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Realism versus Anti-Realism

Realism and anti-realism debate the portrayal of the world with respect to scientific theories. Realism establishes that the “physical world exists independently of human thought and perception” and ‘scientific realism’ claims that certain entities exist (Okasha 58). The aim of scientific realism is to provide a true meaning of the world by referring to the entities that are real. Realism does not, however, assert that the scientific theories known today accomplish this goal; rather, it is an ongoing process that will slowly converge near the truth. On the other hand, anti-realism contends that science should not correspond to reality. The proponents of anti-realism argue that observations from scientific theories could be utilized as instruments to produce accurate predictions. Hence, anti-realism is also known as “instrumentalism.” For example, although Ptolemaic Astronomy was disproven with the rise of Copernicism, it still generated accurate predictions, a claim that instrumentalism holds. Historically, several theories forecasted correct results without being precise as a scientific theory. Lastly, anti-realists do not claim that science completely depicts the world inaccurately. Instead, science provides a “true description” of the ‘observable part,’ while making no claims about the ‘unobservable’ entities (59). In this metaphysical debate involving realism and anti-realism, although realism is partially supported by the observable-unobservable distinction and the ‘no-miracles’ viewpoint, they are not completely convincing and draws further opposition from the ‘underdeterminism’ argument.

The distinction between ‘observable’ and ‘unobservable’ entities is central to the argument supporting realism. The anti-realists proclaim that unobservable “entities are merely convenient fictions, introduced by physicists in order to help predict observable phenomena” (Okasha 60). The instrumentalists’ “rational attitude towards atomic theory is” “one of agnosticism –it may be true, or it may not. [One] just do[es] not know” (64). This applies to the anti-realists view of the unobservable entities as a whole. Two types of anti-realism exist. One believes that the unobservable particles should “not be understood literally at all,” while the other has an agnostic view of the unobservable entities (62). The realists argue that since instrumentalists have a realist view of the observable world and a skeptical perspective towards the unobservable particles, they presuppose the distinction between observable and unobservable. This distinction, the realists assert, cannot be accurately defended, and therefore, it has to be incorrect. Grover Maxwell, an advocate of realism, provided an example where an individual is observing an object through a continuous series of pathways consisting of the naked eye, window, pair of glasses, binoculars, low-powered microscope, high-powered microscope, so on and so forth. (67). He stated that these observations were drawn on a “smooth continuum,” and thus, there was no way of knowing where the divide lied (67). “Maxwell argued” that “the anti-realist’s attempt to classify entities as either observable or unobservable is doomed to failure” since the distinction cannot precisely be drawn (69). Bas van Fraassen, on the other hand, defended anti-realism by proclaiming that not knowing where the divide lies does not imply that there does not exist a separation. He provided an example distinguishing baldness and hirsuteness. Although there is an apparent difference between the two cases, the point at which these two conditions are deemed distinct is uncertain. Even though there is no certain separation between the observable and unobservable categories, “van Fraassen points out that vague

concepts are perfectly usable, and can mark genuine distinctions in the world” (69). All in all, Bas van Fraassen concludes that even though there is no certain division between unobservable and observable, clear-cut cases are present. Therefore, the distinction makes sense to an extent, and instrumentalism cannot be refuted. Altogether, Maxwell utilized the observable and unobservable distinction to refute anti-realism while van Fraassen defended it, but neither argument was strong enough to completely refute the other perspective.

In addition to the observable-unobservable distinction, another crucial argument supporting realism was the “no-miracles argument.” Applied science in today’s society consists of fewer errors than science and technology present earlier. The fact that the scientific theories are “empirically successful” is one of the arguments for realism (62). For example, laser technology, widely applicable in today’s society, is based on electrons jumping from energy states. Anti-realism assumes that since electrons and atoms are unobservable, they are merely ‘convenient fictions.’ The no-miracle argument maintains that “theories are true –the entities in question really exist, and behave just as theories say. Unless we accept this explanation, the empirical success of our theories is an unexplained mystery” (63). Since current science is empirically more successful and applicable, the newer scientific theories are at least more reasonable and accurate than previous ones. Although the no-miracles argument supports realism, the success-truth correlation is imperfect as the anti-realists exhibit. A one-to-one correspondence between empirical success and truth is not as strong as it might be initially perceived. Several theories are predictively successful but theoretically false. For example, Ptolemaic Astronomy, Ether theory, Newtonian mechanics, and Phlogiston theory are just some of the disproved theories that were at one point in time widely held beliefs. Larry Laudan published a list of thirty such theories that failed the criterion of the truth-success correlation.

Instrumentalists declared that the “moral of the story” is that despite the empirical success of “modern scientific theories,” we should not assume that they “are even roughly on the right lines” (65). The realists responded by producing two modified versions of the no-miracles argument as a rebuttal to the instrumentalists: (1) “The empirical success of a theory is evidence that what the theory says about the unobservable world is approximately true, rather than precisely true” and (2) that this empirical success “is not just a matter of fitting the known observational data, but rather allowing us to predict new observational phenomena that were previously unknown” (64). The first modification is less vulnerable to counterexamples than the original version, and the second modification is even stronger. Although these modifications better the realist argument, counterexamples like the failure of “Ether theory” violate the modified version of the no-miracles argument regardless. Altogether, even though this argument is “intuitively compelling,” for realists, “the argument is open to quite serious objections” (69). Overall, the ‘no-miracles’ argument lends support to scientific realism, but due to its inconsistencies, it is not convincing enough to declare realism victorious over instrumentalism.

Although the observable-unobservable distinction and the no-miracles argument were predominantly pro-realist arguments, the “underdetermination argument supports an anti-realist view of science” (72). Underdetermination corresponds to instrumentalism since it implies that “agnosticism is the correct attitude to take towards claims about the unobservable region of reality” (72). The weak version of underdeterminism states that for any theory and any body of evidence, there is at least one rival theory that is equally well-supported by the particular evidence. The stronger version of underdeterminism claims that every theory is well supported by the evidence as any of its rivals. Finally, the extreme form asserts that assumptions can always be altered to fit a theory. Given one’s ingenuity and creativity in generating these

background assumptions, one can come up with multiple theories that is supported by the same evidence. This implies that “data can in principle be explained by many different, mutually incompatible, theories” (72). Therefore, successful empirical data that the no-miracles argument claims to support realism with is disputed by the underdeterminism theory. Same observational data for different proposed theories conveys that there has to be another factor in determining which theory is correct. Therefore, instrumentalists claim that the “observational data ‘underdetermine[s]’ “the scientific theories” (72). The realists backfired to the criticism faced from anti-realism. Since only a “relatively few real cases of underdetermination in the history of science,” exist, it has “little relation to actual scientific practice” (73). In addition, “realists accuse anti-realists of applying underdetermination selectively” (74). Consistent practice of applying the underdetermination argument rules out unobservable entities as real entities as well as potentially observable objects that are currently unobserved. Furthermore, realists conclude that underdeterminism is “simply a sophisticated version of the problem of induction” (75). The problem with this argument is that adjudging underdetermination as a version of induction “does not mean that it can be ignored” (76). Overall, underdetermination supports instrumentalism and exposes shortfalls of realism but does not rule it out due to the realist rebuttals.

The underdeterminism assertion and the no-miracles argument are two of the predominant arguments opposing and supporting realism respectively. The observable-unobservable distinction consists of equally fought arguments from philosophers like Maxwell and van Frassen, which are inconclusive at the end. The overall aim of realism is to account the world through science, while instrumentalism only claims the same for the observable entities, not the unobservable ones. All in all, although realism is supported by today’s science and data, it consists of numerous dents in its claims, which contributes to its shortfall.

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