



Larry Laudan's View of Scientific Progress

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Problem-Solving Model and Reticulated Model

The problem of scientific truth has always been a crucial problem in the philosophy of science. The previous schools of logical empiricism and falsificationism believed that science and truth contained each other. But historicists, such as Thomas Samuel Kuhn, Paul Feyerabend, etc., believe that truth and science have nothing to do with each other, and the two are completely separate. Larry Laudan also believed that science has nothing to do with truth, but he tried to find a middle way between logicism and historicism. He proposed a problem-solving model and a reticulated model of scientific progress. He conducted detailed analysis and research on scientific problems, which are divided into empirical problems and conceptual problems. If we are astonished at anything about nature and attempt to explain and account for it, it constitutes an empirical problem. Empirical problems include unsolved problems, solved problems, and anomalous problems. Unsolved problems are those empirical problems which have not been adequately solved by any theory; solved problems are those empirical problems which are adequately solved by a theory; anomalous problems are those that are not solved by a particular theory, but one or more of its competitors have. Laudan's concept of anomalous problem is different from previous theories on anomaly, it is a comparative concept between theories. Its precise definition is: Whenever an empirical problem, p , has been solved by any theory, p then constitutes an anomaly for every theory in the related domain which does not also solve p . Solved problems support a scientific theory, anomalous problems constitute evidence against another theory, and unsolved problems point the way for research and exploration. Conceptual problems include internal conceptual problems and external conceptual problems. Internal conceptual problems arise

when a theory exhibits some internal inconsistency, or when the basic analytical categories of the theory are ambiguity or circularity within the theory; external conceptual problems are generated by a theory, T , when T conflicts with another theory or doctrine which the proponents of T believe to be rationally well founded. External conceptual problems play a decisive role in theory evaluation and are more important than internal conceptual problems.

Laudan proposed a problem-solving model based on the analysis of the problem and combined it with the history of science. The solved problem—empirical or conceptual—is the basic unit of scientific progress; Scientific aim is to maximize the scope of solved empirical problems, while minimizing the scope of anomalous and conceptual problems. Traditional philosophy of science uses rationality to explain progress, but Laudan believes that progress is easier to understand than rationality. Rationality lies in making the most progressive theoretical choice, and cognitive progress is measured by problem-solving effectiveness. The overall problem-solving effectiveness of a theory depends on assessing the number and importance of empirical problems which the theory solves and deducting the number and importance of anomalies and conceptual problems which the theory generates. The ultimate purpose or fundamental meaning of scientific research is to solve problems, and the standard of scientific progress is the problem-solving effectiveness of theory. The problem-solving model provided an important research paradigm for scholars engaged in philosophy, history of science, and natural science.

Laudan criticizes the paradigm of Thomas Samuel Kuhn, the research programmes of Imre Lakatos, and proposed the concept of research traditions: a research tradition is such a set of general

assumptions, which are about the entities and processes in a domain of study, and about the appropriate methods to be used for investigating the problems and constructing the theories in that domain. The concept of research traditions gives the restriction for raising and solving problems, and describes the general characteristics of scientific changes. It is more consistent with the history of science, and easier to understand than paradigms and research programmes. The concept of research traditions pays attention to the importance of conceptual problems in scientific debate and scientific evaluation; the relationship between research traditions and their constituent theories becomes clearer; the structure of research traditions is more flexible, and its core assumptions are not unselectable.

Laudan criticized the hierarchical model of rational consensus formation advocated by Karl Popper, Carl Gustav Hempel, Hans Reichenbach, in which the dissensus of disagreement at the factual level is resolved at the methodological level, and the dissensus of disagreement at the methodological level is resolved at the axiological level. Laudan analyzed the defects of the hierarchical model and proposed a scientifically rational reticulated model. It eliminates the hierarchical order among theory, method, and aims, emphasizing their interdependence and mutual justification. The choice of a scientific theory must conform to a certain methodological principle and a certain scientific goal or value, and the scientific theories proposed to give the restrictions and requirements on the methodology and scientific goals. Methodology choice depends not only on the common cognitive goal of the theory but also on the theory obtained by using which methodology can better reflect the cognitive goal. When judging whether the cognitive goal can be realized, the methodology of realizing the goal can be used as the judgment standard. The reticulated model does not allow the rationality of theories, methods, and goals to be judged in isolation. When talking about the rationality of any one party, one should look at its relationship with the other two parties. The reticulated model overcomes the defects of the hierarchical model and is also a supplement to the problem-solving model.

Laudan's problem-solving model and reticulated model were developed by Chinese scholar Lei Ma into a more refined model of coordination force. In the model, Lei Ma accurately described the scientific aims and standards of scientific progress, such as novelty, simplicity, unity, certainty, and diversity, which are generally recognized by historians of science and philosophers of science and gave these coordination forces unified definitions and theoretical explanations.

Representative Works

Laudan's representative works are: "Progress and Its Problems: Towards a Theory of Scientific Growth" (University of California

Press, 1977), "Science and Hypothesis" (Springer Netherlands, 1981), "Science and Values: The Aims of Science and Their Role in Scientific Debate" (University of California Press, 1984), "Science and Relativism: Dialogue on the Philosophy of Science" (University of Chicago Press, 1990), "Beyond Positivism and Relativism: Theory, Method, and Evidence" (Avalon Publishing, 1996), "Danger Ahead" (Wiley, 1997), "Truth, Error, and Criminal Law: An Essay in Legal Epistemology" (Cambridge University Press, 2006), "The Law's Flaws: Rethinking Trials and Errors?" (College Publications, 2016). Among them, "Progress and Its Problems" and "Science and Values" were translated into many languages and published. "Truth, Error, and Criminal Law" had a great influence in the academic circle of criminal law.

Resume



Larry Laudan (1941-2022) graduated from Princeton University in 1965 with a Ph.D. He was a professor of philosophy at the University of Pittsburgh, a professor of philosophy at Virginia Tech and State University, and a professor of philosophy at the University of Hawaii. He also taught at the University of London, the University of Texas Law School, and the National Autonomous University of Mexico. With the help of Adolf Grünbaum, Larry Laudan founded the Department of History and Philosophy of Science at the University of Pittsburgh. He co-founded and edited the journal *History of Science and Philosophical Studies* with Gerd Buchdahl. He later succeeded Adolf Grünbaum as director of the Center for the Philosophy of Science. Laudan was once an editorial board member of the internationally authoritative academic journals "Philosophy of Science", and "American Philosophical Quarterly", and one of the editors-in-chief of "Pittsburgh Series in Philosophy and History of Science."

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Conflict of Interest

No conflict of interest.