

Should we believe scientific theories about the unobserved?

The aim of this essay is to explore whether we should believe scientific theories of the unobserved. To evaluate this question I will first make a brief description of what constitutes as the unobserved. I will then unpack the philosophy of scientific realism, explain the variations and which I will be focusing on. Then I will invoke an argument that supports scientific realism and challenge it by showing that abduction arguments are not rigorous enough to make a significant claim. By doing so, I will be able to further challenge scientific realism, and show that we cannot believe our scientific theories of the unobserved.

The unobserved in scientific realism refers to simply what a human cannot observe using their senses. Things that can be seen, touched etc. is all part of the observable. The unobserved will constitute as anything that requires instruments to be observed. For example, the usage of microscopes, telescopes etc.

There are many interpretations of scientific realism. With every author seemingly giving their own definition with slight variations and specifications. One commonality between all the definitions is the agreement that the scientific realists believe that the aim of science is to create knowledge of the external world, and they tend to have a very positive attitude at towards science's success in doing so. Though, many definitions of scientific realism purposely do not include whether they believe science *is* successful in doing so, just that it is a *reasonable aim*¹. Still, their optimism is evident. Before delving into the specifics of the variations of scientific realism, it may be useful to first define realism. The term realism is most often used in philosophy in conjunction with other topics, as in, one can be a realist in one issue but an anti-realist in another issue. Though a generic definition can be made that consists of two elements. One, realists acknowledge the *existence* of objects in the world, such as things you are able to touch and see. The second element is that these objects exist *independently* of the mind. That means that these objects are not subject to our thoughts or theories or linguistic practices, their existence in the world is not influenced by our imagination. The existence of such a world independent to our minds will be referred to as the *external world*. For example, a ball is a spherical object regardless of whether you call it square or believe it is a hat. A broader definition made by Peter Godfrey-Smith¹ called *common-sense realism naturalized* accepts that there may be a link between the world and our thoughts and/or our scientific theories. One prominent example he gives to favour this definition is the phenomena of quantum mechanics being subject to being observed, called the observer effect. Although Peter Godfrey-Smith sees this definition as an extension to realism, I am more inclined to see this view as anti-realist and thus I will not be discussing his view on scientific realism in this essay. The scientific realism I will be discussing in this essay is the definition given by Larry Laudan, which he collectively calls *convergent realism*² and is composed of five claims he believes are the central notions of the self-proclaimed scientific realists (but quite likely they do not believe all notions simultaneously). I will only be discussing two of these claims.

1. *Epistemic Realism*: The scientific theories of the 'mature sciences' are approximately true, with the contemporary theory being more true than previous theories.
2. *Semantic Realism*: Scientific theories *genuinely refer*: There are substances in the external world that our scientific theories refer to, such as electrons, genes, electromagnetic waves.

To challenge these views, I will first break down 'The No-Miracles Argument' which is an argument provided in favour of scientific realism claiming "the positive argument for realism is that it is the

only philosophy that doesn't make success of science a miracle"³. The first premise of the argument is that the best theories of contemporary science are extremely successful. The second premise: the best explanation for the success of science is that the theories must be true, or approximately true. And thus via abduction, the scientific theories are approximately true.

1. The best theories of contemporary science are extremely successful
2. The best explanation for the success of science is that the scientific theories must be approximately true

3. Scientific theories are approximately true

The claim of abduction arguments is that the conclusion must be true (or most likely to be true) because it is the best explanation. However, this is not a claim that can be made with any rigor. To prove this, I will give an example. Consider some evidence E. Then consider a range of possible hypothesis that explains E: $H_1, H_2, H_3, \dots H_n$. Out of all these hypotheses, there is one that is considered the best explanation H_{best} . From here there are two inferences that can be made.

1. H_{best} must be true
2. H_{best} is closer to the truth than all the other explanations

The first is obviously problematic, as this would be a deductive argument where the premises guarantee the conclusion. This is not the case for abductive arguments as there are many explanations, none of which guarantee the conclusion. The second option is less obviously problematic, the problematic assumption being the best explanation must be the most true. The best explanation for the success of science to us must be because our scientific theories are true, but that does not indicate it is the only explanation and the truest explanation. It is also true that we do not know whether we have an exhaustive list of explanations, where we are able to pick out which one is the best. The best explanation we may not have yet discovered! Now I will use the same argument to challenge scientific realism.

The fact that science is in a constant state of flux is a widely accepted idea, although the exact mechanics of it is debated but that will not be discussed in this essay. This shows that science is continuously broadening their scope of possible explanations for a particular phenomenon, and in doing so, scientists decide that the best explanation so far must be the approximately true. But has this been evident in history? Newton's theory of gravity being a force is an example. This was the best explanation at the time for the phenomenon of objects accelerating towards the Earth, and even though it was a very constructive finding with accurate predictions, could it be considered 'correct'? There is no such force as gravity, and the theory did not stand for predicting the force of gravity at larger distances (interstellar). This is an argument against *epistemic realism*. The caloric theory was the best explanation for the transfer of heat energy from one object to another, where heat was considered a type of fluid. Although this theory was also successful for its time, it was not correct. There is no such thing that exists in the world as a fluid called heat. This is an argument against *semantic realism*. This shows that the best explanations in science have no relation to their 'truthfulness' or 'correctness', and what evidently happens is science is constantly broadening their scope of possible explanations, with the best explanation being the one that can most accurately predict reality.

In conclusion, science scientific realists believe that scientific theories are approximately true, with contemporary theories being more true than previous theories, and that they genuinely refer. I have shown that science is essentially compromised of abductive arguments, and that the best

explanation gives no indication of whether it is true or if they refer. Successive scientific theories are, however, more successful in predicting reality.

Bibliography

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2. Laudan, L.. (1981). A Confutation of Convergent Realism. *Philosophy of Science*, 48, 19–49.
3. Chakravartty, Anjan. (Summer 2017 Edition). Scientific Realism. *The Stanford Encyclopedia of Philosophy*. <<https://plato.stanford.edu/archives/sum2017/entries/scientific-realism/>>