

Thoughts on the metaphysics of Science

"How can science claim to be truth?"

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Truth-Finding is a process that rests on epistemology – your beliefs about what you can and can't know. Any process of finding truth rests on a belief concerning what truth is like and concerning our ability to find it. We will address the question here in a descriptive way. What is the faith that underlies scientific methods? Is truth finding in science a computable algorithm, or is it open ended? Although there are very many particular methods used by individual scientists, there are some general principles concerning how science works. Experimental physical science will be the primary subject in view.

Clearly it is not possible to have a valid method for truth-finding if truth does not exist, or if truth is necessarily inaccessible. The starting point for truth finding, therefore, is a belief in truth and in the possibility of knowing the truth by some means. Attempts to prove the capability of science to find truth run into the trouble that they must assume what they intend to prove. The philosophy of objectivism tautologically declares that science finds truth- this is faith in the objectivity of the "self". In each case, the hope of knowing truth rests on some kind of faith. Historically, the faith that supports science came principally from Christianity as is clearly demonstrated in the writings of Kepler, Newton, Faraday, Maxwell, etc. Today, science is often presented to the public as a world-view, or as a religion in itself (called scientism, materialism, or methodological naturalism), but there is no philosophical justification for doing this. Science, like language, is something that all people do to some degree or another. As in the case of language, it helps considerably if you think about what you are doing and this is part of what it means to study science. **You don't have to be a materialist.**

Science is an interplay of thought, action and observation. It will be useful to refer to Figure 1 in the following discussion. Firstly, at the center of scientific activity is truth. The scientist must believe that the long and tedious process of scientific study will actually produce the possibility of knowing some truth. The first element of science is some kind of controlled experience or observation of something which is believed to be real. Proceeding clock-wise around the diagram, we see that the next step is a process of analysis where individual aspects of the events observed are isolated and simple relationships observed. The goal here is to look for some kind of intelligible patterns in the events observed by means of these selected aspects. Then there is the bold step of generalization, where it is proposed that the events observed are particular manifestations of a more general principle. This step leads to the formulation of a theory. Once the theory is constructed, it becomes necessary to explore the logical/mathematical consequences of the theory. In this exploration the goals are to see if there are contradictions in the theory and to see if the theory has interesting predictions. The theory must be put to the test, and this is best done through technology (applications). These applications usually lead to either the recognition of weaknesses or limitations of the theory, or to the discovery of new directions of inquiry. Thus the cycle continues.

Assumptions

Truth must have several attributes in order to be captured by science. For example:

- 1) Truth must be stable, because science takes time to operate and we verify by repetition of experience.
- 2) Truth must be separable into parts, because we can't understand everything at once.
- 3) It must be possible to know something true without knowing all truth.
- 4) Truth must be structured in an intelligible way that is expressible in (perhaps not yet known) language.
- 5) It must be possible to control experiments and to repeat them in order to isolate relations.
- 6) Truth must have objective existence so that different scientists can independently apprehend it.
- 7) The truth must be something that the scientist is willing to accept, otherwise truth is rejected.
- 8) It must be possible for the cycle of scientific research to correct errors and to come closer to a faithful representation of the truth.

It is important to recognize that scientific research is an open process. Each step in the cycle represented in Figure 1 involves making decisions which require judgment. Which aspects of the observed phenomena should be taken as determinative? What possible relations between these aspects should be considered? What elements in the relations between the aspects should be seen as general and which ones as particular? How should the theory be represented? What are reasonable implications of the theory and what are unwarranted extrapolations? What are responsible applications of this knowledge? What experiments are the best ones to pursue? The elements of this discussion include ethical as well as epistemological and metaphysical questions. Many researchers confine their work to technical questions, but the community of scientists is ultimately confronted with these questions in order to advance research. The process of science cannot be reduced to an algorithm. Furthermore, the task of determining the meaning of what is studied is beyond the reach of scientific method. This is exemplified by the fact that, were it not for the Rosetta stone, no amount of scientific research would have been able to decode hieroglyphics. Scientific method alone cannot determine the meaning of anything.

These assumptions, and there are certainly more assumptions implied by scientific research that have been left off the list, mean that science has limitations. On the other hand it is not necessary to assume that all of truth and reality are within the grasp of science in order to believe that science can know some truth. Nor is it necessary to believe that science is the only way of knowing truth. Indeed there are good reasons to believe that all of truth does not meet the criteria for scientific study. For example, if science is the only way of knowing truth and science does not determine meaning, then everything, including science, is meaningless. The methods which science needs cannot themselves be defined by science – metaphysics and epistemology are branches of philosophy. Furthermore, there are other disciplines that are not fundamentally experimental that require methods different from those of experimental science. Each area of investigation in the university has methods of exploration that reflect that nature of their discipline.

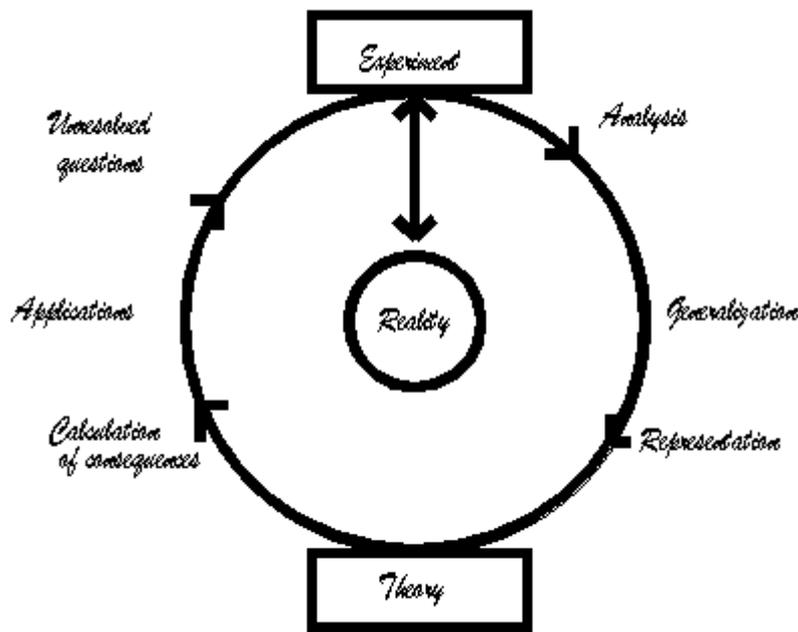


Figure 1