Grounded Theory as Scientific Method

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GROUNDED THEORY

During the last 30 years sociologists Barney Glaser and Anselm Strauss have formulated and developed in great detail their grounded theory perspective on social science research.[1] In their work they have consistently argued for the inductive discovery of theory grounded in systematically analyzed data. Their inductive perspective has stemmed in part from their dissatisfaction with the prevalent hypothetico-deductive practice of testing "great man" sociological theories. In the course of critiquing this prevailing dogmatic approach to theory testing, Glaser and Strauss have provided us with a much broader conception of what social science investigators could and should do with their research time.

Since its introduction in the 1960s, grounded theory has been progressively developed in a way that is consistent with its original formulation, such that it is currently the most comprehensive qualitative research methodology available. Deriving its theoretical underpinnings from the related movements of American pragmatism and symbolic interactionism, grounded theory inquiry is portrayed as a problem-solving endeavor concerned with understanding action from the perspective of the human agent. Grounded theory is typically presented as an approach to doing qualitative research, in that its procedures are neither statistical, nor quantitative in some other way. Grounded theory research begins by focusing on an area of study and gathers data from a variety of sources, including interviews and field observations. Once gathered, the data are analyzed using coding and theoretical sampling procedures. When this is done, theories are generated, with the help of interpretive procedures, before being finally written up and presented. This latter activity Glaser and Strauss claim is an integral part of the research process.

Grounded theory is regarded by Glaser and Strauss as a general theory of scientific method concerned with the generation, elaboration, and validation of social science theory. For them, grounded theory research should meet the accepted canons for doing good science (consistency, reproducibility, generalizability, etc.), although these methodological notions are not to be understood in a positivist sense. The general goal of grounded theory research is to construct theories in order to understand phenomena. A good grounded theory is one that is: (1) inductively derived from data, (2) subjected to theoretical elaboration, and (3) judged adequate to its domain with respect to a number of evaluative criteria. Although it has been developed and principally used within the field of sociology, grounded theory can be, and has been, successfully employed by people in a variety of different disciplines. These include education, nursing studies, political science, and to a very limited extent, psychology. Glaser and Strauss do not regard the procedures of grounded theory as discipline specific, and they encourage researchers to use the procedures for their own disciplinary purposes.

SCIENTIFIC METHOD

In breaking with methodological orthodoxy, grounded theory has been subjected to a considerable amount of criticism, principally on the grounds that the approach signals a return to simple "Baconian" inductivism. However, grounded theory methodology embodies a conception of scientific inquiry that is far removed from such a naive account. Indeed, I believe that, suitably reconstructed, grounded theory offers us an attractive conception of scientific method. Accordingly, this paper provides a methodological reconstruction of Glaser and Strauss's perspective on social science inquiry. It takes the view that grounded theory is best regarded as a general theory of scientific method concerned with the detection and explanation of social phenomena. To this end, grounded theory is reconstructed as a problem-oriented endeavor in which theories are abductively generated from robust data patterns, elaborated through the construction of plausible models, and justified in terms of their explanatory coherence. This paper proceeds on the assumption that grounded theory can be strengthened by reconstructing it in accordance with recent developments in scientific realist methodology.[2] I shall call this general account of scientific method "abductive explanatory inferentialism" (AEI). While this is an extended label, it does serve the useful purpose of suggesting that the theory of scientific method is centrally concerned with generating theories abductively and appraising them in terms of what philosophers have come to call inference to the best explanation. I shall explain these two related ideas later.

PROBLEM FORMULATION

According to the AEI theory of scientific method, the selection and formulation of problems are of central importance to scientific research. In fact, by adopting a particular account of scientific problems, AEI method is able to explain how inquiry is possible, and at the same time provide guidance for the conduct of research. The account of problems that boasts these twin virtues is the constraint-composition theory.[3] Briefly stated, the constraint-composition theory asserts that a problem comprises all the constraints on its solution, along with the demand that the solution be found. On this formulation the constraints are actually constitutive of the problem itself; they characterize the problem and give it structure. The explicit demand that the solution be found arises from the goals of the research program, the pursuit of which leads, it is to be hoped, to filling an outstanding gap in the problem's structure. Also, by including all the constraints in the problem's articulation, the problem enables the researcher to direct inquiry effectively by pointing the way to its own solution. In a very real sense, stating the problem is half the solution!

As mentioned earlier, Glaser and Strauss clearly recognize the importance of understanding method in the context of problem-solving. However, although they offer some thoughtful remarks about research problems, they do not give the matter systematic attention.[4] In fact, their comments contain a number of misunderstandings that are characteristic of problems thinking -- misunderstandings that a constraint composition view of research problems, operating within the ambit of AEI method, is conceptually positioned to avoid. One misunderstanding embodied in problems talk presupposes that problems and methods are separate parts of inquiry. Strauss maintains that, because we do not have to prepare an articulated problem in advance of inquiry, researchers may come to their problems at any point in the research process. But this suggestion fails to appreciate that one typically initiates an investigation with an ill-structured problem, and that this ill-structured problem is developed in the course of inquiry. From the constraint-composition perspective, a problem will be ill-structured to the extent that it lacks the constraints required for its solution. And, because our most important research problems will be decidedly ill-structured, we can say that the basic task of scientific inquiry is to better structure our research problems by building in the various required constraints as our research proceeds.

A related misunderstanding of Strauss is his apparent belief that one can effect a break from linear thinking methodology by insisting that the method comes before the problem. However, this proposal provides no escape from linear thinking; it simply points out that the steps constituting a linear progression need not occur in one fixed order. Even to insist that research problems are an integral part of method will not overcome the straight-jacketing of linear thinking; for one could still assert that problems are integral to method, but that they constitute the essential first step in a temporal sequence of research activities. However, this possible reply is itself based on two misconceptions about scientific problems. The first misconception involves the widespread belief that scientific method has a natural beginning, whether it be with observations, theories, or problems. However, it is more realistic to hold that research begins wherever it is appropriate to enter its reasoning complex. Hence, although my exposition of AEI method begins by mentioning problems, it should not be thought that problems mark the first step in the method. A proper characterization of the interacting components that comprise AEI method would require a formulation that is systems-theoretic rather than linear.

The second, and related, misconception involves the belief that the problems component of method is a temporal phase that is dealt with by the researcher, who then moves to another phase, and so on. However, the researcher who employs AEI method is dealing with scientific problems all the time. Problems are generated, selected for consideration, developed, and modified. In a very real sense they function as the "range riders" of method by regulating our thinking in the contexts of theory generation, development, and appraisal. AEI method structures the methodological space within which our research problems operate. In turn, the constraints that comprise our research problems provide AEI method with the operational force to guide inquiry.

PHENOMENA DETECTION

Although hypothetico-deductivism and grounded theory offer different accounts of inquiry, they share the view that scientific theories explain and predict facts about observed data. However, this widely held view fails to distinguish between data and phenomena.[5] The failure to draw this distinction leads to a misleading account of the nature of science, for it is typically phenomena, not data, that our theories are constructed to explain and predict. Thus, properly formulated, grounded theories should be taken as grounded in phenomena, not data.

Phenomena are relatively stable, recurrent general features of the world that we seek to explain. The more striking of these “noteworthy discernible regularities” are sometimes called "effects." Phenomena comprise a varied ontological bag that includes objects, states, processes and events, and other features which are hard to classify. It is, therefore, more useful to characterize phenomena in terms of their role as the proper objects of explanation and prediction. Not only do phenomena give scientific explanations their point (without the detection of phenomena it would be difficult to know what to explain), they also, on account of their generality and stability, become the appropriate focus of scientific explanation (systematic explanation of more ephemeral events would be extremely difficult, if not impossible).

Data, by contrast, are idiosyncratic to particular investigative contexts. They are not as stable and general as phenomena. Data are recordings or reports that are perceptually accessible. Thus, they are observable and open to public inspection. Phenomena are not, in general, observable. The importance of data lies in the fact that they serve as evidence for the phenomena under investigation. In extracting phenomena from the data, we often engage in data reduction using statistical methods. Generally speaking, statistical methods are of direct help in the detection of phenomena, but not in the construction of explanatory theories.

It is important to realize that reliability of data forms the basis for claiming that phenomena exist. In establishing that data are reliable evidence for the existence of phenomena, we control variously for confounding factors (experimentally and statistically), carry out replications, calibrate instruments, empirically investigate equipment, and perform statistical analyses for data reduction purposes. While reliability is the basis for justifying claims about phenomena, we will see later that judgments about explanatory coherence are the appropriate grounds for theory acceptance.

Talk of reliabilist justification for the detection of phenomena brings to mind the important methodological notion of robustness.[6] This notion, which has long been considered important in science, carries with it the idea that there need to be multiple means for establishing the nature and existence of phenomena. Strategies of multiple determination are important because they are the major means by which we establish the reliability needed to justify claims about phenomena.[7] Strauss speaks briefly of robustness as a desideratum for grounded theory, but in a way that is different from the notions that are generally considered in science; besides, his focus is on notions of robustness that are theories rather than phenomena. I suggest that Glaser and Strauss's general plea for checking the data should be taken by grounded theorists as a reminder that they should seek to reliably establish phenomena in multiply-determined ways before they begin to generate grounded theory.

THEORY GENERATION

According to the stark prescriptions of hypothetico-deductive method, one takes a hypothesis or theory and tests it indirectly by deriving from it consequences that are themselves amenable to direct empirical test. In taking a theory as given, the hypothetico-deductive method is not itself concerned with that theory’s origin or creation, only with its validation or justification. This is because the creation of a theory is thought to be a psychological (historical, sociological, etc.) event only, whereas science as a rational enterprise is properly concerned with testing, because that is considered to be a logical affair.

Despite its hegemonic status, hypothetico-deductivism is seriously deficient as a theory of scientific method. In speaking against "logico-deductive theorizing," Glaser and Strauss, in effect, level two criticisms at the method: first, it grossly exaggerates the place of theory-testing in science; and second, it improperly denies that inductive reasoning can figure in the formulation of theoretical ideas.

In arguing that grounded theory inductively emerges from data, Glaser and Strauss have been criticized on the grounds that they advocate a "Baconian" inductivism. On this interpretation, grounded theory is depicted as a tabula rasa view of inquiry which indefensibly maintains that observations are not theory or concept dependent. But no one holds to such a naive inductivist position. Indeed, Glaser and Strauss explicitly note that “the researcher does not approach reality as a tabula rasa -- [that he or she] must have a perspective [in order to] see relevant data and abstract significant categories from [it].”[8] Hence, it is in the interest of obtaining emergent, diverse categories at different levels of abstraction that Glaser and Strauss would have the researcher hold all potentially relevant facts and theories in the background for some time.

Although it is clear that Glaser and Strauss are not naive inductivists, the actual nature of the inductive relation that, for them, grounds emergent theories in their data is difficult to fathom. For Glaser and Strauss, grounded theory is said to emerge inductively from its data source in accordance with the method of "constant comparison." As a method of discovery, the constant comparative method is an amalgam of systematic coding, data analysis and theoretical sampling procedures which enables the researcher to make interpretive sense of much of the diverse patterning in the data by developing theoretical ideas at a higher level of abstraction than the initial data descriptions. However, the notion of constant comparison contributes little to figuring out whether the inductive inference in question is enumerative, eliminative, abductive or of some other form. Given the pragmatist influence on grounded theory methodology, it is not surprising to find Strauss characterizing scientific method in Peircean fashion as comprising induction, deduction, and verification. However, it is surprising to note that while Strauss mentions Peirce's idea of abduction in his brief discussion of induction, he refrains from linking it to his discussion of the inductive discovery of theory.[9]

Whatever Glaser and Strauss's view of the matter, I think it is important to follow Peirce's lead and characterize the creative inference involved in the generation of theory as abductive in nature.[10] A typical characterization of abductive inference can be given as follows: some observations (phenomena) are encountered which are surprising because they do not follow from any accepted hypothesis; we come to notice that those observations (phenomena) would follow as a matter of course from the truth of a new hypothesis in conjunction with accepted auxiliary claims; we therefore conclude that the new hypothesis is plausible and thus deserves to be seriously entertained and further investigated. This standard depiction of abductive inference focuses on its logical form only and, as such, is of limited value in understanding the research process unless it is conjoined with a set of regulative constraints that enable us to view abduction as a pattern of inference, not just to any explanations, but to the most plausible explanations. Constraints that regulate the abductive generation of scientific theories will comprise a host of heuristics having to do with the explanation of phenomena. More recent work on grounded theory rightly stresses the centrality of heuristics to methodology, and the constraint composition account of problems is strategically positioned within AEI method to facilitate the operation of such heuristics.

Finally, it is worth noting that, although abduction is not widely acknowledged as a species of scientific inference, the successful codification of some abductive methods has already been achieved. For example, exploratory factor analysis, long used in educational and psychological research, is really a stylized way of abductively generating common causes to explain significant patterns in correlational data. More recently, John Holland and others[11] have produced a general theory of induction, which includes the development of a computer program, PI (processes of induction), which contains explicit algorithms for abductively generating potential explanations of puzzling phenomena.

THEORY DEVELOPMENT

Because they are caught in the grip of hypothetico-deductive orthodoxy, educational and social science researchers are ever concerned to test theories with respect to their empirical adequacy. A tacit presupposition of such practice is that, somehow, theories have arisen in full-blown form, whereupon they are immediately ready for testing. In fact, however, most such theories are in a seriously underdeveloped state, and the unfortunate result is that researchers unwittingly submit low content theories to premature empirical testing. This occurs, for example, with our customary practice of validating theories through null hypothesis significance testing, and it frequently occurs when more complex statistical regression methods are used to test causal models.

By contrast, Glaser and Strauss hold a dynamic perspective on theory construction. This is clear from their claim that “the strategy of comparative analysis for generating theory puts a high emphasis on theory as process; that is, theory as an ever-developing entity, not as a perfected product.”[12] In this regard, Glaser and Strauss advise the researcher to be constantly on the lookout for new perspectives that might help them develop their grounded theory, although they do not explore the point in detail.

Significantly, AEI method gives similar advice, but in a more constructive way: Because we often do not have knowledge of the nature of the causal mechanisms we abductively probe, we are urged to construct models of those mechanisms by imagining something analogous to mechanisms whose nature we do know.[13] More specifically, theory elaboration in science is frequently a matter of constructing what have been called iconic paramorph models. With a paramorph model, the source that is modeled from is quite different from the subject being modeled -- developing theories that invoke generative mechanisms to explain distinct effects requires that this is the case. The iconic mode of representation frequently involves simulating reality in a concrete visualizable image. This is the appropriate mode for representing the bulk of our causal mechanisms which are drawn from the domain of possible experience. Theories, then, are generated abductively and developed through analogical extension. We shall see shortly that questions to do with the appropriateness of the analogies invoked in our modeling enter into the business of theory appraisal.

THEORY APPRAISAL

The dominant empiricist account of theory appraisal is characterized in normal hypothetico-deductive fashion, whereby theories are assessed for their empirical adequacy by ascertaining whether their test predictions are borne out by the relevant data. However, the limitations of such an austere account of confirmation are now widely accepted in the philosophy of science.[14]

While Glaser and Strauss do not articulate a precise account of the nature and place of theory-testing in social science, they do make it clear that there is more to theory appraisal than testing for empirical adequacy. Clarity, consistency, parsimony, density, scope, integration, fit to data, explanatory power, predictiveness, heuristic worth, and application are all mentioned by Glaser and Strauss as pertinent evaluative criteria, although they do not work them into a coherent view of theory appraisal.

Because science pursues multiple goals, and because theories are typically underdetermined by the relevant empirical evidence, proper theory appraisal has to be undertaken on evaluative dimensions in addition to that of empirical adequacy. Understood as a central feature of scientific realism, AEI method takes the systematic evaluation of mature theories to be essentially a matter of inference to the best explanation, where a theory is accepted when it is judged to provide a better explanation of the evidence than its rivals. Early critics of the notion of inference to the best explanation complained that the absence of suitably formulated criteria prevented researchers from making judgments of the best explanation. However, Paul Thagard has recently developed a promising account of theory evaluation which takes inference to the best explanation to be centrally concerned with establishing explanatory coherence.[15] Thagard's theory is not a general theory of coherence; rather it is a theory of explanatory coherence where propositions hold together because of their explanatory relations. Relations of explanatory coherence are established through the operation of seven principles: symmetry, explanation, analogy, data priority, contradiction, competition, and acceptability. The determination of the explanatory coherence of a theory is made in terms of three criteria: consilience (or explanatory breadth) simplicity, and analogy. The criterion of consilience, which Thagard believes is the most important for choosing the best explanation, captures the idea that a theory is more explanatorily coherent than its rivals if it explains a greater range of facts. The notion of simplicity Thagard deems most appropriate for theory choice is captured by the idea that preference should be given to theories that make fewer special assumptions. Finally, explanations are judged more coherent if they are supported by analogy to theories that scientists already find credible.

Thagard's theory of explanatory coherence has a number of virtues: it satisfies the demand for justification by appeal to coherence considerations rather than foundations; it takes theory evaluation to be a comparative matter and one that is centrally concerned with explanation; and it can be implemented in a computer program while still leaving an important place for judgment by the researcher. The theory of explanatory coherence, then, offers the grounded theorist an integrated account of many of the evaluative criteria deemed important for theory appraisal by Glaser and Strauss.

GROUNDED THEORY RECONSTRUCTED

Although the influences of American pragmatism on grounded theory methodology are manifold, the impact of contemporary philosophy of science on Glaser and Strauss's writings is almost non-existent. This is curious, given that pragmatists like Dewey held philosophy to be like science, only more general. But, it is also unfortunate that, in their formulations of grounded theory as general scientific method, Glaser and Strauss have continued to ignore pertinent developments in philosophical methodology. Although mindful of grounded theory's pragmatist origins, this paper has outlined a philosophical reconstruction of grounded theory method in accord with a broadly realist conception of methodology. As a reconstruction, it should not be understood as an accurate report of Glaser and Strauss's account of grounded theory. Just as the construction of a scientific paper is really the continuation of research rather than a narrative account of that research, so a philosophical reconstruction of a method is a bona fide construction rather than a trustworthy guide to the original formulation of the method.

At a time when it is fashionable to espouse anti-realist perspectives on educational and scientific research generally, a commitment to scientific realist methodology might seem an unfair burden to place on grounded theory. However, in my view the various attacks on realism have in fact contributed to its development in a more viable form.[16] Constructivist excesses aside, findings from contemporary science studies tend to support the idea that scientific realism is the working scientist's "natural attitude." AEI method provides a framework for inquiry that takes advantage of realist philosophical work on research problems, generative methodology, and coherence justification. These are methodological notions that should be congenial to grounded theorists. Constructing grounded theory method in accordance with AEI affords us a better position from which to confront the central methodological question, "How is effective inquiry possible?"

For a response to this essay, see Kinach.

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1. Grounded theory methodology received its first systematic formulation in Barney Glaser and Anselm Strauss, *The Discovery of Grounded Theory* (Chicago: Aldine, 1967). The general approach is developed in progressively more detail in Glaser, *Theoretical Sensitivity* (Mill Valley: Sociology Press, 1978), and in Strauss, *Qualitative Analysis for Social Scientists* (Cambridge: Cambridge University Press, 1987). The most detailed specification of grounded theory procedures is presented in Anselm Strauss and Juliet Corbin, *Basics of Qualitative Research* (Newbury Park: Sage, 1990).

2. Derek Layder, *New Strategies in Social Research* (Cambridge: Polity Press, 1993), selectively incorporates ideas from grounded theory and Mertonian theory testing into a broadly realist methodology for social science research.

3. An instructive examination of scientific problems, and an endorsement of their constraint-composition conception is provided by Thomas Nickles, "What Is a Problem That We Might Solve It?" *Synthese* 47, no.1 (1981): 85-118. This account of problems is deployed within a general abductive theory of scientific method in Brian Haig, "Scientific Problems and The Conduct of Research," *Educational Philosophy and Theory* 19, no. 2 (1987): 22-32.

4. Here I consider comments made about problems by Leonard Schatzman and Strauss in their *Field Research* (Englewood Cliffs: Prentice-Hall, 1973).

5. Two recent important papers on the distinction between data and phenomena are Jim Bogan and Jim Woodward, "Saving the Phenomena," *Philosophical Review* 97, no. 3 (1988): 303-52, and Woodward, "Data and Phenomena," *Synthese* 79, no. 3 (1989): 393-472.

6. A suggestive examination of the various notions of robustness in science is William Wimsatt, "Robustness, Reliability, and Overdetermination," in *Scientific Inquiry and the Social Sciences*, ed. M. Brewer and B. Collins (San Francisco: Jossey-Bass, 1981), 124-63.

7. Strauss, *Qualitative Analysis*, 304.

8. Glaser and Strauss, *The Discovery*, 3.

9. Strauss, *Qualitative Analysis*, 12.

10. Stimulated in part by work in cognitive science, the methodology of discovery is now receiving the research attention it deserves. A recent philosophical work in this field is Aharon Kantorovich, *Scientific Discovery* (Albany: State University of New York Press, 1993).

11. The theory of induction is outlined in John Holland, et al., *Induction: Processes of Inference, Learning and Discovery* (Cambridge: MIT Press, 1986). For an application of the computer program PI see Paul Thagard and Keith Holyoak, "Discovering the Wave Theory of Sound: Induction in the Context of Problem Solving" (Proceedings of the Ninth International Joint Conference on Artificial Intelligence, Los Altos: Morgan Kaufman, 1985), 610-12.

12. Glaser and Strauss, *The Discovery*, 32.

13. An instructive treatment of models, which stresses their central role in scientifc theory construction is Rom Harré, "The Constructive Role of Models," in *The Use of Models in the Social Science*s, ed. Lyndhurst Collins (London: Tavistock, 1976), 16-43.

14. Clark Glymour, *Theory and Evidence* (Princeton: Princeton University Press, 1980) criticizes the standard hypothetico-deductive account of confirmation and proposes a bootstrapping alternative.

15. For a formulation of inference to the best explanation in terms of explanatory coherence see Paul Thagard, *Conceptual Revolutions* (Princeton: Princeton University Press, 1992).

16. Of the varieties of scientific realism, I think evolutionary naturalistic realism recommends itself as the best of contending theories. For a perspicacious formulation of this brand of realism see Clifford Hooker, *A Realistic Theory of Science* (New York: State University of New York Press, 1987).
