On the Conceptual Disconfirmation of Theories

Anthony G. Greenwald
Ohio State University
David L. Ronis
Michigan Cancer Foundation

The first author's concepts of operational and conceptual disconfirmability are revised on the basis of recent critiques appearing in this journal. Operational and conceptual disconfirmation can be conceived as alternative resolutions of the disconfirmation dilemma, which is the problem faced by a researcher when a theoretical prediction is empirically disconfirmed. Operational disconfirmation corresponds to the conclusion that the prediction failed because of invalid procedures, while conceptual disconfirmation corresponds to the conclusion that the theoretical analysis underlying the prediction was faulty. Social psychology may indeed differ from other disciplines in being more prone to the operational disconfirmation conclusion.

Greenwald's analysis of the inconclusiveness of experimental confrontations of dissonance theory with self-perception theory introduced conceptions of operational and conceptual disconfirmability and defined them as follows:

> When the relation between theory and data is characterized by questionable operations . . . so that unexpected data are not necessarily disconfirming of conceptualization, the theory will be said here to be characterized by *operational disconfirmability*. When the link between concepts and operations is more confidently established, the theory will be said to be characterized by the stronger level of disconfirmability, *ceptual disconfirmability* [1975b: 494].

This analysis was criticized by Leary (1979), who noted (correctly) that the idea of conceptual disconfirmability does not fit well with prevalent philosophical interpretations of theoretical evolution. In the prevalent holistic view (Lakatos & Musgrave, 1970; see also Hempel, 1966, pp. 19-46, for a particularly clear account) confirmation of a theoretical prediction depends on a potentially large number of conditions other than the major condition that the theory is correct. For example, (1) extraneous variables must be controlled, (2) focal

---

AUTHORS' NOTE: We thank Virgil Hinshaw, Mark Leary, Sam Rakover, and Edward E. Sampson for comments on an earlier draft of this article. Requests for reprints should be sent to A. G. Greenwald at Ohio State University, 404C West 17th Avenue, Columbus, OH 43210.

Personality and Social Psychology Bulletin, Vol. 7 No. 1, March 1981 131-137
© 1981 by the Society for Personality and Social Psychology, Inc.

variables must be validly measured or manipulated, and (3) the computer must function properly during analysis. A disconfirmation finding, by itself, therefore, does not disprove a theory; it means only that one of the many conditions failed. Consequently, a basis for concluding that a theory is in error requires the juxtaposed failures of a variety of different predictions. Further, this basis for disproof is at best plausible—not logical.

Leary proceeded to note that, since theories are thus not rejectable on the basis of strict disconfirmation (*modus tollens*) logic, the notion of conceptual disconfirmability is vacuous. That is, there are no theories for which disconfirmation findings require theory rejection. We are prompted by Leary's analysis (and by Forsyth's, 1976, and Rakover's, 1981) to develop further the notion of conceptual disconfirmation and to relate it to contemporary philosophical views of the growth of knowledge, especially Popper's:

> Thus I was led to the idea of *methodological rules* and of the fundamental importance of a *critical approach*; that is, of an approach which avoided the policy of immunizing our theories against refutation.
>
> At the same time, I also realized the opposite: the value of a *dogmatic* attitude: somebody had to defend a theory against criticism, or it would succumb too easily, and before it had been able to make its contributions to the growth of science [1972: 30].

RATIONAL JUSTIFICATION FOR (WEAK) CONCEPTUAL DISCONFIRMATION

Even though, as just described, *modus tollens* logic of disconfirmation is not rigorously applicable to theoretical hypothesis tests, *one must be able to justify the rejection of theories under some circumstances.* Consider that, although a theory may be viable for a long period during which it is very useful to a scientific community, scientific progress is such that a superior theory will eventually arise. It therefore seems desirable for the researcher to treat the theory as vulnerable, as *capable* of being disconfirmed.

Is there a rational basis for concluding that a theory should be rejected? Yes, and it depends on the recognition that a researcher must repond to an empirical disconfirmation of a theoretical prediction by reducing confidence in (1) the theory itself or (2) the procedures used to test it (or both). That is, it would be illogical not to regard a disconfirmation result as tending to discredit at least one of these two sets of assumptions (conceptual and operational, respectively) underlying the prediction. Just as there is (according to the holistic analysis) no rigorous basis for rejecting the theory given a disconfirmed prediction, there is

(for the same reasons) no rigorous basis for concluding that procedures were invalid. A disconfirmed prediction therefore leaves the researcher with a *disconfirmation dilemma*—whether to reduce faith in procedures or theoretical hypotheses—in other words, whether to interpret the results as an operational or a conceptual disconfirmation. (A permissible resolution of the dilemma, of course, is to reduce confidence in *both* procedures and theory.)

The rational basis for a conceptual disconfirmation conclusion follows from the logical necessity of resolving the disconfirmation dilemma by reducing confidence in either the theory or the procedures used to test it, if not both. The logical structure of the situation puts these conceptual and operational disconfirmation conclusions on an equal footing. One or the other can become the *more rational* conclusion, according to Bayesian principles of inference, whenever there is an imbalance in the weight of evidence or prior belief underlying the researcher's initial confidence in theory and procedures. If, for example, the researcher's initial confidence in procedures is based on much evidence and long tradition, while the theory is implausible and untested, then conceptual disconfirmation (reduction of confidence in theory) is the better justified response to a failure of the theory's prediction. Because (1) any resolution of the disconfirmation dilemma takes the form of reduced confidence in, rather than outright rejection of, hypotheses or operations and (2) different researchers are not obliged to agree on the resolution, the alternative resolutions of the disconfirmation dilemma are best qualified as *weak* conceptual or operational disconfirmation, respectively.

Although the idea of weak conceptual disconfirmation is rooted in subjective beliefs, it also has an objective basis to the extent that individuals' beliefs are formed by data that are shared within a research community. The more often and variously a theory or operation is associated with disconfirming data, the less faith it should and will be accorded. The more often and variously a theory or operation is corroborated by stringent tests, the more credence it will be given. Philosophers of science have attempted to quantify the support a theory has accumulated. Though the details of their systems differ, they generally agree with statements such as the preceding and with the idea that a theory is more strongly supported if the evidence it predicts is improbable in the light of previous theory and research (Kyburg, 1970). When, for example, past theories predict one pattern of data but a new theory correctly predicts the opposite, this confirmation result provides very strong support for the new theory. Similarly, a correct prediction of a previously undemonstrated phenomenon provides more support for a theory than does correct postdiction of a known effect, and confirmation of a very precise prediction provides more support for the theory than does confirmation of a less precise prediction. In general, a theory receives more support from the confirmation of its more risky predictions.

MERITS AND LIABILITIES OF ALTERNATIVE DISCONFIRMATION STRATEGIES

The foregoing establishes that the researcher who is confronted with an empirical disconfirmation of a theoretical prediction must rationally interpret the disconfirmation as either operational or conceptual, if not both. The characteristic tendency to resolve the disconfirmation dilemma by operational disconfirmation can be identified, following Popper (1972), as the *dogmatic* approach, whereas the tendency toward conceptual disconfirmation corresponds to Popper's idea of the *critical* approach. Further following Popper, we regard the choice of a dogmatic versus a critical approach as strategic.

Popper emphasizes the critical approach and proposes a set of methodological rules in order to ensure that theories are not immunized against disconfirmation (Popper, 1959, p. 54). Popper rejects, for example, theoretical changes that reduce falsifiability or testability. Changes should therefore make a theory more rather than less precise, and thus make it more rather than less (conceptually) disconfirmable. As noted by Popper, such theories have high empirical content (1959, pp 40-42). If research methods are valid, the critical approach produces theories of ever-increasing approximation to truth (verisimilitude, in Popper's usage). If research methods are invalid, conceptual disconfirmation is not reasonable and the critical approach is likely to lead nowhere. Thus, the critical approach puts the researcher under pressure to develop valid procedures.

On the other hand, the dogmatic approach of preferring to conclude that research procedures are discredited by disconfirmation findings has two important virtues: (1) when research procedures are indeed inadequate for testing a theory, the researcher's faith in the theory may be the chief factor in persevering long enough to convert an apparent disconfirmation into an actual confirmation and (2) because a theory helps to organize research findings in the memories of individual scholars as well as in textbooks,preserving the theory helps to maintain access to this research literature. These perseverance-favoring and information-organizing virtues of the dogmatic approach, which amplify Popper's (1972) remark about the "value of a dogmatic attitude," have been developed from the analysis of organizations of knowledge by Greenwald (1980).

The major limitation of either the dogmatic or the critical approach is its sacrificing the virtues of the other. In that both approaches have important virtues, the most effective overall strategy for the development of scientific knowledge should be a dialectical synthesis of the two strategies. The remainder of this article considers the current state of social psychological practice in relation to such a dialectical approach.

WHY CRITICIZE SOCIAL PSYCHOLOGY?

A common theme in the articles of Forsyth (1976), Leary (1979), and Rakover (1981) was the question of whether social psychology should be a special target of criticism for its characteristic research strategies. Forsyth and Leary, applying the holistic analysis, suggested that social psychology's aversion for conceptual disconfirmation is no different from the (dogmatic) approach in other scientific fields. Rakover, in contrast, concluded that the assumptions that link research operations to theoretical concepts are less well-established in social psychology than in various natural sciences. If, therefore, social psychologists tend to have little evidence for and little faith in the validity of their research operations, they may be justified in having a greater predilection for the dogmatic (operational disconfirmation) approach than do scientists in other disciplines.

The predisposition toward operational disconfirmation as the resolution of the disconfirmation dilemma may indeed be greater in social psychology than in other scientific disciplines. A survey conducted by Greenwald (1975a) showed that personality and social psychologists were very reluctant to concede that prediction-disconfirming results discredited their theoretical hypotheses. Also, these researchers tended not to communicate publicly the results of experiments that had failed to confirm predictions. (That survey's findings, unfortunately, did not permit comparison of personality and social psychologists with other psychologists or with researchers in other social science or natural science disciplines.) Perhaps the most telling comment that we can make to document a bias of social psychologists against conceptual disconfirmation is to ask the reader to engage in a simple exercise: Name five social psychological theories, selected from the entire history of the discipline, that are generally regarded as having been disconfirmed.

RESEARCH STRATEGY AND THE DISCONFIRMATION DILEMMA

A researcher can affect the relative plausibility of operational versus conceptual disconfirmation as the resolution of a disconfirmation dilemma by using tactics that affect relative initial confidence in theoretical hypotheses versus research procedures. A predisposition toward conceptual disconfirmation can be created by enhancing initial confidence in procedures (perhaps by doing preliminary validation research) or by reducing initial confidence in theoretical hypotheses (perhaps by testing riskier predictions).

Tactics such as those just described can be used by an individual researcher to assure that both components of the dogmatic-critical dialectic are incorporated within a single research program. A quite different strategy is to eschew the conceptual disconfirmation conclusion, instead trusting that other reseachers will attempt to discredit what you attempt to confirm. Thus, a researcher might be an unwavering advocate of a theory, uniformly resolving the disconfirmation dilemma by revising presumably invalid procedures.

The contrast between strategies in which the dogmatic-critical dialectic is synthesized within the researcher or, alternately, is divided between competing research factions is reminiscent of Sampson's (1977) contrast of the preference for all desirable personality traits being located within a single individual (self-contained individualism) versus being distributed unevenly among members of

a community (collectivism). Sampson implied that the latter strategy might be superior. If Sampson's collectivist preference were generalized to the disconfirmation dilemma, then the competing-factions approach would be judged preferable. It is difficult to be sanguine about the collectivist (competing-factions) strategy in the case of the disconfirmation dilemma, however. It is not clear, for example, that the social psychological community can sustain falsification-oriented factions. Given that professional advancement may be based more on the success of one's own theories than on one's success in falsifying others', few researchers may be prompted to invest themselves in falsification efforts.

CONCLUSIONS

The conception of operational and conceptual disconfirmability proposed by Greenwald (1975b) was found to need revision in light of the recent critiques by Forsyth (1976), Leary (1979), and Rakover (1981). In place of the earlier proposal that operational and conceptual disconfirmability be regarded as properties of theories, we suggested instead that operational and conceptual disconfirmation be conceived as alternative resolutions of the disconfirmation dilemma, the problem of dealing with unpredicted empirical findings. Further, these resolutions correspond to the dogmatic and critical approaches, respectively, as described by Popper (1972). We suggested that both dogmatic and critical strategies are necessary for theoretical advance, that social psychologists are characteristically less critical of theories than is desirable, and that the most satisfactory remedy may be for individual researchers to adopt tactics that enhance the basis for using conceptual disconfirmation as a resolution for the disconfirmation dilemma.

REFERENCES

Forsyth, D. R. Crucial experiments and social psychological inquiry. *Personality and Social Psychology Bulletin*, 1976, *2*, 454-459.

Greenwald, A. G. The totalitarian ego: Fabrication and revision of personal history. *American Psychologist*, 1980, *35*, 603-618.

Greenwald, A. G. Consequences of prejudice against the null hypothesis. *Psychological Bulletin*, 1975, *82*, 1-20. (a)

Greenwald, A. G. On the inconclusiveness of "crucial" cognitive tests of dissonance versus self-perception theories. *Journal of Experimental Social Psychology*, 1975, *11*, 490-499. (b)

Hempel, C. G. *Philosophy of natural science*. Englewood Cliffs, NJ: Prentice-Hall, 1966.

Kyburg, H. E., Jr. *Probability and inductive logic*. London: Collier-Macmillan Ltd., 1970.

Lakatos, I., & Musgrave, A. (Eds.). *Criticism and the growth of knowledge*. Cambridge, England: Cambridge University Press, 1970.

Leary, M. R. Levels of disconfirmability and social psychological theory: A response to Greenwald. *Personality and Social Psychology Bulletin*, 1979, *5*, 149-153.

Popper, K. R. *Objective knowledge*. Oxford, England: Oxford University Press, 1972.

Popper, K. R. *The logic of scientific discovery*. London: Hutchinson, 1959.

Rakover, S. S. Social psychological theory and falsification. *Personality and Social Psychology Bulletin*, 1981, *7*, 123-130.

Sampson, E. E. Psychology and the American ideal. *Journal of Personality and Social Psychology*, 1977, *35*, 767-782.

Anthony G. Greenwald is Professor of Psychology at Ohio State University. His current research concerns cognitive processing of persuasive communications and attentional processes in memory.

David L. Ronis is a behavioral reseach specialist in the Department of Social Oncology of the Michigan Cancer Foundation. His current interests include attitude formation and change, attitude structure, attitude-behavior relations, and attribution theory.