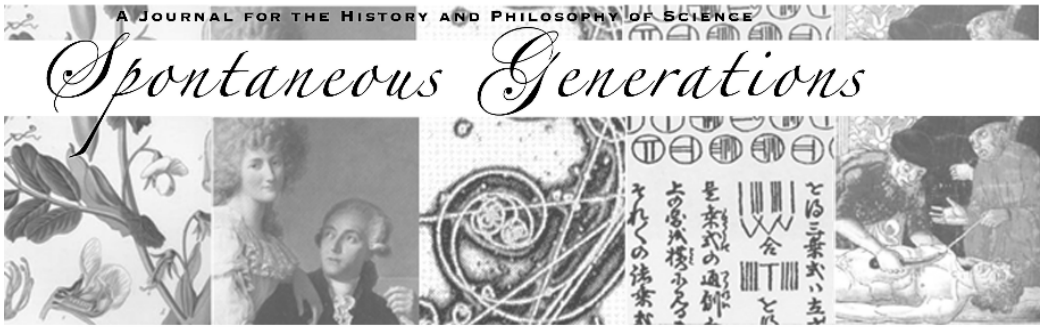


# Four Challenges to Epistemic Scientific Realism—and the Socratic Alternative

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# Four Challenges to Epistemic Scientific Realism—and the Socratic Alternative*

Timothy D. Lyons†

Pivotal to epistemic scientific realism is the no-miracles argument (NMA): the success of our scientific theories would be miraculous were they not at least approximately true. It is this argument that justifies believing the meta-hypothesis that our successful theories are at least approximately true. There are essentially four challenges, two primary and two secondary, to NMA and the realist's meta-hypothesis. Revealing the individual force of each challenge, as well as the relations between them, requires a set of clarifications that depart from the common interpretations of those challenges. (The arguments for each point made here are detailed in the cited texts.)

A primary challenge is the historical argument, central to which is a list of theories that are successful but cannot, by present lights, be approximately true. Those that challenge contemporary realism—including sophisticated variants of the meta-hypothesis and of NMA—can be found in Lyons (2002, 2006, 2016a). The inference from such a list is not an induction to the falsity of our current theories; it is a logically valid *modus tollens* that shows that the realist's meta-hypothesis is false. In that case, it cannot even be accepted as a 'fallible' or 'defeasible'—let alone a 'likely'—conjecture. That conclusion is one dimension of the *modus tollens*. The second dimension, however, is that the list of "miracles"—a list of successes left inexplicable by realists—reveals the falsity of the sole premise of NMA, rendering wholly unacceptable the sole *justification* for believing the realist meta-hypothesis. (See Lyons 2002, 2006, 2015.) With the *modus tollens* in place, it becomes clear that any persuasiveness of NMA is merely psychological, and here is one respect in which *increasing the quantity of items* on the list becomes important: doing so proportionally destroys any psychologically residual hope realists cling to for NMA and so for justifiably believing their false meta-hypothesis. (In Lyons [2016a], I also show that a weakened statistical

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version of the epistemic realist's meta-hypothesis—"it is statistically likely that our successful theories are approximately true"—suffers the same fate.)

In advance of considering the other primary challenge, there are two secondary but notable challenges—both of which have suffered recent neglect. The first is that there are alternative non-realist meta-explanations for success. Since the antirealist refrains from believing best explanations, what is key to the alternative is its ability to defuse NMA, in which case the alternative need not be better. Nonetheless, if it is better, it also blocks the weaker—but, apparently, only other—realist justificatory retreat, the inference that approximate truth provides, not the *only*, but the *best* explanation of success. One non-realist meta-explanation is "modest surrealism": *the mechanisms postulated by the theoretical system would, if actual, bring about the relevant phenomena observed, and some yet unobserved, at time t; and these phenomena are brought about by actual mechanisms in the world* (Lyons 2002, 2003). The availability of such alternatives ties back to the historical *modus tollens*: insofar as they can explain the counterinstances, they have far greater breadth than the realist meta-explanation.

The other secondary threat bears directly on the comparison of competing meta-explanations, but it challenges the capacity of the realist's meta-explanation to make what it purports to explain, success, "a matter of course". Otherwise untapped is the fact that this argument can be leveraged against the historical *modus tollens*, whose list is one of successes that are inexplicable for realism: diluting approximation to accommodate the list makes approximate truth so vacuous as to fail to render success likely. While narrowing approximate truth eliminates its touted explanatory breadth, increasing its permissiveness destroys its explanatory strength. Either way, whether because of counterinstances or vacuity, the realist is unable to explain success, so unable to offer the best, let alone the only, explanation (see Lyons 2003, 2016b).

The other primary challenge to epistemic realism is the argument from underdetermination, its central premise being a competitor thesis at the level of scientific theorizing. Take "competitor" to denote an alternative that shares the confirmed predictions of our favoured theory—including alternatives that are otherwise predictively distinct—and whose approximate truth would render our favoured theory patently false. The competitor thesis properly construed is, "there are competitors whose approximate truth we *cannot justifiably deny*." Like the historical threat, this thesis can be evidentially supported: there are syntactic relations between historically successful scientific theories and theoretically non-approximating current theories that can be, for any favoured theory, re-instantiated to reveal genuine competitors (not mere "Cartesian fantasies"). And, since science itself accepts

the original instantiated relations, the purported lack of the competitors' explanatory virtues cannot suffice to deny the approximate truth of those competitors. With the competitor thesis secured in this empirical way, and insofar as epistemic realism entails the denial of that thesis (Lyons 2009, 2014, 2015), it follows that epistemic realism is false: it is *not the case* that we can justifiably believe that our successful theories are approximately true. Moreover, the indefinitely many competitors qualify as empirically informed but ultimately ahistorical counterinstances in the *modus tollens*. Not only must the NMA be rejected outright, but we also have an explanation for the original list: those historical counterinstances were among the indefinitely many non-approximating theories that, like our current theories, share the range of successes they achieved (see Lyons 2015). (Tying this into the challenge of non-realist meta-explanations, one can take this as a syntactic expression of the modest surrealist's, semantic, meta-explanation.)

With these four interlocking challenges clarified, a serious threat to epistemic scientific realism emerges. My proposed alternative (2005, 2011, 2012, 2015, 2016a, forthcoming) is a non-epistemic, purely axiological—or, as I've called it, Socratic—scientific realism. Against antirealists such as van Fraassen and Laudan, central to this position is a wholly realist, but refined, meta-hypothesis that retains deep theoretical truth as the aim of science: *in changing its theoretical systems, the scientific enterprise seeks, not truth per se, but an increase in a particular subclass of true claims, those whose truth—including deep theoretical truth—is experientially concretized*. For coherence, this axiological meta-hypothesis is directed at the very aim it describes, and it must live up to what it demands. The following four points are among those that bear on its promise. First, the threats above, minimally, have forced epistemic realists to narrow their meta-hypotheses to only a small class of constituents achieving rare success; most of what goes on in science is lost. By contrast, liberated from the chains of semantic belief, the axiological meta-hypothesis is put forward to account for the many and multi-varied features of science, not only theorizing and theory choices but high and low level auxiliary modifications, idealizations, experimental design, theory-laden data selection, etc. Second, irrespective of whether we can say the postulated semantic goal has been achieved, its achievement entails a set of syntactically identifiable theoretical desiderata that are agreed to be central to theory choice: an increase in empirical accuracy and consistency, and the retention, if not an increase in, breadth of scope, testability, and three kinds of simplicity. And the quest for that primary goal promotes a fourth kind of simplicity, along with explanatory depth, the confirmation of novel predictions, and explanatory power. Third, because the axiological meta-hypothesis promotes or even requires those eleven desiderata, it can explain and, crucially, justify their collective pursuit; while, fourth, the posit

of antirealist goals—say, empirical adequacy, problem solving effectiveness, or the set taken alone—cannot (see Lyons 2005). Striving to maintain a Socratic epistemic humility in the quest for truth—seeking truth without claiming to possess or approximate it—this axiological meta-hypothesis is not asserted as an object of belief. Rather, in accord with a Socratic scientific realist treatment of other empirical hypotheses, it is offered as a testable tool for further empirical inquiry. Despite over three decades of unavoidable epistemic realist retreats, Socratic scientific realism endeavors to provide an encompassing account of the scientific enterprise.

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