

# Encyclopedia of Research Design

## Theory

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Book Title: Encyclopedia of Research Design  
Chapter Title: "Theory"  
Pub. Date: 2010  
Access Date: June 17, 2015  
Publishing Company: SAGE Publications, Inc.  
City: Thousand Oaks  
Print ISBN: 9781412961271  
Online ISBN: 9781412961288  
DOI: <http://dx.doi.org/10.4135/9781412961288.n458>  
Print pages: 1499-1503

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<http://dx.doi.org/10.4135/9781412961288.n458>

Theory is generally understood as a systematic representation of a genuine problem, articulated as far as possible in mathematical terms in the natural sciences or logical (or strictly linguistic terms) in the life and social sciences. The systematic nature of theory is normally aimed at providing explanatory leverage on a problem, describing innovative features of a phenomenon or providing predictive utility. The empirical adequacy required of a theory is a controversial feature of theories and often differs radically across disciplines. As most research in the sciences and social sciences is theory driven, that is, is concerned with the refinement or refutation of theoretical claims, the design of that research will have an immediate impact on the nature of theory construction and the presumed relationship among theory construction, observation, and the outcome of empirical research.

## Positivism and Its Impact on Theory

The traditions of research in the social sciences have consistently argued for a theory-driven approach to the design of investigations, particularly in its more experimental formulations. This tradition became established in the 20th century through the adoption of logical-positivist premises and a hypothetico-deductive framework in research that focused on observable features of the world as the final arbiter of research outcomes. Late 19th-century positivism, originally articulated by Auguste Comte, was influential in guiding the new social sciences, particularly psychology, in adopting research methods that would allow observed features of the world to determine the outcome of research questions. This was done to remove the influence of metaphysics and theology in science and originally had a salutary effect. However, this naïve version of positivism suffered from shortcomings that would make themselves felt in the 20th century. In particular, it ruled out the possibility of allowing entities such as atoms the status of real objects in science because they were unobservable. Ernst Mach, the Austrian physicist and philosopher whose philosophical views were important in the early social sciences, championed this version of positivism.

Positivism reduced the problem of theory to one of sensations, namely, the experience of an experimental outcome would in fact be the basis for a scientific theory. This was useful in removing the effects of metaphysics from science but hindered the

progress of science as it came to rely ever more on unobservables. Logical positivism (in the version promulgated by the Vienna Circle) sought to ameliorate this. The principle of verification advanced by the movement claimed that the meaning of a statement is determined by sense-experience. However, this sense-experience can be direct or indirect allowing for the introduction of concepts (theory) that are linked to observations while not directly observable themselves. Instead, protocol sentences (direct observation terms) were linked to axioms (theoretical terms) with logico-mathematical terms. One consequence of this view is the rigid separation of theory from observation or data. Although it was dominant until after World War II, this position created an important sense that theory was to be understood as [p. 1499 ↓ ] a rigorous feature of experimental science. This was especially the case for theory that was formulated in mathematical terms or in terms of so-called laws. An additional concern that sprung out of the work of the logical positivists was a preoccupation with the unity of science. Dominant for much of the 20th century, the unity of science view was that all sciences are related through a thoroughgoing reductionism that would ultimately base all scientific theory on the laws of physics (although Otto Neurath, a logical positivist, was generally opposed to a crude reductionism of this sort).

Theory in the social sciences then was a highly restricted affair. Limited by its necessary ties to the nature of observations, restricted by logic, and pursued for its ends as a formalization of research, theory remained deeply tied to the immediate problems of the laboratory. For example, the learning theories in psychology that emanated from the behaviorist laboratories of Clark Hull, Edward C. Tolman, or Burrhus F. Skinner were, despite their elegance, often restatements or redescriptions of what the investigators thought the results of their experiments demonstrated. That is, the learning theories themselves were formulated in such a way as to ensure that the empirical demonstrations never deviated in large measure from the claims of the theory. Skinner famously called for an end to theories of learning altogether, although he continued to theorize apace.

Indeed, logical positivists themselves recognized that there was a problem with theory in their account. Carl Hempel's "paradox of theorizing" argues that if the terms and general principles of a scientific theory serve their purpose by establishing connections among observable phenomena, then they can be eliminated. This is because a chain of laws and interpretive statements that establishes such a connection should be

replaceable by a statement that directly links observational antecedents to observational consequences. The dilemma then, for Hempel, was that if the terms and principles of a theory are unnecessary, then theory is unnecessary. Hempel claimed that perhaps theory is still useful because of its inductive, predictive, or heuristic uses, but this did not limit the damage to notions of logical positivism. Obviously, no one was about to abandon theorizing. Furthermore, others such as Karl Popper already noted that theories seemed more like “conjectures” than the formal arrangements of the logical positivists. Imre Lakatos argued famously that the core of scientific theories is generally protected by what he called auxiliary hypotheses and, hence, theories can never be just connecting statements between observational antecedents and consequences. By the 1970s, it was clear that a conception of theories in science was emerging that emphasized the surplus meaning of theory above and beyond the mere redescription of empirical content.

## End of the Received View

After World War II, severe doubts crept into the “received view,” as the logical positivist version of science was often called. Norwood Hanson in his *Patterns of Discovery* (published in 1958) was among those who argued that the observations themselves are “theory laden.” One does not naïvely observe the world as it is but always approaches the world with some preconceptions in place. Hanson argued that it is not a question of using or testing a theory but is the creation and discovery of what becomes an appropriate theory. In that sense, he claimed that he was more concerned with the way in which theoretical systems are built into observations such that they come to lead one to understand certain facts. Hanson did not claim that theories created facts de novo but that observations were always already colored by the theories or concepts that were used to frame the observations.

The question of theory and its relationship to data was revisited anew by Thomas Kuhn. In his influential book *The Structure of Scientific Revolutions* he increased the revisionist impulse in the understanding of science. Arguing that scientific advances run in cycles, Kuhn proposed that deeply embedded worldviews allowed science to proceed in a “normal” fashion until such time that the cracks in the established view led to a radical realignment, and a “scientific revolution” turns over the established “paradigm.”

Although Kuhn's work was later criticized, not least for its ambiguous use of the notion of paradigm, the overall impact was to steer philosophers and historians of science away from an emphasis on prescribing how science should proceed to describing how it [p. 1500 ↓ ] might actually work in the context of human institutional and social activities. Contemporary research in science studies has continued this tradition by emphasizing the social nature of scientific progress.

## Theories and Models

If theories are not precise statements of law, or systematic organizers of fact, then their role must be found elsewhere. Some philosophers of science, who were influenced by the work of Frederick Suppe, argued that theories were set-theoretic structures. This semantic conception of theories treats theories as abstract structures that stand in mapping relations to phenomena. In addition, on this view, scientists are busy constructing models that are idealized, partial simulations of the world or that probe real-world systems. According to Suppe, theories and models consist of mathematical spaces or structures standing in mapping relations to other systems. The consequence of this claim is that the structure of a scientific model can be examined as a semantic conception. These discussions have tended to focus in recent years on the problem of testing theories in such a way that the test is not tautological.

## The Ascendance of Functionalism

In the social sciences, however, where few models are expressed in precise mathematical terms, the relationship between theory and data or, more generally, theory and observation, continues to be a feature of ongoing debate. Theories come in different types and no one has determined the point at which the honorific label of theory is applied to a hunch or hypothesis. Traditions vary among social sciences, and what might be considered a theory might be anything from a counterintuitive proposal (for example, several features of evolutionary psychology) to a redescription of experimental outcomes. Certain neoclassical economic theories tend to favor computational solutions to problems. However, early in the 20th century, the social

sciences created functionalism as a way of accounting for processes or properties whose activity was of interest even if their actual ontological status was uncertain. That is, even if one did not know precisely what a phenomenon consisted in, one might be able to explain how it functioned.

In recent decades, the predominance of functionalism in the social sciences has been firmly established. Functional accounts normally do not commit themselves to what there is but to what is occurring in the processes under investigation. For example, without even giving an account of just what memory is, theories of memory have long been expressed in terms of the functions of memory (short-term memory, long-term memory, episodic memory, semantic memory, etc.). Furthermore, the development of the cognitive sciences created another meaning of function and further cemented the tradition as one of the most dominant in the social sciences. For the cognitive scientist, functionalism was a thesis about the instantiation of a computer program on a physical platform, regardless of the nature of that platform. The mind could be likened to a computational function. A sense of this meaning of functionalism still permeates cognitive psychology and cognitive neuroscience.

## Willard Quine Empiricism

The use of the term *theory* then has become rather unrestricted. It is often a placeholder for a variety of unknowns that serves to keep us from leaping to firm conclusions while otherwise formalizing hunches and guesses. There might be some “empirical evidence” for the case at hand, but the theory supported by that evidence is, of course, always underdetermined. This means only that no empirical results bring finality to theoretical frames; this problem was originally articulated by philosopher Willard Quine in his well-known article “Two Dogmas of Empiricism” (the dogma of the distinction between analytic and synthetic truths and the dogma of reductionism). Although the debate that followed its publication was lengthy and detailed, the outcome was a gradual historical reevaluation of the sciences. Most important, however, was the support it would provide for the work of the historians and sociologists of science who demonstrated that the distinction between *theory* and *fact* is a rather dubious and unhelpful one in evaluating science, its results, its methods, and its products.

[p. 1501 ↓ ]

## Reflexivity

What characterizes most social science research is the reflexive nature of human activities. That is, to understand the human activities, the investigating scientist must of necessity be an apposite member of the community of participants under investigation. Otherwise, such phenomena as widely divergent as depression, abuse, socialization, fondness, racism, sexual attraction, and so on will be unintelligible to the investigator and, hence, will not likely capture all the relevant features of the phenomenon in question. One could argue that one needs to be a member of a community of scientists to do any kind of research; although the atomic number of, say, Fe (iron)—26—will not change according to cultural customs, depression might, in fact, do so. The latter is an example of a phenomenon that is the outcome of the shared practices of a particular community regardless of its neuroscientific precursors. Furthermore, as Joseph Margolis has argued, the combined infrapsychological powers alone of the aggregated members of a community cannot account for the features at hand; it is not just a process that occurs “inside the head.” Instead, the phenomenon is the outcome of a communal set of activities; to be depressed is by definition to be depressed in a particular culture.

Other philosophers of the social sciences, such as Rom Harré, have argued that what characterizes the social sciences is a concern with the activities of ordinary life in their most varied and rich circumstances. These activities are best captured by the Wittgensteinian distinction of “following a rule” versus “acting in accord with a rule.” The former is done when conforming to a set of prescribed rules, such as those that must be followed when learning some new, complex skill. The latter is done when one speaks a natural language as a child, and thus, one has never observed the grammatical rules that are nevertheless followed, or when driving a car effortlessly after many years of practice even though one learned to do so by initially following a concrete set of rules. The distinction here is between habitual activity, which is highly overlearned, and the kind of activity that involves conforming to norms and conventions one might barely be able to articulate. A theory that takes the latter into account must have features unlike

a neuroscientific account of human activity because norms and conventions are by definition communal phenomena.

In psychology, however, there are many who do not believe that special theoretical concessions need be made for these kinds of distinctions and that eventually all psychological phenomenon will be captured by some overarching neuroscientific or evolutionary framework. Despite the popularity of this reductive claim, these theories are a considerable explanatory distance from the activities of ordinary life. For an account of these kinds of activities, goes the counterargument, attention needs to be paid to the microdetails of life itself either through talk (as in various discourse analytic positions) or other forms of ethnography. Proponents of overarching theories, in contrast, argue that their positions will provide an ultimate explanation of the foundations of such activities.

## Broadened Conceptions of Theory

Events outside the social sciences have also led to new and unusual forms of theory in recent years, such that the term has come to be used in an ever wider sense. Under the influence of formalism, historicism, Marxism, structuralism, feminism, queer theory, ethnic studies, postcolonialism, culture studies, and more, the idea of a theory came to represent something of a challenge to orthodoxy. In part motivated by the crisis in epistemology that was a consequence of postmodernism and the denial of the possibility of certain knowledge, theory in the humanities resisted so-called universalizing impulses. Critical theory has been inserted into the humanities since the 1960s in a way that has led to new emphases on theoretical scholarship. Having suffered through a period of excess in the late 20th century, some of these orientations have settled into academic subdisciplines, whereas others have passed altogether. One important consequence has been the general suspicion of grand theories espoused traditionally in the social sciences. Hence, from Sigmund Freud to Talcott Parsons, the overarching theoretical frame has been treated with wariness and viewed as carrying within it other interests (for example, the phallo-centric nature of Freud's theory) that are not explicitly accounted for in the theory itself.

The consequences of these developments for the social sciences have been less disruptive to the [p. 1502 ↓ ] research enterprise than they have been for the humanities. Nonetheless, the effects can be observed in the further institutionalization of theoretical traditions in such disciplines as sociology and psychology, where new divisions and societies devoted to the study of theory have come into their own in recent decades (e.g., the International Society for Theoretical Psychology) as well as new journals (e.g., *Theory & Psychology*). In addition, the greater influence of qualitative methods or microsociological research has changed the way theory is organized in the academy. The question of theory is not so much a question of finding the best “fit” for the data as it is providing an adequate account of a phenomenon that reflexively takes up the position of the researcher as well as the participants into its final articulation.

Theory is no longer the prerogative of narrowly determined empirical research enterprises that extract hypotheses from an overarching theory and then carefully test these along a neo-positivist model. In all areas of the social sciences, theory includes models and hypotheses, as well as systematically developed frameworks or just initial articulations of what is the phenomenon of interest. What constitutes theory is now largely a matter of convention as well as locally or disciplinarily determined rules for empirical adequacy.

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<http://dx.doi.org/10.4135/9781412961288.n458>

*See also*

- [Cause and Effect](#)
- [Content Validity](#)
- [External Validity](#)
- [Grounded Theory](#)
- [Models](#)
- [Observations](#)
- [Positivism](#)
- [Thought Experiments](#)
- [Validity of Research Conclusions](#)

Further Readings

Bem, S., & Looren de Jong, H. (2005). *Theoretical issues in psychology: An introduction* (2nd ed.). Thousand Oaks, CA: Sage <http://dx.doi.org/10.4135/9781446215302>.

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Quine, W. V. O. (1980). Two dogmas of empiricism . In W. V. O. Quine (Ed.), *From a logical point of view* (2nd rev. ed.) (pp. 20–46). Cambridge, MA: Harvard University Press.

Suppe, F. (1998). Theories, scientific . In E. Craig (Ed.), *Routledge Encyclopedia of Philosophy*. London: Routledge . Retrieved from <http://www.rep.routledge.com/article/Q104SECT7>

A research design is the set of methods and procedures used in collecting and analyzing measures of the variables specified in the problem research. The design of a study defines the study type (descriptive, correlational, semi-experimental, experimental, review, meta-analytic) and sub-type (e.g., descriptive-longitudinal case study), research problem, hypotheses, independent and dependent variables, experimental design, and, if applicable, data collection methods and a statistical analysis plan. AWESOME

ENCYCLOPEDIAS: " Encyclopedia of Research Design, 3 Volumes combined by Neil J Salkind " Super Bug Encyclopedia (2016) " Super Human Encyclopedia By Robert Winston (2014) " Encyclopedia of Electronic Components, Volume 3 (2016) " World Encyclopedia of Aero Engines: From the Pioneers to the Present Day (5th Edition) by Bill Gunston. 1 Research design, with its statistical underpinnings, can be especially daunting for students and novice researchers At its heart, research design might be described simply as a formalized approach toward problem solving, thinking, and acquiring knowledge.. A research design is a step-by-step approach used by a researcher to conduct a scientific study. There are 12 Types of Research Designs.Â Research design should be able to ensure the standards results by indicating how research questions can be formed because a researcher will always want the same results every time, he performs an experiment. c) Validity. The validity of a research design is used to calculate the expected results and to estimate the truthfulness of the result. In most cases, researchers opt for their own definition when it comes to what is considered valid. Therefore, the questionnaire prepared from the research design is considered valid. d) Generalization. Generalization is one of the most important key chara