

How good is the ultimate (“no miracles”) argument for scientific realism?

The remarkable predictive success of science is the primary motivation for scientific realism. Realists claim that this success is too impressive to be accidental, and the best and the only non-miraculous explanation for it is that mature scientific theories are approximately true (Putnam, 1975, p. 73). This is known as the “No Miracles Argument” (NMA). The NMA can be formulated as follows:

- Mature scientific theories are remarkably successful in prediction and explanation.
- This success requires a non-coincidental explanation.
- Such best explanation for their success is the approximate truth of these theories.
- Therefore, successful theories are approximately true.

Yet this appealing intuition is philosophically unstable. In this essay, I argue that the NMA fails as a justification for scientific realism for three central reasons. First, it begs the question by presupposing the truth-tracking reliability of Inference to the Best Explanation (IBE) in the very domain it is meant to justify. Second, the NMA’s rarely acknowledged dependence on a uniqueness-of-truth assumption, which states that there exists a single, uniquely correct description of the unobservable world toward which science converges, puts it at odds with scientific practice. Third, Constructive Empiricism (CE) provides a coherent alternative that avoids these problems while proving false the NMA’s bold claim that realism is the *only* option. I then briefly examine a major realist strategy, Structural Realism (SR), and argue that it fails to rescue the NMA. Taken together, these arguments demonstrate that the NMA lacks a stable philosophical foundation to justify scientific realism.

NMA depends on Inference to the Best Explanation (IBE), the idea that justifies the best explanation of a phenomenon is *true* (Lipton, 1991, p.11). Realists use IBE to infer that the success of a theory is best explained by its approximate truth. However, IBE is domain-dependent, and that justification begs the question when applied to *unobservable* entities. The reliability of IBE in this domain cannot be confirmed without already assuming that the “best” explanation of scientific success – the realist’s explanation – is true. In the observable domain, abductive inferences can be tested and corrected: if it’s inferred that a strange noise is best explained by a broken pipe, one can check. But no such independent confirmation mechanism exists in the unobservable domain (van Fraassen, 1980, p. 21) – take caloric fluid (French, 2016, p. 136) or ether (French, 2016, p. 17) for example. In simple terms, the IBE’s reliability is used to justify realism, while realism’s claim is used to justify IBE. Realists attempt to compare this to the benign circularity present in using deductive reasoning to justify deduction. When inspected in depth, however, this analogy does not hold true. While deductive rules, by definition, preserve truth, IBE is abductive in the sense that it introduces new content and thus risks of fallacy. As van Fraassen (1989) puts it: the “best” explanation may be the “best of a bad lot” (p. 21) – good only relative to the available alternatives, not necessarily true. IBE has no independent check that validates its own reliability in the unobservable domain. This makes IBE circularity vicious – risking a fallible inference in precisely the domain where it cannot be tested. Thus, NMA relies on an unjustifiable reasoning pattern at its heart – rendering it unreliable for the justification of realism.

Even more profound problems with the NMA concern an implicit metaphysical premise. For NMA to work as intended, these assumptions must be granted:

- 1) There exists a single, uniquely correct description of the (unobservable) world.

2) Scientific theories could approximate this unique truth.

3) IBE is a method capable of converging on that truth.

The first premise is rarely stated explicitly, likely because it's often taken for granted. Yet it's neither trivial nor supported by scientific practice. If multiple incompatible yet successful models can coexist, then success no longer indicates convergence toward a single truth. Contemporary scientific practice often suggests *model pluralism* – fields such as quantum physics, climate science, and biology employ *multiple*, sometimes *incompatible* models that each succeed within their own domains, often sharing tradeoffs between accuracy, simplicity, and explanatory clarity. Utilization of several models to explain different behaviors of the atomic nucleus is undeniable evidence for this (Frigg & Hartmann, 2006). Nuclear physicists use the *liquid-drop model*, treating the nucleus as a charged, continuous fluid, to predict phenomena like nuclear fission. Another subset of scientists employs the *shell model* to account for nuclear spin and magnetic moments, treating nucleons as discrete, independent particles. These descriptions are mutually inconsistent – the nucleus cannot be both a continuous fluid and a set of independent particles simultaneously. Yet, both models are highly successful in the corresponding domain of each. This indicates that scientific success does not require a single, unique underlying truth, blocking the realists' path to infer that success reveals an approximation of such truth. Therefore, NMA's functionality is challenged by the scientific practice on a metaphysical premise it assumes.

One more bold, often overlooked claim of NMA – its *exclusivity* claim, that realism is the *only* non-miraculous explanation of success, can be refuted simply via the existence of another such explanation. Constructive Empiricism (CE), developed by Bas van Fraassen, challenges this exclusivity claim by offering an alternative account. CE holds that the aim of science is not truth regarding the unobservable world, but *empirical adequacy*. According to van Fraassen (1980), a

theory is acceptable if it correctly describes targeted *observable* phenomena and events (p.12).

Scientists need not believe the theory's unobservable posits even if they use it. Scientific theories succeed because they are empirically adequate, not because their unobservable claims are approximately true (as claimed by realists). CE explains novel predictive success by noting that empirically adequate theories will, by definition, produce successful predictions. One major objection to this viewpoint is that scientists aim at explanations too, not just prediction and CE seems to undermine the scientific explanation. However, CE argues that explanations still serve in a pragmatic role, valuable as a "practical tool" rather than a literal description of unobservable reality (van Fraassen, 1980, p. 88). Scientists use explanations to organize phenomena, guide and design experiments – but history shows that explanatory mechanisms are frequently replaced even when empirical success remains. Another objection is that CE relies on *ambiguous boundaries* between observable and unobservable (Musgrave, 1988, p. 244). CE counters this by asserting that a non-ambiguous distinction *can* be made by carefully defining the *scope* of claims about unobservables (Muller & van Fraassen, 2008). With this in mind, "observable" can refer to what scientists have reliable access to, not to a rigid metaphysical category. CE requires only this practice-based distinction and only needs to be viably coherent, not flawless, to refute the NMA's exclusivity premise. With CE *available as a coherent alternative* without a commitment to the literal truth of unobservables, NMA loses its premise that realism is the *only* non-miraculous explanation of success, failing on its own terms.

Realists have attempted to rescue their positions, major response being Structural Realism (SR) stated by Worrall (1989). SR attempts to preserve truth through theory change by claiming that the retained part of scientific theories is *the structure* rather than the specific theoretical entities proposed. While this response addresses historical evidence well enough, SR ultimately

surrenders what the NMA was supposed to defend: commitment to the existence and accurate description of unobservable entities. If SR *restricts* realism to the perseverance of mathematical (or relational) structure, then it does not support NMA's conclusion that theories are approximately true in their claims about the *unobservable world*. Instead, it abandons this claim to form a more abstract realism. SR, therefore, cannot rescue the NMA to its original force.

The No Miracles Argument remains an influential intuition but ultimately fails to justify scientific realism. Its reliance on IBE causes an unreliable form of circular reasoning in the unobservable domain. Its fundamental commitment to a picture with a single convergent truth is destabilized by model pluralism in scientific practice. And Constructive Empiricism directly refutes NMA's exclusivity claim by providing a coherent, non-miraculous alternative account of scientific success. Structural Realism does not save the NMA, as it abandons the entity-level commitments the argument was meant to justify. Scientific success is undeniable, but the realist's inference from success to truth by employing NMA remains unwarranted.

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