

Instructions

You are asked to submit an essay of 900-1,200 words. You must include a word count, a violation of the word limit will result in a deduction. Your response essay must be clearly structured, precisely worded, validly argued, and diligently spell-checked. Be as concise as possible without compromising clarity. Because the essay you are asked to write is not long, I expect that you spend more thought on just how you want to organize your answer, as well as on rewriting the paper. There are some additional rules to keep in mind, as specified on the syllabus. The paper is worth up to 20 points and must be submitted in class as well as to [turnitin.com](https://www.turnitin.com). For each day your paper is late, five points will be deducted from your point total, although no negative point totals will be given for the midterm papers.

A thought experiment

Imre Lakatos has proposed the following fictitious story as a challenge to falsificationism:

“The story is about an imaginary case of planetary misbehaviour. A physicist of the pre-Einsteinian era takes Newton’s mechanics and his law of gravitation, [...] the accepted initial conditions, [...] and calculates, with their help, the path of a newly discovered small planet, p . But the planet deviates from the calculated path. Does our Newtonian physicist consider that the deviation was forbidden by Newton’s theory and therefore that, once established, it refutes the theory [...]? No. He suggests that there must be a hitherto unknown planet p' , which perturbs the path of p . He calculates the mass, orbit, etc., of this hypothetical planet and then asks an experimental astronomer to test his hypothesis. The planet p' is so small that even the biggest available telescopes cannot possibly observe it: the experimental astronomer applies for a research grant to build yet a bigger one [...] In three years’ time, the new telescope is ready. Were the unknown planet p' to be discovered, it would be hailed as a new victory of Newtonian science. But it is not. Does our scientist abandon Newton’s theory and his idea of the perturbing planet? No. He suggests that a cloud of cosmic dust hides the planet from us. He calculates the location and properties of this cloud and asks for a research grant to send up a satellite to test his calculations. Were the satellite’s instruments (possibly new ones, based on a little-tested theory) to record the existence of the conjectural cloud, the result would be hailed as an outstanding victory for Newtonian science. But the cloud is not found. Does our scientist abandon Newton’s theory, together with the idea of the perturbing planet and the idea of the cloud which hides it? No. He suggests that there is some magnetic field in that region of the universe which disturbed the instruments of the satellite. A new satellite is sent up. Were the magnetic field to be found, Newtonians would celebrate a sensational victory. But it is not. Is this regarded as a refutation of Newtonian science? No. Either yet another ingenious auxiliary hypothesis is proposed or... the whole story is buried in the dusty volumes of periodicals and the story never mentioned again.” (in Imre Lakatos and Alan Musgrave (eds.), *Criticism and the Growth of Knowledge*, Cambridge University Press, 1970, pages 100f)

This story might be taken to show any or all of the following claims:

1. Falsification is ambiguous.
2. There is no asymmetry between verification and falsification.
3. There is an asymmetry between verification and falsification in that we can verify a theory (in case any of the above proposed experiments would have found the conjectural effect), but cannot falsify a theory (even in case all of the above proposed experiments do not find anything).
4. Falsifiability/unfalsifiability is an attribute of the attitude a research community adopts towards a theory, not of the theory itself, and hence that “unfalsifiable” cannot be a criticism of a theory.
5. Newtonian scientists lack good scientific judgment.
6. An exemplary case of good science fails to meet the “falsifiability” standard, and hence that the “falsifiability” criterion
 - (a) does not draw a line between good science and pseudoscience/non-science/bad science;
 - (b) does not pick out a desirable feature.

Does the thought experiment demonstrate any or all of these things? Which, and how exactly? Which not, and why? How might a falsificationist reply to these suggestions? How successful are the replies? What, if anything, is left of falsificationism, at the end of your discussion?