

Underdetermination, instrumentalism and realism

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Understanding Underdetermination in conjunction with realism and instrumentalism

The present essay is about the understanding of under determination thesis in conjunction with the realism and instrumentalism. As we know that realism and instrumentalism are two opposite views in philosophy of science, so by explaining the two it would be much easier to grasp the concept of under determination thesis, which is one of complex doctrine.

The intended audiences of this essay are science student's and people who are interested to know about the philosophical issues in science. I divide the essay into four of parts. The first part explains the realism and instrumentalism concepts, second part explains the under determination thesis in detail and then the third part will state the views of different philosophers about three schools of thoughts. The fourth and the final part conclude the whole argumentation

Realism

The word realism in the dictionary means the tendency to view or represent things as they really are. [dic]. In philosophy of science it can be defined as “the philosophical doctrine that abstract concepts exist independent of their names”. It can be explained as an approach in philosophy that considers objects as they are in the universe as real things and their characteristics as a secondary thing. The advocate of realism are called realist and it is important to differentiate the realist's.

A person can be realist about the different kinds of things i. e. mountains, physical objects, numbers, universe etc. but in the case of a philosopher, it is

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required to specify that for what object/thing the philosopher is realist [book]. An American philosopher name Hilary Putnam stated that “ A realist with respect to a given theory holds the following:

What makes them true or false is something external that is to say, it is not in general our sense data, actual or potential, or the structure of our minds, or our language, etc.

Furthermore he says that the positive argument for realism is that it is the only “ philosophy that does not make the success of science a miracle”.

[Book]. Generally, in science established scientific theories are treated as a true fact, but according to realist these theories would be treated as a successful explanation of the whole scientific process or its relation to an object, and not as a whole truth. [Book] An example is that sun, mountains, building etc. exists in this world, but the attributes like length, width, colour etc. are either dependent or independent of the environment.

For example the sun is spherical in shape, so it is independent from any material thing of this universe. But in case of a building, its shape and size, all depend upon the person who designed or built it. So it can be said that reality is related to mind and environment.

In general, Realism is supposed to be a term that relates to number of subjects i. e. ethics, aesthetics, causation, modality, science, mathematics, semantics etc. When we talk about the realism in the context of science then the intention is to elaborate the scientific realism which has a number of dimensions i. e. metaphysical, epistemological and methodological. Besides

this it is also the truth that there is no single version of scientific realism which is being accepted by all the scientific realists.

The doctrine of scientific realism states that “ the world studied by science exists and has the properties it does, independently of our beliefs, perceptions, and theorizing; that the aim of science is to describe and explain that world, including those many aspects of it that are not directly observable; that, other things being equal, scientific theories are to be interpreted literally; that to accept a theory is to believe that what it says about the world is true, and that by continually replacing current scientific theories with better ones. Science makes objective progress and its theories get closer to the truth”.

Realism has two schools of thought, first one is called Extreme realism, represented by William, a French philosopher; according to him “ universals exist independently of both the human mind and particular things”. The second one is moderate realism and according to which “ universals exist only in the mind of God, as patterns by which He creates particular things”. The main proponent of this view was St. Thomas Aquinas and John of Salisbury.

According to epistemological view of realism, things exist in this universe, independent of our understanding or perception. This point is totally opposite to the theory of idealism, which states that “ reality exists only in the mind”.

By having a brief explanation of realism, instrumentalism will be discussed, which is the opposite view of realism and most of time called Antirealism. Antirealism is a doctrine that rejects realism, and includes instrumentalism, <https://assignbuster.com/underdetermination-instrumentalism-and-realism/>

conventionalism, logical positivism, logical empiricism and constructive empiricism.

Instrumentalism

Instrumentalism is treated as a doctrine that states “ theories are merely instruments, tools for the prediction and convenient summary of data” [Book]. In other words it can be defined as “ concepts and theories are merely useful instruments whose worth is measured not by whether the concepts and theories are true or false, but by how effective they are in explaining and predicting phenomena”.

The point is that in order to make predictions from theories, logic is required, so it can be hard to say theories have no truth values. In view of this instrumentalists admit that theories have truth values, but do not accept this argument that theories should be treated as accurately true. In view of this T. S. Kuhn said that “ Theories may have truth values but their truth or falsity is irrelevant to our understanding of science”. [Book]

In other words instrumentalism evaluates the significance of a theory with respect to empirical evidence and did not require the understanding of the actual phenomena. For example Newton gravity model is understandable and working fine, but it has no theoretical foundation [Answer. com]

The another aspect of instrumentalism is that it relates closely to pragmatism and this point of view opposes the scientific realism because according to this, theories are more or less true in nature. Moreover, instrumentalism refutes that theories can be evaluated on the basis of truth. Theories will not be perceived as air plane black box which gives output on <https://assignbuster.com/underdetermination-instrumentalism-and-realism/>

the basis of observed input. The point is that there should be a clear distinction between theory and observation that further leads to a distinction between terms and statements in each type.

Like in science for statement of observation there is a specific meaning for an observable truth, for example if “ the litmus paper is red”, so the observation terms have their meaning fixed by their referring to observable things or properties, e. g. “ red”. Theoretical statements have their meaning fixed by their function within a theory and aren’t truth evaluable, e. g. “ the solution is acidic”, whereas theoretical terms have their meaning fixed by their systematic function within a theory and don’t refer to any observable thing or property, e. g. “ acidic”.

Though you may think that “ acidic” refers to a real property in an object, the meaning of the term can only be explained by reference to a theory about acidity, in contrast to “ red”, which is a property you can observe. Statements that mix both T-terms and O-terms are therefore T-statements, since their totality cannot be directly observed”.

There is some criticism of this distinction, however, as it confuses “ non-theoretical” with “ observable”, and likewise “ theoretical” with “ non-observable”. For example, the term “ gene” is theoretical (so a T-term) but it can also be observed (so an O-term). Whether a term is theoretical or not is a semantic matter, because it involves the different ways in which the term gets its meaning (from a theory or from an observation).

Whether a term is observable or not is an epistemic matter, because it involves how we can come to know about it. Instrumentalists contend that <https://assignbuster.com/underdetermination-instrumentalism-and-realism/>

the distinctions are the same, that we can only come to know about something if we can understand its meaning according to truth-evaluable observations. So in the above example, “gene” is a T-term because, although it is observable, we cannot understand its meaning from observation alone.

The explanation of realism and instrumentalism above has provided us the capability to understand the topic with much insight. Now, I switch to underdetermination thesis. From the above discussion we have the knowledge that instrumentalism is related to pragmatism and this point of view is in contrast with the scientific realism, which states that theories are often more or less true. Here, I refer to Quine, who said that theories can be underdetermined by all possible observations [23], and Newton Smith's, treat this as a threat to realism. He said, realism in his sense has to be rejected if there can be cases of underdetermination of theories.

Under determination

As we know that underdetermination is a thesis that is “used in the discussion of theories and their relation to the evidence that is cited to support them”. [1] Arguments from underdetermination are used to support epistemic relativism by claiming that there is no good way to certify a theory based on any set of evidence. A theory is underdetermined if, given the available evidence, there is a rival theory which is inconsistent with the theory that is at least as consistent with the evidence. Moreover, underdetermination is treated as an epistemological issue about the relation of evidence to conclusions.

Historical background

The subject gets its first attention by René Descartes, a French philosopher and mathematician in the 17th century. He presented two arguments related to under determination.

“ While dreaming, perceived experiences (for example, falling) do not necessarily contain sufficient information to deduce the true situation (being in bed)”.^[2] As we know that it is not always possible for a person to separate dreams from reality and the theory that what is real or dream at a certain time is underdetermined.

The second argument of Descartes's is called demon argument “ which is a variant of the dream argument that posits that all of one's experiences and thoughts might be manipulated by a very powerful being (an “ evil demon”) that always deceives. Once again, so long as the perceived reality appears internally consistent to the limits of one's limited ability to tell, the situation is indistinguishable from reality, one cannot logically determine between correct beliefs from being misled; this is another version of under determination”.^[2]

The second person who talks about under determination was David Hume, who does not use the word under determination specifically but an argument about the problem of induction. I will discuss the induction later in the essay while explaining the under determination types.

The Under determination thesis gets the recognition in the twentieth century through the work of Thomas S. Kuhn, who is a famous theoretical physicist and philosopher. He was very much prominent due to his work, The <https://assignbuster.com/underdetermination-instrumentalism-and-realism/>

Structure of Scientific Revolutions that offered an alternative to linear models of scientific progress. According to Kuhn the under determination has a place to for argumentation against theories in the philosophy of science, and scientific realism. According to Khun the under determination can be divided into two types the weak and strong under determination. The both could be stated in the following words:

Weak underdetermined is that the currently available evidence is not sufficient to prove the argument, but some evidence that will be available in the future might do this.

Strong underdetermined is to claim that it is principally impossible to get evidence that could fully resolve the argument between the opponent theories.

Besides strong and weak underdetermined theory there are two other attributes called deductive and inductive under determination. The two rival theories could be deductively underdetermined when the available evidence does not completely deny either theory. The theory is inductively underdetermined when theories are compatible with the available evidence, but still tries to determine, which theory could be a better failure

A weak under determination can turn to a strong one if it avoids the attainment of future evidence that turns it into deductive under determination. A counter argument is that it is not possible for a theory to be accurately strong and inductive.

In general weak under determination arguments are focused on the availability of evidence for an explicit set of theories, and strong under determination mostly entails common epistemological arguments that relates to the type of evidence and its viability for a particular or general theory. Furthermore, it is generally acknowledged that all theories are weakly underdetermined, but in case of some specific purpose all theories are strongly underdetermined.

Explaining the types of under determination thesis, Ludan said that “ for any finite body of evidence, there are indefinitely many mutually contrary theories, each of which logically entails the evidence”. So in other words it can be said that deductive under determination is under determination of selecting theory through a logical method.

Finally, the term under determination as thesis is associated with two respectable names Pierre Duhem and W. V. Quine in philosophy of science, “ that neither the truth nor the falsity of any scientific theory is determined by evidence”.

According to Duhem-Quine Under determination is a “ relation between evidence and theory. More accurately, it is a relation between the propositions that express the (relevant) evidence and the propositions that constitute the theory. Evidence is said to underdetermine theory”.

From the above it can be said that evidence is not enough to prove the theory, belief or truth. Moreover, only the availability of evidence is not enough to make the theory a credible one. In view of this we can call the first argument a deductive and the second inductive under determination. Hence, <https://assignbuster.com/underdetermination-instrumentalism-and-realism/>

according to under determination thesis, both arguments have required some definite epistemic proposition, and belief in a theory could not be justified on the basis of evidence. For under determination types, Duhem, also said that “ logic alone cannot take us from the falsification of a prediction to a refutation of an isolated hypothesis. Importantly, deductive under determination does not mean that theory choice is underdetermined, nor does it mean that there is more than one reasonable conclusion given certain experimental evidence”.

Up until now we have a basic understanding of the under determination thesis, so now I will discuss what realism actually is, the theoretical frame and the origin of the concept.

Another argument against scientific realism, deriving from the under determination problem, is not as historically motivated as these others. It claims that observational data can in principle be explained by multiple theories that are mutually incompatible. Realists counter by pointing out that there have been few actual cases of under determination in the history of science. Usually the requirement of explaining the data is so exacting that scientists are lucky to find even one theory that fulfils it.

Furthermore, if we take the under determination argument seriously, it implies that we can know about only what we have directly observed. For example, we could not theorize that dinosaurs once lived based on the fossil evidence because other theories (e. g., that the fossils are clever hoaxes) can account for the same data. Realists claim that, in addition to empirical adequacy, there are other criteria for theory choice, such as parsimony.

In particular, it must not be confused with what Newton-Smith takes to be a “minimal common factor among the wide range of philosophers who in recent years have advocated a realist construal of scientific theories”. This common factor consists of the following theses:

(1) “ Scientific theories are either true or false and which a given theory is, it is in virtue of how the world is”,

(2) “ If a theory is true, the theoretical terms of the theory denote theoretical entities which are causally responsible for the observable phenomenon whose occurrence is evidence for the theory”,

(3) “ We can have warranted beliefs (at least in principle) concerning the truth values of theories”,

(4) “ The historically generated sequence of theories of a mature science may well be a sequence of false theories but it is a sequence in which succeeding theories have greater truth-content and less falsity content than their predecessors”. We may refer to (1) as the objectivity, (2) as the causality, (3) as the decidability, and (4) as the convergence of scientific theories.

Newton-Smith uses the name “ realism” for the combination of these four theses, and he also seems to hold that this is the standard use of the term. It is clear that theoretical realism in the weakest sense entails neither objectivity, nor causality, nor decidability, nor convergence. In particular, some theoretical propositions may be true even if no scientific theory as a whole is either true or false.

Moreover, it is doubtful whether realism in Newton-Smith's sense entails theoretical realism. For example, if all theoretical propositions are false, then theoretical realism is false, but realism in Newton-Smith's sense might still be true. In any case, one of Newton-Smith's main theses is that realism in his sense has to be rejected if there can be cases of under determination. In particular, he claims that either objectivity or decidability has to be weakened if under determination can occur to give up decidability is what he calls the ignorance response (to under determination).

This " involves embracing the possibility of inaccessible facts - facts concerning whose obtaining we could have no information". To give up objectivity is what he calls the arrogance response. This " amounts to holding that if we cannot know about something there is nothing to know about". 36 Notice, that this holds only for under determination in Newton-Smith's sense, i. e. under determination by all possible data.

It does not hold for the other kinds of under determination mentioned above. In other words, it is only when an underdetermined theory is empirically viable that we cannot know that it is true or that it is false (either because it is neither true nor false, or because we cannot know, even in principle, what its truth value is). In general, we cannot have under determination (of any kind) together with empirical viability, objectivity, and decidability. If a theory is underdetermined, we cannot know that it is true. This I accept.

At first, it appears that Quine would not accept this. He holds that there may be two best total theories which are empirically viable and incompatible, but that we may know, at least in principle, that one of them is true and the

other false. However, it seems that Quine is then using “ true” and “ false” in a non-realistic sense; according to him, “ to call a statement true is just to reaffirm it”. He does not seem to assume that there is some objective reality, “ the world”, such that the truth of a statement consists in its correspondence with this reality. Hence, presumably he would reject the objectivity thesis which is part of realism in Newton Smith’s sense.

Realism/Anti-realism

Given the various epistemological difficulties (under determination, problem of induction, rationality, social forces), and the lack of a consensus on these issues, why should we think that our theories are actually describing reality?

The apparently large gap between observational and theoretical knowledge inspires worry about realism

Metaphysical difficulties come into play here as well—we do not have good understandings of the nature of laws and causation, explanation, so how can we claim that we are discovering the nature of the universe?