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REVIEW

A Scrutiny of Scientific Realism: The No-Miracles Argument and the Pessimistic Meta-Induction

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ABSTRACT

The historical debate of scientific realism portrays a monumental sign of science-a way of critiquing philosophy. At first sight, this centrepiece of scientific realism could line up against the no-miracles argument and the pessimistic meta-induction because, by means of the no-miracles assumption, fundamental theories in science would be the fine manifestation of reality as well as are most likely to be the truth. Nonetheless, a means to an end of the pessimistic meta-induction arguably states the anti-realistic position-since scientific speculations are not always plausible to be the ultimate truth *vis-à-vis* mature hypotheses of science in history. By and large, I have herein put forward a systemic meaning for realism: an inspection of unseen objects in the world, which are broken free from the human mind. However, I will demonstrate the no-miracles argument in the vicinity of realism, whilst the pessimistic meta-induction lies towards anti-realism. In the bargain, I will examine structural realism in response to this scientific dichotomy. Briefly, this research article is, apparently, bound-up with a very limited account of relevancies; *ergo*, it would be recommended to further research on this controversy.

Keywords: Anti-realism, no-miracles argument, pessimistic meta-induction, structural realism.

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1. Introduction

Scientific realism is a philosophical hypothesis that produces a true explanation of the world, excelling at the appearance of things. In general, the present controversy shown in this study will drive upon the following lines: the no-miracles argument attempts to convince the realist stance of scientific theories; accordingly, realism could be the best explanation of the success of science, and they are likely to be approximately true (Putnam, 1979, pp. 79–80). By contrast, the pessimistic meta-induction argument holds the anti-realist position that mature theories are possibly to turn out to be false as regards empirical evidence in the history of science-likewise, they are also not even approximately true (Okasa, 2016, p. 60). De facto, having illustrated that the term "realism" can be defined thereby as a study of unobservable entities that exist independently of minds, such as viruses, genes, atoms, leptons, and black holes. (Boyd, 1983, p. 45; Ladyman, 2002, p. 268). In this article, I will, therefore, explore the no-miracles argument in the direction of realism and the pessimistic meta-induction in the direction of anti-realism whilst discussing an alternative to reconcile the debate echoed through the ages. The overall structure of this essay takes the form of three portions: the no-miracles argument-the pessimistic meta-induction-and structural realism.

2. Contents

2.1. The No-Miracles Argument for Realism

This is the most significant argument for scientific realism, which is famously contributed by Hilary Putnam (1926–2016). As Putnam (1979) claims, "*The positive argument for realism is that only philosophy does not make the success of science a miracle*" (French, 2007, p. 94). The following interpretation is

intended to spell out the success of science that could be the central idea of the no-miracles argument. Despite that, modern science appears to be phenomenally successful; then, it is possible to postulate unobservable entities via technological implications, for instance, antibiotics, iPods, supercomputers, genetic manipulations, and macroscopic objects (French, 2007, p. 94). Additionally, these machinery applications are able to make novel predictions that are confirmed by plenty of empirical evidence. Furthermore, it attempts to discover the existential-ontological truth of the unobservable substances while often facilitating empirical or instrumental success. Particularly, this sort of engineering success has caused a change in the fundamental image of the world with regard to quantum entanglement and spatiotemporal phenomena (French, 2007, p. 94). For these reasons, it becomes obvious that the no-miracles argument strongly clarifies the ultimate stance for realism.

Moreover, inference to the best explanation advocates a defence mechanism for the no-miracles arguments. Generally, in the view of realism, this manifests that the predictive or instrumental success of science is explainable; indeed, it could be "*an inference to the only explanation*" (Ladyman, 2002, p. 213). Also, there is another way of forming this auxiliary assumption: "*If the phenomenalist about theoretical entities is correct, we must believe in a cosmic coincidence*" (Smart, 1963, p. 39). Correspondingly, this takes into account coincidence, which is philosophically problematic. For example, perhaps, it could be argued whether microwave ovens and electron microscopes are intended to behave mysteriously-how these electric devices would be able to function without unobservable entities like electromagnetic waves and atoms. In addition, as van Fraassen (1980, p. 20) contends, there is a certain rule of inference in order to design the best explanation for scientific theories in terms of logic and literature; as a result, explanatory statements should follow the way that conclusion is inferred by logical premises. On the grounds of explanatory success, there is a permissive path to accept scientific theories as they would come across empirical hypotheses or adequate evidence. In brief, it is clear that inference to the best explanation necessarily defends the no-miracles argument for realism.

Furthermore, there are a few counterexamples against the sheer argument of realism. According to Ladyman (2002, p. 244), some scholars have asserted that approximate truth is unable to explain the empirical or machinery success and then establish realism in some cases: although some scientific theories are empirically or instrumentally successful, they do not turn out to be approximately true premises; they would necessarily need more explanations to attest the theses in full. The no-miracles argument would, *eo ipso*, be undermined by the following counterfactual arguments offered by Laudan (Ladyman, 2011, p. 94; Laudan, 1981, p. 45):

1. There are some theories that were mature and had the novel inferential success even though their central theoretical implications do not refer to the best modern theories.
2. Successful reference of the central theoretical applications is a fundamental condition for approximate truth.
3. Successful reference of the essential theoretical terms and approximate truth would not be a compulsory condition for the novel inferential or predictive success of some scientific theories.

However, as Ladyman (2002) explores, realists have replied to these objections using several rebuttal arguments in relation to causal theories of reference-those which are relevant to abandoned theoretical implications such as electrons or atoms. Rather, they lucidly provided another restricted account of realism for theoretical claims at unobservable entities upon the derivation of novel inferences. In sum, it is apparent that there have been some refutations of the no-miracles argument.

2.2. The Pessimistic Meta-Induction for Anti-Realism

The argument of the pessimistic meta-induction holds the opposite aspect of scientific realism. In accordance with Putnam (1979), most of the present scientific theories tend to be true when the past or mature scientific theories are false because previous scientific theories are different from the novel theories, as well as are replaced by modern technological theories (Bortolotti, 2008). Consequently, most of the prevailing scientific theories, along with prior scientific assumptions, are encompassed by induction-where the conclusion turns out to be false. It is now intended to form an inductive argument with respect to the history of science-because it is being employed beyond the level of science *per se*, meta-induction, or "meta-level", instead (French, 2007, p. 95; Godfrey-Smith, 2003, p. 177); this can reach an inductive logical conclusion: they are empirically successful theories in the past even though the present scientific theories are likely to be false. Hence, it is deemed unacceptable that scientific realism is true. In short, it becomes evident how the pessimistic meta-induction grips the view of anti-realism.

On this score, the history of science and scientific induction have together made a noteworthy attempt to fortify this anti-realist position. As Laudan (1981, pp. 29–30) suggests, there is another way of putting this opposing argument as follows:

1. In the history of science, there have been plentiful scientific theories that are empirically successful. Nevertheless, they have been subsequently refused as they do not refer to the prevailing scientific applications anymore.
2. There is, assumingly, no difference between rejected scientific theories and the current theoretical terms-because there is no acceptable reason to believe that they will never be replaced by novel or successive scientific theories in the future.
3. *Ergo*, by reference to the induction, it could be postulated that the current theoretical terms are provisional and subject to change in due course.

For these reasons, it can now be concluded that it is impossible to admit approximate truth or successful theoretical implications in science. Besides, Ladyman (2002, p. 237) and French (2007, p. 95) have declared a few examples which clearly and distinctly clarify Laudan's (1981) above statement:

1. The crystalline spheres of Greek and mediaeval astronomy,
2. The humoral theory of mediaeval medicine,
3. The effluvia of early theories of static electricity,
4. The 'catastrophist' geology, with its commitment to a universal (Noachian) deluge,
5. The phlogiston theory of chemistry,
6. The caloric theory of heat,
7. The vital force theories of physiology.

Thus, it is certain that the history of science and scientific induction embody clear enough evidence to propose the following idea: the current successful theoretical terms are possibly false, and there is no fair ground for scientific realism to stand by.

In spite of that, there are a couple of counterfactual arguments for the anti-realist stance of the pessimistic meta-induction. First, some scholars have debated the rationale of mature theories. On the view of realism, scientific theories might be satisfied when they achieve the following requirements: coherence and cohesion with other contemporary theoretical terms, property of a well-established series of scientific principles, and the most appropriate methodologies for a variety of scientific domains (Ladyman, 2002, p. 238). For instance, in physics, the law of energy and the fundamental theory of the structure of matter like oxygen, hydrogen, carbon, and so forth tend to commonly employ a vast array of scientific units such as velocity, force, charge, mass, etc. (Ladyman, 2002, p. 238). Nonetheless, they are, indeed, implausible to make a scientific theory with degrees of coherence and cohesion in comparison with mature theories. Second, many scholars have claimed the fact of novel predictive success; the conception of empirical success slightly defends the thesis of scientific realism (Ladyman, 2002, p. 238). In effect, empirical success is not an essential requirement to justify scientific theories as true or false. For example, there was a prominent acceptability for the theory of wave and time along with particle theories of light, whereas these theories are phenomenologically and ontologically not compatible and consistent; it is, *ipso facto*, not a necessary requisite in this regard. In all, the pessimistic meta-induction has, in part, been associated with some counterexamples.

2.3. Structural Realism

Structural realism could arguably facilitate reconciling the above pair of substantial contentions: the no-miracles argument that pulls in the direction of realism and the pessimistic meta-induction that pulls in the direction of anti-realism. In response to that, Worrall (1989) has, for the most part, been well entrenched in the compelling idea of the "best of both worlds" regarding structural realism:

"There was an important element of continuity in the shift from Fresnel to Maxwell-and this was much more than a simple question of carrying over the successful empirical content into the new theory. At the same time, it was rather less than a carrying over of the full theoretical content or full theoretical mechanisms (even in 'approximate' form). [...] There was continuity or accumulation in the shift, but the continuity is one of form or structure, not of content." (Worrall, 1989, p. 117).

In particular, the ongoing manifestation indicates the actual distinctness between structure and content. In terms of the content, mature theories and past theoretical entities are intended to be false or not to exist. Conversely, by means of the structure, the current scientific references, including mathematical terms, are able to be true due to some scientific extent of the empirical adequacy (Bortolotti, 2008). For example, Worrall (1989) argued that the theory of light has historically been transferred to Maxwell's theory of wavefunctions from Fresnel's theory of particles (Bortolotti, 2008). This can bring up the following assumptions: there is no room for scientific realism to play within which it affirms the nature of things employing physical and metaphysical entailments of the current scientific theories. On the contrary, there is a reasonable ground for scientific anti-realism to be admitted, owing to some theoretical mechanisms in favour of theory change and structural realism (Ladyman, 2002). Above all, it could be asserted that on the basis of the continuity of scientific realism, which follows

scientific evolution, the empirical success of the false theories is not miraculous. Thus, there is no doubt that scientific realism undeniably plays a vital role in harmonising these disputes.

Likewise, the form of theory change also makes a crucial supplement to reconcile the no-miracles argument and the pessimistic-meta-induction. The central idea of this view directly contradicts the underdetermination argument-because the theory change often accommodates theoretical possibilities rather than historical reflections of scientific theories (Ladyman, 2002, pp. 230–231). Consequently, it emerged with an explanatory relationship between the empirical references, or success of theoretical terms and the possibility of truth. Moreover, as he investigates, with reference to Laudan (1981), there is a positive phase of realism in order to eliminate the nature and ontological existence of the theoretical entities driving upon induction. Correspondingly, he also recognised a few theoretical terms, which are certainly unobservable, for instance, caloric, phlogiston, and ether. Similarly, modern science has also identified the best scientific theories that are necessarily referred to as dragons, unicorns, and leprechauns, those which do associate with nothing in the material world (Ladyman, 2002, pp. 230–231). Therefore, in virtue of the inductive pessimistic conclusion, the best current scientific hypotheses are likely to turn out to be false, owing to a lack of empirical evidence. Upon these circumstances, it becomes obvious that scientific realism could not be the ultimate explanation of the success of science-because it leaves a burden of proof to some length. In a sense, the form of theory change is supposed to be a critical movement to end up with this historical debate.

3. Conclusion

All in all, the main purpose of the current study was to determine to what extent the no-miracles argument pulls in the direction of realism, whilst the pessimistic meta-induction moves in the direction of anti-realism; eventually, how this scientific quarrel can be restored to harmony treating with structural realism. To pave the way for these lines, I have concisely examined the no-miracles argument alongside the inference to the best explanation, the pessimistic meta-induction with the history of science, and structural realism together with the form of theory change-that made a recipe for reconciling the controversy thereto. Hence, therein lies that structural realism would be a significant way of solving this historical debate in scientific realism among many scholars in academia.

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Conflict of Interest

I declare that there is no conflict of interest regarding the publication of this paper. I, the corresponding author, hereby clarify that the information given in this disclosure is true and complete to the best of my knowledge and belief.

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