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Diskusijos / Discussions

On the Absolute and Relative Pessimistic Inductions: A Reply to S. Park

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According to certain realist views of science, not only does the scientific enterprise provide knowledge of things we can observe with our unaided senses, such as rocks and baboons, it also provides *theoretical* knowledge, that is, knowledge of unobservable entities and processes like quarks and magnetic fields. Indeed, for scientific realists broadly speaking, our best empirical theories should be understood as giving us true, or at least approximately true, descriptions of the world (Putnam 1975: 73; cf. Boyd 1983).

A powerful criticism of this realist picture is an argument called the 'pessimistic induction'. Commonly framed, the argument informally runs like this: since past scientific theories were overturned by later theories, we should not put too much stock in our current theories, for they will likely be discarded as well.

In a recent essay, Seungbae Park (2019) distinguishes between two versions of this sort of argument against scientific realism, what he calls the *Absolute Pessimistic Induction* (API) and the *Relative Pessimistic Induction* (RPI). The former is expressed below.

> **(API):** Earlier theories, though successful, were abandoned. Therefore, despite the success of our current theories, they too will be abandoned.

Park names this the absolute pessimistic induction because "it appeals to the absolute notion that past and current theories are successful" (Park 2019: 96).

One standard response to the API is that current theories predict and explain more phenomena than their predecessors did, so we cannot infer that our current theories will suffer the same fate as those that came before. This historical observation – namely, that new theories are empirically superior to old theories – Park dubs *empirical progressivism* (*ibid.*: 95).

As a means for defending scientific realism, however, empirical progressivism has not gone unchallenged. One critic that Park cites is Mario Alai. According to Alai,

> even in the past empirical knowledge and scientific methodology had improved steadily: for instance, they had improved a lot from 100 A.D. to 1700 A.D., yet many wrong theories were still held at that date, and even thereafter. (Alai 2017: 3282)

Park claims that Alai has constructed the RPI, a new version of the pessimistic induction distinct from the API articulated above. Simply stated, it looks like this:

> **(RPI):** Earlier theories, though more successful than their predecessors, were abandoned. Therefore, despite being more successful than theories that came before, our current theories will also be abandoned.

Park calls this the relative pessimistic induction because "it appeals to the relative notion that theories are *more* successful than their forerunners" (Park 2019: 96). Unlike the API, the RPI seems immune to the threat posed by empirical progressivism. Of the two arguments, then, the RPI appears to present a more formidable challenge to the scientific realist.

But Park demurs: "Like other inductions," he writes, "the API and the RPI are cogent or uncogent, depending on whether their premises are true, and whether their conclusions probably follow from their premises" (*ibid.*). He goes on to argue, however, that neither version of the pessimistic induction can satisfy these two conditions. The problem is that the phrase "earlier theories" in the premises is ambiguous. Depending on whether the phrase refers to so-called *distant* past theories or *recent* past theories, either each premise is implausible, or the inferences from the premises to the conclusions are illegitimate. Hence, the RPI is no better than the API.

Park's case against the API and RPI

To get a clearer picture of why Park thinks the RPI has the same problem as the API, let us first consider his case against the API in more detail. The premise of the API states that earlier theories were overturned. In defense of this claim, Park notes that pessimists often refer to Larry Laudan's list or P. Kyle Stanford's list of abandoned theories, lists which include theories like the humoral theory and the Ptolemaic theory. As Laudan famously says, "for every highly successful theory in the past of science which we now believe to be a genuinely referring theory, one could find half a dozen once successful theories which we now regard as substantially non-referring" (Laudan 1981: 35). If Laudan's view concerning the history of science is correct, the premise of the API is plausible.

But Park protests that such a view clashes with what he calls *historical optimism*. According to Park, "Historical optimists point out that both Laudan's and Stanford's lists are biased in favor of absolute theories, such as the phlogiston theory and the Ptolemaic theory, which were discarded before the 20th century. They are called *distant* past theories, and should be distinguished from *recent* past ones" (Park 2019: 96–97). In contrast to their distant brethren, theories of the recent past enjoyed acceptance during the 20th century. As Park explains,

> The theory of plate tectonics and the oxygen theory are examples of recent past theories. Some recent past theories were formulated before the 20th century, while others were formulated in the 20th century. All of them, however, were accepted in the 20th century. Interestingly, *most* of them are not yet rejected in the early 21st century […] so they can also be seen as current theories. (*ibid.*: 97)

Given this demarcation, Park claims, historical analyses of scientific theories reveal that the majority of past theories fall within the recent past, not the distant past. As a result, historical optimism implies that "most past theories are not overthrown yet, and it confutes the premise of the API that earlier theories were overthrown" (*ibid.*).

One way for the API advocate to get around this is to revise the argument's premise. Instead of the 'earlier theories', she might specify that it is the *distant* past theories that have been overthrown. According to Park, this new premise "would not clash with historical optimism, which says nothing about what portion of distant past theories are retained and discarded" (*ibid.*).

The problem now, though, is that the absolute pessimist has a fallacious argument on her hands. For, given empirical progressivism, it is illegitimate to infer that because the *distant* past theories were disregarded, the current ones will also be discarded. Park says:

> Current theories are more likely to be thrown out […] if recent past ones were thrown out than if distant past ones were thrown out, given that the capacity of current theories to explain and predict phenomena more resembles that of recent past ones than that of distant past ones. So pessimists should investigate recent past theories, rather than distant past ones, to gauge the probability that current ones will be ousted. (*ibid.*)

Proponents of the API thus face a dilemma. On the one hand, if the premise states that the *distant* past theories were overturned, then the premise is plausible, or at least does not clash with historical optimism, but the conclusion does not probably follow. On the other hand, if the premise states that the *recent* past theories were overturned, the conclusion probably follows, but the premise is implausible. Historical optimism and empirical progressivism, therefore, jointly thwart the absolute pessimist's aspiration to have both a plausible premise and a conclusion that probably follows from it.

Moreover, Park contends that pessimists who endorse the RPI face this same dilemma. The RPI, recall, says that the earlier theories, although more successful than their predecessors, were abandoned, so the current theories, although more successful than the forerunners, will also be abandoned. The problem, again, is that the 'earlier theories' in the premise either refers to the distant or the recent past theories. If the 'earlier theories' refers to the distant past theories, Park points out:

> the premise is plausible, i.e., it is plausible that distant past theories, although more successful than their predecessors, were ousted. The conclusion, however, does not probably follow from this premise. Empirical progressivism invalidates the pessimistic inference, for example, that the miasma theory (a distant past theory) was ousted, although more successful than the humoral theory (the predecessor of the distant past theory), so the germ theory (a present theory) will be also ousted, although more successful than the miasma theory (a distant past theory). (*ibid.*: 98)

But if, instead, it is recent past theories that are in view, then the inference is legitimate. However, the premise is now no longer plausible. Given historical optimism, it is false that most theories of the recent past have been overthrown.

So, according to Park, both the API and the RPI suffer from the same defect. Depending on whether their premises refer to the distant or recent past theories, either their premises are plausible, but the inferences from them are fallacious given empirical progressivism, or the inferences are legitimate, but historical optimism renders the premises implausible. In any case, neither argument poses a significant challenge to the scientific realist.

Missing the (pessimist's) point

Despite the force of Park's case against the API and RPI, it is not clear that either argument is an accurate representation of the pessimist's quarrel with the scientific realist. The realist's fundamental conviction, after all, is that the truth of an untested empirical theory is the primary feature in explaining the theory's success (Dawid and Hartmann 2018: 4067). In other words, the explanatory and predictive success of current scientific theories is supposedly best accounted for by postulating a tight link between success and truth. Indeed, as Park himself urges, we should interpret scientific realism as saying that present theories "are likely to be approximately true" (*ibid.*: 101; cf. Park 2017: 71).

The pessimist's anti-realist sentiment, therefore, is arguably more accurately described as an intention to sever the alleged tie between the *success* of a theory and the *truth* (or *approximate truth*) of that theory. To accomplish this, the pessimist need not rely on inductive reasoning. For example, let us consider the following two epistemic states:

(a) Believing that a theory is false.

(b) Not believing that a theory is true or approximately true.

To believe that some scientific theory *will* be overturned implies that one is taking an (a)-type posture toward that theory. But one could take a (b)-type posture toward a theory without also thinking that the relevant theory is false and, thus, without thinking that it is likely to be overturned. For one may simply be agnostic about its truth. All the pessimist needs to break the supposed connection between the success of the present science and its truth, then, is an argument that would justify taking an epistemic stance like (b) toward the current theories. This can be done through a deductive inference, quite apart from any inductive arguments one might employ.

This seems to be a better reading of what pessimists are up to. In fact, contrary to what Park asserts, neither Laudan nor Alai is clearly offering inductive-style arguments like those represented by the API and the RPI. As K. Brad Wray observes, Laudan's argumentative strategy in *A Confutation of Convergent Realism* is *deductive*. Wray (2015: 65) writes:

> Laudan's aim is to show that key realist claims about the connection between (i) scientific success and theoretical truth and (ii) scientific success and reference are false…he relies on just a few examples to undermine the realists' claims about the truth/success and genuine

reference/success links. Thus, a catalogue of failures, the sort of evidence we might expect in an inductive argument, is unnecessary. In this respect, the famous list of failed theories that Laudan does provide in 'Confutation' is unnecessary and constitutes overkill.

Some suggest that Laudan is offering a *reductio ad absurdum* (e.g., Psillos 1999: 102). Others, like Timothy Lyons, describe Laudan's argument as a *meta-modus tollens* (Lyons 2002).

Alai, too, need not be read as giving an inductive argument. Let us consider, once more, the quote from Alai offered by Park: "[E]ven in the past empirical knowledge and scientific methodology had improved steadily: for instance, they had improved a lot from 100 A.D. to 1700 A.D., yet many wrong theories were still held at that date, and even thereafter." Park says that Alai has "constructed the RPI" (Park 2019: 96). But nothing in the quote provided explicitly makes reference to the time-dependent conclusion that our current theories will be most likely found false and will be replaced. More plausibly, given the explanatory connection that realists posit between success and approximate truth, it is an argument to the timeless conclusion that a theory's empirical superiority and success is not a reliable test for its truth. Juha Saatsi (2005: 1090–1091) makes a similar point in connection to Laudan's argument in *Confutation*.

To better align with the anti-realist's intentions, then, we should reconstruct the API and RPI into what could be called the *absolute pessimistic deduction* (APD) and the *Relative Pessimistic Deduction* (RPD), respectively.

(APD): Earlier theories, though successful, were neither true nor approximately true. Therefore, despite the success of our current theories, we should not regard them as true or approximately true.

(RPD): Earlier theories, though more successful than their predecessors, were neither true nor approximately true. Therefore, despite being more successful than the theories that came before, we should not regard our current theories as true or approximately true.

Now, if the phrase the 'earlier theories' in the premises refers to the distant past theories, then, as with the API and RPI, both arguments would have a plausible premise, but the conclusions would not follow from them. For it is reasonable to assume that, given empirical progressivism, the standards of success have increased and developed over time. However, if, instead, the phrase 'earlier theories' refers to the *recent* past theories, then, unlike the API and RPI, the APD and RPD have *both* a plausible premise *and* a conclusion that follows from it. Since, on account of their deductive structure, the premises in each argument only require that *some* recent past theories were not true, historical optimism cannot be invoked to deny the plausibility of the premises. For, as Park admits, historical optimism does not assert that *all* recent past theories have remained unrefuted, just that *most* have (Park 2019: 101).

One example of a now-defunct theory from the recent past is the Bohr-Sommerfeld atomic model. Named after the physicists Niels Bohr and Arnold Sommerfeld, the Bohr-Sommerfeld model was widely accepted in the early 20th century due to its astonishing success in describing the spectrum of the hydrogen atom. Nevertheless, the theory was

later supplanted by the advent of quantum mechanics.[1] Other examples, too, could be given. For instance, the inconsistency between general relativity and the quantum theory is a well-known problem. Park, however, attempts to downplay the implications of this for realism. The inconsistency, he avers, does not show that both of them will be supplanted in the future. Park (2019: 101–102) argues:

While it is, of course, possible that both of them will be, it is also possible that neither of them will be. After all, it is possible that consistency between them will be achieved through a minor modification of one or both of them. And it is also possible that only one of them will be supplanted.

True enough. But the relevant point is this: despite the success of each, *at best* one or both will need to be modified, if not rejected outright, to resolve the current situation. Additionally, it does not appear that the current, variously conflicting interpretations of quantum theory can all be correct as they presently stand (e.g., Frauchiger and Renner 2018: 3711).

Contrary to what Park argues, then, both the absolute and the relative pessimist can achieve a plausible premise and a legitimate inference from that premise to the conclusion. As a result, if even a few examples from recent history demonstrate that scientific theories can be empirically successful and yet fail to refer to the central unobservables they invoke, or fail to be what realists would regard as approximately true, then the APD and the RPD alike pose a challenge to the idea that only realism can explain the success of science.

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[1] According to physicist Augusto Beléndez (2017), it was Erwin Schrödinger's wave equation and probabilistic interpretation of Max Born's wave function that marked the definitive retirement of Bohr-Sommerfeld's atomic model.