Brandon Jardine
PHL321
23 November 2009

_Theoretical Constituents Are Insufficient To Defend Against Laudan's Induction_

The debate between scientific realists and the anti-realists has been one of the most prominent of
the field of philosophy of science. The realist position states that we (or scientists) have good reason to
believe what our (empirically successful) scientific theories say about unobservable entities is true, while
the anti-realist simply propose we do not. One of the most widely known, useful, and criticized attacks
on scientific realism is known as the 'pessimistic induction'. In his 1996 paper, Stathis Psillos attempts to
dismantle Laudan's induction. However, Psillos' argument seems to be insufficient and not convincing.
In true philosophical spirit, I will here attempt to dismantle Psillos' dismantling.

First formed by Laudan, (1981) the famous pessimistic induction can be simply stated:

1. Current successful theories are approximately true.
2. Many past theories have been shown to be false.
3. Many of these false theories still enjoyed being empirically successful.

The purpose of Laudan's induction here is to undermine the main assertion of the realist. That is, we
have good reason to believe our current theories are approximately true because they are empirically
successful. Laudan attempts to show that many, if not most, of all past scientific theories have been
shown to be categorically false. Even so, many of them were indeed empirically successful. Therefore,
empirical successfulness cannot be used as an adequate indicator of truthiness. Obviously this argument
has troubling implications for realists. It is no surprise that there have been several attempts to undermine
Laudan's induction on realism's behalf. These counterarguments generally fall into one of two forms;
either they target the logical validity of the induction, or they attack the evidence the premises are founded on.

A paper consisting of the latter from Hardin and Rosenberg (1982) proposed that Laudan's "historic gambit" was insufficient for his induction to have the gravity that was suggested. According to the duo, realism could remain valid in spite of the evidence raised in support of the pessimistic induction. Laudan would later respond to these concerns (1984), claiming that Hardin and Rosenberg had modified realism to accommodate the historical evidence, and what they were left with was not realism at all. Even after considering Hardin and Rosenberg's argument that there still remain some historical cases that pose significant problems for the realist.

More recently, in 2001, Peter Lewis produced an argument against Laudan's induction that falls into the first category above. Lewis claims that Laudan's induction falls into what, in statistics, is known as the "false positives paradox" (2001, 376). Essentially Lewis' point here is that Laudan's induction falsely accuses the use of empirical success as a test for truth as being unreliable on the basis that it provides a significant number of false positives. He compares this test to a medical diagnostic test that shows perhaps one out of one hundred cases positive when in reality only one out of one thousand are true positives. Lewis suggests that the only way to claim that false positives keep this test from being reliable is to conclusively show that the majority of results gathered from it are false positives.

Psillos' argument falls under the same category as Lewis'. That is, it attacks the logical underpinnings of Laudan's induction rather than the specifics of the evidence. Psillos' argument claims that "theoretical laws and mechanisms which generated the successes of past theories have been retained in our current scientific image" (1996, S308). Psillos proposes that rather than examining our past scientific theories as whole units, we should examine the laws and other components that make up those theories. We can then judge each of these, and according to Psillos, we will find that the successful ones are still accepted currently as true, while the unsuccessful ones have been discarded. Psillos uses this distinction to draw attention to what he calls the "right kind" of connection between empirical successes
and the truthiness of a theory, "genuine empirical success of a theory does make it reasonable to believe that the theory has *truthlike constituent theoretical claims*" (S308).

According to Psillos, the realist should determine what constituents of past theories have contributed to their successfulness (S309). If we examine the constituents that are necessary for successful prediction generation we will find that they are retained in current scientific thinking. When a scientific theory is discarded, the constituents that were essential for the predictive success of the theory are retained and "carried over" into the next scientific theories to be developed. However here, Psillos admits this occurs "sometimes, only as limiting cases of the relevant constituents of the replacing theory" (S310). Additionally, Psillos states "...realists should argue that the truthlike constituents are (more likely to be) those that essentially contribute to... these successes" (S310). Psillos does not state that truthlike constituents are necessarily those that are required for the empirical successes of theories, only that they are likely to be.

Rather than claim like Hardin and Rosenberg (1982) that many of the central theoretical terms do indeed refer to satisfy Laudan's requirements, Psillos posits that many of the terms were not actually 'central', giving the example of caloric (S312). The only time when a term would be 'central', that is, when the "successes of the theory ...warrant the claim that there are natural kinds denoted by these terms" (S312).

Psillos also addresses another problem the anti-realist is likely to raise against his argument. In retrospect, it can be easy to construct which theoretical constituents were responsible for the successes of discarded theories and have been retained in more recent theories. The anti-realist would suggest that rather "realists are bound to first identify the past constituents that have been retained and then proclaim that it was those (and only those) that contributed to the empirical success and which enjoyed evidential support" (S311). Psillos dodges this bullet by making the claim that "eminent scientists do this all the time" (S311). In the same thought, Psillos makes the clarification that the attitude of scientists to determine the responsible constituents is not "all-or-nothing". Scientists routinely differentiate between
the truthiness of some constituents. Some might be truthlike and others might be insufficient (S311).

Psillos has attempted to construct a defense of scientific realism against the scientific induction. However, I would propose that this argument contains holes, and remains insufficient at defending scientific realism against the pessimistic induction. I will attempt to show that Psillos' argument only succeeds in adding an additional layer of abstraction to the realist's concerns, a layer of abstraction that is insufficient in alleviating the relevant concerns. Psillos' proposal also produces additional concerns determining which of his "constituent" members are worth keeping and which should be discarded. Additionally, I hold issues with Psillos' classification of how and why scientists function in their duties.

Psillos claims his "Divide et Impera" mode of defense against Laudan's induction sufficiently protects realism from the latter. As I have explained above, Psillos attempts this by drawing a distinction between scientific theories and the constituent member laws and ideas that make up that theory as a whole. However, in this case, division does not lead to the proverbial conquering. Psillos gives no reason why the constituent parts of scientific theories are not subject to the same problems the theories in whole are up against. In other words, Laudan's induction claims we cannot assume theory A is approximately true by basis of its empirical successfulness due to historical examples of empirically successful theories being subsequently shown false. Likewise, we have no reason to believe that the supposed empirical successfulness of constituents a1, a2, and a3 are responsible for a sufficient indicator of truth. Several examples of constituent pieces that have contributed to successfulness of a theory have subsequently been abandoned by science can be isolated.

A classic example of a constituent that held empirical successfulness are the epicycles of Ptolemaic astronomy. The whole theory of Ptolemaic astronomy consists of members such as epicycles, geocentricity, and orbits associated around the mean of Earth's location and an equant, as well as others. Among these constituent parts, epicycles are clearly the member responsible for the predictive success of the Ptolemaic system, at least as far as retrograde motion of the planets is concerned. That is, epicycles were necessary for the predictive success of Ptolemaic astronomy. This should be sufficiently
satisfactory for Psillos' classification. However, science has now ruled out the notion of epicyclic movement of orbital bodies.

If epicycles are not an example from a sufficiently 'mature' scientific source, one need not look further than Newtonian mechanics. With the advent of quantum mechanics, many components of Newton's models that enjoyed great empirical success in the past have since been discarded. For example, the classical Newtonian formula 'force equals mass times acceleration' fails for extremely large masses. With a more thorough survey of historical evidence a list of these examples comparable to Laundan's 'historical gambit' could be accumulated.

Even if these examples are not taken to be sufficient enough to cast doubt of Psillos' defense of realism, another issue is raised. How, precisely, are we to determine which theoretical constituents are responsible for the predictive success of whole theories? Granted that in some cases this may be apparent, however, examples are present where making this distinction is hampered. This is particularly problematic in situations where the object of the theory in question is a complex unobservable. For example, in the case of DNA transcription, the components of the RNA Polymerase II and protein complex that form around it are well described. However, molecular biologists and organic chemists are at a loss to describe which constituents of transcription theory are responsible for the predictive success of the theory as a whole.

Even in cases where the distinct constituent members of theory are obvious there remain potential problems. Specifically, how exactly are constituent members determined as being successful, and how others are determined to be discarded to the rubbish pile. In 1958 Pierre Duhem published a paper questioning the falsification scheme proposed by Popper and others. Quite similar to Duhem's problem with falsification (1998, 192), upon a test showing a theory false, it is logically impossible to determine which constituent factor contributing to that theory is responsible for the theory's failure. The only way to determine which constituent member of the theory is responsible for the theory's demise is to devise ways of testing each individual member. At this point the differentiation between 'theory' and 'theoretical
constituent' becomes merely semantic. The researcher will be treating the 'constituent' as a theory, in which case the pessimistic induction still applies.

As we can see, Psillos' distinction between theories and theoretical constituents is insufficient. Psillos defines the theoretical constituents as "theoretical mechanisms and laws it [the theory] posited" (S308). If, for instance, we were to take some theory, and examine a specific 'theoretical mechanism or law' of that theory, we would simply be examining a sub-theory. For instance, Newton's physics may be considered one theory. However, 'F = ma' can also be treated, and tested, as a theory in its own right. While deconstructing whole theories to test their constituents is a valuable tool for scientists, it does little to protect the realist from the pessimistic induction.

Additionally problematic is Psillos' description of the methods used by scientists. Regarding the determination of theoretical constituents that are responsible for the empirical successes of theory Psillos claims "eminent scientists do this all the time ...Scientists themselves tend to identify the constituents that they think responsible for the successes of their theories and this is reflected in their attitude towards their own theories" (S311). While scientists do analyse constituent members of theories, it is not the job of scientists to decide which are true and which are false. They merely act to determine which constituents better describe the way the observable world is, that is, which are more empirically successful. To attribute that scientists work to determine which constituents are more truthlike with relation to unobservables is a fallacy, and does not describe the process of scientists accurately.

While at first glance Psillos' argument may seem to defend realism from the pessimistic induction, upon closer examination it eventually boils down to a problem of semantics. The theoretical constituents that Psillos has proposed are vulnerable to the Laudan's pessimistic induction in the same way that scientific theories as a whole are. The distinction between theoretical constituents and theories themselves is not clear. There is a clear record of empirically successful constituents being later discarded by the scientific community, in the same manner as whole theories. This leaves the proposed defense of realism insufficient and unsatisfactory to guard against Laudan's pessimistic induction.
References


