reflects a developmental transition in which integration remains difficult. In contrast, we interpret the dramatic ...

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How to Enrich Scientific Method

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Machado and Silva (October 2007) claimed that psychology’s current conception of scientific method comprises two clusters of activities: experimentation and mathematization. They proposed that psychology needs to enrich its accounts of scientific method with a third cluster of activities that they call conceptual analysis. I agree with the authors that psychology needs to improve its understanding of scientific methods, but I believe that giving greater attention to conceptual analysis is not the appropriate way to do this. In this comment, I suggest that conceptual analysis as such is not a distinctive feature of scientific method. I maintain instead that the most appropriate way to enrich our understanding of scientific method is to develop better theories of scientific method.

Whither Conceptual Analysis?

In arguing for the inclusion of conceptual analysis in scientific method, Machado and Silva (2007; see also Machado, Lourenço & Silva, 2000) distinguished between conceptual investigations and theoretical investigations. Conceptual investigations involve activities such as clarifying and specifying the meaning of concepts, assessing the consistency of sets of statements, and evaluating the soundness of arguments. By contrast, theoretical investigations are concerned with the construction of theories. Conceptual investigations are a form of “grammatical therapy” carried out on theories, which are the proper objects of conceptual analysis.

I do not wish to belittle the value of the conceptual analysis of linguistic products. However, I think it is ancillary to the important scientific task of theory construction, which takes as its primary concern the generation, development, and evaluation of explanatory theories (Haig, 2005). I believe that good theory construction, with its attendant methods, has the resources to provide the types of conceptual analyses (better, theoretical analyses) that really matter to science. Consider, for example, the oft-stated demand for the explicit definition of key scientific terms in order to render their meanings more precise. Against this demand, Popper (1966) argued over 60 years ago that the physical sciences have been able to provide us with precise theoretical knowledge without giving much attention to the meaning of their theories’ constituent terms. This is achieved by ensuring that the burden of meaning is carried by the theories proper rather than by any of their constituent terms or statements. Scientists characteristically introduce technical terms as convenient shorthand for the longer descriptions of the subject matter that are found in their theories. They do not invent new terms and then look to establish their meaning.

As a further example of conceptual analysis, consider the question of evaluating the consistency of a set of statements that make up an explanatory theory. Here it will often be appropriate to evaluate the component claims in terms of their explanatory coherence. Thagard (1992) has developed a method comprising a theory of explanatory coherence that enables the researcher to do just this. Machado and Silva (2007) would count this activity as conceptual analysis. I think it should properly be regarded as an exercise in theoretical analysis. Moreover, the theory of explanatory coherence is a new and effective method of theory appraisal, one whose very creation has in fact enriched our understanding of scientific method.

Enriching Scientific Method

I now elaborate on my contention that the most appropriate way to enrich scientific method is to better theorize about our existing theories of scientific method and to construct new theories of method. I provide three different examples of such enrichment:

Example 1. Inductive method is a historically popular account of scientific method. It is characterized as a process of reasoning inductively by enumeration from observation statements about particular events to empirical generalizations. Skinner’s radical behaviorism is psychology’s best-known example of a research tradition that employs such an account of scientific method. The lack of methodological detail in Skinner’s portrayal of inductive method has been remedied by Sidman (1960), who developed an instructive nonstatistical per-
spective on the analysis of experimental data.

An alternative conception of inductive method embodies a statistical view of the inductive process involved in empirical phenomena detection (Haig, 2005). Such an account involves a sequence of activities comprising initial data analysis, exploratory data analysis, close replication through computer-intensive resampling methods, and generalization through constructive replication. I believe that psychology’s adoption of inductive scientific method in the two forms just noted would enrich its usual understanding of scientific method.

**Example 2.** The hypothetico-deductive method is the traditionally received, and most widely used, theory of scientific method in psychology. As is well known, this account of method depicts the researcher as a tester of hypotheses. However, the method has been criticized by methodologists principally on the grounds that it is confirmationally permissive (Rozeboom, 1999). This permissiveness stems from the fact that a positive confirming instance of a hypothesis obtained by the hypothetico-deductive method can confirm any hypothesis that is coupled with the test hypothesis, irrespective of the plausibility of the conjoined hypothesis. However, rather than abandon the hypothetico-deductive method, as some have suggested, I think we should look to rebuild it in a more sophisticated form. Clearly, such enrichment of the method would have to correct for its present confirmational inadequacy. One way in which this might be done would be to redeploy a Bayesian account of confirmation within a hypothetico-deductive framework (cf. Rosencrantz, 1977).

**Example 3.** A third way to enrich our conception of scientific method is to assemble a variety of specific research methods and strategies into broad integrated theories of scientific method. I have endeavored to do this by fashioning an abductive conception of scientific method in which one seeks first to detect empirical phenomena and then to construct explanatory theories through abductive reasoning in order to explain those phenomena (Haig, 2005). This abductive theory functions as a framework theory in which the incorporated specific methods and strategies enrich the theory and help it to direct inquiry. Within the abductive theory, the process of phenomena detection is characterized as an inductive method, and the evaluation of explanatory theories is undertaken by employing the theory of explanatory coherence.

**Conclusion**

I suggest that rather than bring conceptual analysis into the ambit of scientific method, psychologists should endeavor to enrich our conceptions of scientific method by theorizing about them in the manner that scientists theorize about more familiar substantive domains. Endeavors such as assessing the consistency of a set of statements are better regarded as part of theory construction rather than as an exercise in conceptual analysis. Conceptual analyses such as concept clarification should be regarded as ancillary cognitive skills that scientists bring to their use of scientific method.

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