism and many postmodern authors as well - that natural science can indeed validate a *plausible* commitment to the actual existence of its theoretical entities. Scientific conceptions aim at what really exists in the world, but only hit it imperfectly and "well off the mark". What we can get is, at most, a rough consonance between our scientific ideas and reality itself. This statement should not sound surprising, if only one recalls Rescher's unwillingness to trace a precise border-line between ontology and epistemology.

Furthermore, Rescher's aim is to replace Charles S. Peirce's "long-run convergence" theory of scientific progress by a more modest position geared to increasing success in scientific applications, especially in matter of prediction and control. This dimension of applicative efficacy is something real, and can hardly be denied from a rational point of view. He goes on arguing that the connection between adequacy and applicative success in questions of scientific theorizing leads, in turn, to a pragmatist-flavored philosophy of science. Unlike traditional pragmatists like Peirce and Dewey, however, Rescher shifts the attention from a concern for *theories* to a concern for *methods*. And this also marks the difference between his ideas and the approaches endorsed by other contemporary thinkers - like Hilary Putnam and Richard Rorty - who deem a pragmatist outlook in the philosophy of science important. Throughout his works, and particularly in the latest ones, Rescher insists that in matters of practical and applicative control we can always achieve significant improvements. But he also states very clearly that "perfection" (i.e.: the *completion* of the project) is, in principle, unfeasible. This means that his ideas are opposed to all those scientific projects whose aim is the search for a "final theory," a good case in question being that of the physicist Steven Weinberg.[3]

So we have a general picture of this kind:

> [...] In attempting answers to our questions about how things stand in the world science offers (or at any rate, both *endeavors* and *purports* to offer) information about the world. The extent to which science succeeds in this mission is, of course, disputable [...] The theory of sub-atomic matter is unquestionably a "mere theory", but it could not help us to explain those all too real atomic explosions if it is not a theory about real substances [...] Only real objects can produce real effects. There exist no "hypothetical" or "theoretical entities" at all, only *entities* - and hypotheses and theories about them which may be right or wrong, well-founded or ill-founded. The theoretical entities of science are introduced not for their own interest but for a utilitarian mission, to furnish the materials of causal explanation for the real comportment of real things [...] Thus our inability to claim that natural science as we understand it depicts reality correctly must not be taken to mean that science is a merely practical device - a mere instrument for

[3] See S. Weinberg (1992).

> prediction and control that has no bearing on describing "the nature of things". What science says is descriptively committal in making claims regarding "the real world", but the tone of voice in which it proffers these claims always is (or should be) provisional and tentative.[4]

Many authors have claimed in this regard that the unobservability of scientific entities rests on *contingent* facts, which depend on both the nature of the unobserved thing and the features of our perceptual mechanisms. For sure, they go on, things which were in the past unobservable became observable later on, because we were able to artificially extend our perceptual capacities by means of such technologically advanced scientific instruments as microscopes and telescopes. Given this fact, any neat demarcation between observables and unobservable entities is not significant from an ontological point of view: if we reject the realist perspective as long as scientific unobservable entities are concerned, even realism in general must be abandoned. Following this line of thought unobservable scientific entities are just contingently unobservable, so that their unobservability (due, for instance, to smallness of size) presents the same - resolvable - difficulties that one has to deal with when far distant celestial bodies are taken into account (in this case, spatial location is the problem at issue).

Rescher would accept the preceding arguments with some reservations. He is ready to admit the reality of the so-called theoretical entities because of his aversion for any instrumemtalistic conception of scientific knowledge. In his view, in fact, "instrumentalism puts the cart before the horse. As far as the working scientist is concerned, scientific theories do not exist for the sake of prediction and control, but the other way round - prediction and control are of interest because they serve to monitor the adequacy of our theorizing about objective reality. Accommodation of the phenomena - 'empirical adequacy' as it were - is *not* the be-all and end-all of scientific theorizing; it is merely a part of the test criteria for the adequacy of this theorizing."[5] In other words, while it is correct to state the fallibility and continuous corrigibility of science, starting from these premises we are not allowed to draw the conclusion that no existential and descriptive claims about the "real world" should be made in scientific theorizing.

Existential and descriptive claims can indeed be made, but the spirit of these assertions must always be provisional, tentative and, above all, *hypothetical*. All we are entitled to say is that *if* the science of the day (*our* science) is correct, *then* the so-called theoretical entities exist and possess the characteristic features that it envisions. No science would be possible without this basic realistic attitude, because its very aim is to provide an ontologically founded picture of reality. In understanding this fact, a philosopher of science has to recognize, on the one side, the descriptive

[4] N. Rescher (1987), pp. 38-39.

[5] *Ibid.*, p. 41.

and explanatory role that science purports to play, while, on the other, he must also stress that science is bound to be imperfect and fallible in its execution of such a role. Rescher even notes that the supporters of instrumentalism usually base their position on grounds of a commitment to empiricism. But the type of empiricism they espouse is quite uncommon, because traditional empiricism is known as the doctrine that any type of descriptive knowledge of the world must be grounded in experience. Since instrumentalists, instead, claim that experience is impotent to provide any descriptive knowledge of the real (extraphenomenal) world, their doctrine may be characterized as a full-fledged anti-empiricist stance..

At this point we are confronted by a crucial question: Given the fact that Rescher opposes instrumentalism and stresses the necessity that substantive existential and descriptive claims are appropriate in the scientific context, what *kind* of realism is he actually endorsing? The question becomes even more important if we recall that Rescher (1) is a conceptual idealist, and (2) thinks that no neat border between ontology and epistemology can be outlined. If someone objects to him that, in order to provide realism with a solid foundation, we need recourse to a reality that is *totally* independent of thought (and let alone of language), his reply runs roughly as follows. *What* can we possibly think about this reality, and how can we say *what* it is like? Even for imagining a world totally devoid of human presence, we must use human concepts. Conceptualization is not an optional we can get rid of, but a built-in component of our nature of human beings. According to our author, then, we must distinguish between the *that* and the *what* of this purported mind/thought independent reality. In this case, we are sensibly entitled to claim *that* it exists, while simply rejecting the challenge to specify *what* it is like. Going back to the example of science once again, we know for sure *that* there are errors in present-day science, but cannot say *what* they are.

So we can never assume that a particular scientific theory - for instance, Einstein's relativity theory - gives us *the* true picture of reality, since we know perfectly well from the history of science that, in a future we cannot actually foresee, it will be replaced by a better theory. And it should be noted, moreover, that this future theory will be better for future scientists, but not *the best* in absolute terms, since its final destiny is to be displaced by yet another theory. All this prompts Rescher to claim that:

> [...] The current state of "scientific knowledge" is simply one state among others that share the same imperfect footing of ultimate correctness or truth. The "science of the day" must be presumed inaccurate no matter what the calendar says. We unequivocally realize there is a strong prospect that we shall ultimately recognize many or most of our current scientific theories to be false and that what we proudly flaunt as "scientific knowledge" is a tissue of hypotheses - of tentatively adopted contentions many or most of which we will ultimately come to regard as quite untenable and in need of serious revision, or perhaps even abandonment. It is this fact that blocks the option of a scientific realism of any straightforward sort. Not only are we not in a position to claim

> that our knowledge of reality is *complete* [...] we are not even in a position to claim that our "knowledge" of reality is *correct* [...] Such a position calls for the humbling view that just as we think our predecessors of a hundred years ago had a fundamentally inadequate grasp on the "furniture of the world", so our successors of a hundred years hence will take the same view of our purported knowledge of things.[6]

Rescher's conception of scientific realism is thus strictly tied to his distinction between reality-as-such and reality-as-we-think-of-it. He argues that there is indeed little justification for believing that our "present-day" natural science describes the world as it *really* is, and this fact does not allow us to endorse an absolute and unconditioned scientic realism. In other words, if we claim that the theoretical entities of current science correctly pick up the "furniture of the world," we run into the inevitable risk of hypostatizing something - i.e. our present science - which is only an historically contingent product of humankind, valid in *this* particular period of its cultural evolution. Rescher's view is, instead, that "a realistic awareness of scientific fallibilism precludes the claim that the furnishings of the real world are exactly as our science states them to be - that electrons actually are just what the latest *Handbook of Physics* claims them to be."[7]

But what about *future* science? We might in fact be tempted to say that, since present-day science is really bound to be imperfect and incomplete, perhaps future science will do the job, thus accomplishing that project of "perfected science" that the logical positivists loved so much. Even in this case, however, many problems arise. First of all, just *which* future are we talking about? There is indeed no reason to believe that tomorrow's science will be very different from ours as long as its capacity of providing the "correct" picture of reality is concerned. The fact is - our author argues - that scientific theories always have a *finite* lifespan. This is so for every human creation (and science *is* a human product, in any possible sense of the term), so that, "as something that comes into being within time, the passage of time will also bear it away."[8] While we can certainly claim that the *aims* of science are stable, it should honestly be recognized that its questions and answers are not.

Science, in sum, is not a stable system, but a dynamic process, and this fact leads us to view as problematic all those conceptions that place on the shoulders of future science the burden of perfection. Not even the fascinating theses of Charles S. Peirce - Rescher's favorite mentor - escape this fate.[9] According to Peirce's "convergent approximationism," the scientific results we are able to reach with the passing of time grow increasingly concordant, and the results consequently become less and

[6] *Ibid.*, p. 6.

[7] *Ibid.*, p. 7.

[8] Ibid., p. 8.

[9] N. Rescher (1978).

less differentiated. So, "in the face of such a course of successive changes of ever-diminishing significance, we could proceed to maintain that the world really is not as *present* science claims it to be, but rather is as the ever more clearly emerging science-in-the-limit claims it to be [...] We increasingly approximate an essentially stable picture."[10] Although such an optimistic picture cannot be rejected from a logical point of view, our *historical* experience, based on what the history of science teaches us, shows that the reverse is much more plausible.

Ideal science, even when its realization is referred to the future, looks more a philosophical utopia than a feasible accomplishment (even though utopias are indeed useful when they are viewed as assentially "regulative" ideas). Perfected science, thus, is not "what will emerge when," but "what would emerge if," and many - realistically unachievable - conditions must be provided in order to obtain such an highly desirable result. This means that our cognitive enterprise must be pursued in an imperfect world, and the strong realistic thesis that science faithfully describes the real world should be taken for wat it is: a matter of *intent*. The only type of scientific realism that looks reasonable is one viewed in a pragmatic perspective, in which what is at stake is a sort of "ideal science" that nowise men can claim to possess:

> [...] Seeing that a pragmatic line of approach pivots the issue on what is useful for us and productive for us in the context of our evaluatively legitimated aims and purposes, we return to the characteristic theme of idealism - the active role of the knower not only in the constituting but also in the constitution of what is known. To be sure, this sort of idealism is not substantive but methodological. It is not a denial of real objects that exist independently of mind and as such are causally responsible for our objective experience. Quite the reverse, it is designed to facilitate their acceptance. But it insists that the justificatory rationale for this acceptance lies in a framework of mind-supplied purpose. For our mind-independent reality arises not *from* experience, but *for* it - i.e. for the sake of our being in a position to exploit our experience to ground inquiry and communication with respect to the objectively real.[11]

So we have a realism which is initially founded on a fundamentally idealistic basis, and this happens because the dichotomy realism/antirealism assumes that we are able to see the world from an *external* point of view. The strong version of scientific realism ignores a basic fact: we can never trust completely and in detail what our *actual* scientific theories claim, since history shows that, sooner or later, they will be dislodged.

At least a couple of questions always arise in this context: *Which* science, and *whose* science, are we talking about? There is indeed no reason to deem our particular scientific outlook on the world absolute from the cognitive viewpoint:

[10] N. Rescher (1987), p. 23.

[11] *Ibid.*, pp. 147-148.

> [...] Scientific "knowledge" at the level of deep theory is always *purported* knowledge: knowledge as we see it today. In our heart of hearts, we realize that we may see it differently tomorrow - or the day after. We must stand ready to acknowledge the fragility of our scientific theorizing. All we are ever able to do in natural science is to select the optimal answer to the questions we manage to formulate within the realm of alternatives specifiable by means of the conceptual machinery of the day. And we have no reason to doubt - nay, we have every reason to believe - that the day will come when this conceptual basis will be abandoned, in the light of yet unrealizable developments, as altogether inadequate.[12]

This means that the scientific knowledge at our disposal in any particular moment of the history of mankind must be held to be "putative," while its relations to the truth (i.e. how things really stand in the world) should be conceived in terms of tentative and provisional estimation. Even the optimistic visions that see science as growingly approaching the "real" truth have, at this point, to be rejected. It is natural to assume that later science is better than the previous one, and this fact seems to be confirmed by our common standards of evaluation. Once again, however, the history of science shows that "better" and "truer" are not the same thing: if, in fact, truthfulness can be predicated of later science, how come it is bound to be eventually rejected, just as it happened with its predecessors?

At a more general level, we have indeed no reason to think that our particular scientific outlook on reality is absolute from the cognitive viewpoint, because it must be relativized to the interaction which obtains between the world on the one hand, and human beings who investigate it on the other. The outcome of our investigation of nature is something in which both our inputs and those by nature play a fundamental role. They cannot be separated or, at least, we are not able to do so.

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