Is Formal Training Really Formal?

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One of the important aspects of thinking scientifically is the ability to rule out alternative hypotheses. How do people come to be able to do this? Many researchers address this question by examining the effect of formal training in a discipline. Findings in the literature (Lehman, Lempert, and Nisbett, 1988) suggest that formal training actually does make people more likely to generate alternatives when evaluating samples of social science research. However, there is a problem: the implications of the finding are not entirely clear. Lehman et al. suggest that formal training in, for example, psychology is good because such training teaches the general principle "rule out alternatives." Another possibility, however, is that, in their psychology courses, students learn about specific types of alternative hypotheses that just so happen to be operating in the problems they're being asked by Lehman et al to evaluate. In other words, it isn't clear whether the ability to rule out alternative hypotheses is attributable to the learning of a formal rule, or, instead, to learning content information about specific types of alternatives that are likely to be operating in the situations subjects were asked to evaluate.

We suggest that training in a the social sciences might accomplish two distinct goals, and that it is important to separate these conceptually. One is, as Lehman et al would suggest, that training in social science involves learning a formal rule: Consider alternative hypotheses. However, this sort of training also accomplishes another goal: It teaches students about particular alternative causes (or sources of confounding) that often plague social science studies. In Lehman's study, for example, the dependent measure was students' ability to critique social science research. We argue that students who had been trained in certain fields might have been better at critiquing such research because, in those fields, they would have learned about such plausible alternative causes as historical cohort effects, biased sample selection, placebo effects, etc. Indeed, one reason for thinking that these sorts of alternatives are not easily spontaneously generated is that, historically, it took a long time for social scientists to recognize them. We suggest that the reason Lehman's subjects benefited from the training they received was not only that they were being taught a formal rule, but that they also had been taught about and therefore sensitized to particular, plausible alternative hypotheses (Koslowski, 1996).

In the present study, we worked with college freshmen who had little or no training in the social sciences or research methods. Participants were divided into four groups. A Time 1, Time 2 paradigm was used. At Time 1, students in three of the groups read summaries of scientific research that contained methodological flaws. In addition, students in group 1 were taught about one of three particular sources of confounding: historical cohort effects, mortality effects, and volunteer effects. Students in group 2 were taught the formal rule, Rule out alternatives, but they were not taught about any particular types of alternatives. Students in group 3 read the summaries but were taught nothing. Students in group 4 participated at Time 2 only. At Time 2, all students were asked to read and critique 4 research summaries; these included samples of flawed as well as of good social science research.

The dependent measure we used was the sorts of criticisms that students made of the research summaries. Preliminary findings suggest that training in particular alternatives made students more likely to consider those alternatives when considering research than students who learn the formal rule (but no particular instances). Students who learn the formal rule do, spontaneously, attempt to consider alternatives, but they are less accurate on the whole at identifying specific problems in research, and the alternatives they consider are not necessarily the ones that were present in the research summaries. We conclude that one may know the rule, Consider alternative hypotheses, but that in order to invoke that rule, one needs to have information about particular alternatives. The reason that some of Lehman's subjects did well and others did not may be that some had learned about the kinds of confounding factors that often constitute plausible social science alternatives while others had not, and the research they were asked to evaluate was social science research.

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