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Improving statistical reasoning: an impressive feat, but what does it mean?

IMPROVING STATISTICAL REASONING: THEORETICAL MODELS AND PRACTICAL IMPLICATIONS. Peter sedlmeier, Lawrence Erlbaum Associates, Mahwah, NJ, 1999. ISBN 0-8058-3282-3. Price \$49.95 (hard cover).

One of the challenges in teaching introductory cognitive psychology is explaining the kinds of statistical reasoning errors that humans make. After all, the students have difficulty even recognizing that these are errors! But what makes these statistical reasoning tasks difficult? And are there any methods for teaching people, including my undergraduate cognitive psychology students, to improve their statistical reasoning skills? Since the publication of Kahneman and Tversky's seminal work (e.g. Tversky and Kahneman, 1974) identifying human errors in judgement, there has been a long research tradition of research trying to find the underlying explanation for why human beings have difficulty with statistical reasoning.

In his book, Peter Sedlmeier outlines four main theoretical approaches to understanding human statistical reasoning (and the errors that most humans make). He argues that the adaptive-algorithms view, grounded in evolutionary psychology, can best explain what makes some problems relatively difficult, and what problems are relatively easy. Furthermore, and most important, he argues that taking such an approach has implications for training in statistical reasoning: If people are taught to convert problems to those that are most suited to our 'natural' way of solving them, they will be much better at statistical reasoning. And in the core of the book, the seven middle chapters, Sedlmeier presents a series of training studies that indeed demonstrate some impressive results on a variety of statistical reasoning tasks. In general, his training results are much better than the results in a variety of training studies over the years, in terms of both effect size, and when possible to compare, the durability of the training effects.

What is responsible for Sedlmeier's success? The training methodology that Sedlmeier develops incorporates an amalgamation of several different factors so it is difficult to pinpoint which factors are responsible. The most important factor, according to Sedlmeier, is that people are taught to translate problems described in probabilistic terms to frequency problems that people are adapted to solve. Sedlmeier also suggests that two other factors that may play a role are the use of interactive visual displays to represent the problem, and the requirement that participants learn by solving the problems (learning by doing) rather than merely viewing examples of solutions. Although it is possible and quite likely that all three factors play an important role in helping people to understand statistical reasoning problems, it is not clear why Sedlmeier emphasizes the evolutionary perspective in this book. It is only in recent years that the relative ease of solving one type of problem compared to another- is imputed with an evolutionary explanation (that we have built-in mechanisms/algorithms for solving the easier type of problem), rather than in information-processing explanation. Indeed, the computational model (PASS) described towards the end of the book, and that begins to explain some of these data by suggesting that people make probability judgements by storing frequencies of events is an explanation at the information-processing level.

Overall, this book does several things well, and thus is an important contribution to the literature and potentially relevant to a number of different audiences. Sedlmeier provides an excellent review

of the literature on errors in statistical reasoning and prior training studies, and thus the book is a useful introduction to people new to the field. Second, the training studies are impressive and insightful, and they might serve as fodder for much future research on training in statistical reasoning. Finally, as Sedlmeier points out, the social implications of teaching statistical reasoning skills are enormous. People use statistics to sell products to you, to convince people to vote for certain candidates or to choose a course of treatment for a disease. Teaching us how to train people to reason about statistics is the most important contribution of this book.

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Mass communication and reality

A COGNITIVE PSYCHOLOGY OF MASS COMMUNICATION. Richard Jackson Harris. Lawrence Erlbaum Associates, Mahwah, NJ, 1999. No. of pages 337. ISBN 0-8058-3088-X. Price \$36.00.

The central thesis of this textbook is that experience with mass media is fundamental in the formation of our knowledge about the world, and that the world presented to us by mass media is thus more 'real' to us than the world we directly experience. At first blush, this approach seems McLuhanesque. However, Harris emphasizes media content, the processing of that content, and the effects of that processing on behaviour. This is rightly so, we believe. For if psychologists have *anything* to contribute to the study of mass media, it is an understanding of how individuals process and react to content.

Chapter 1 provides a nice though less than riveting statement of purpose, a few methodological notes, and overview. Chapter 2 continues with some methodological issues, and offers synopses of theoretical approaches. Psychologists will be less familiar with some of the theoretical approaches, but Harris does a good job of explaining them.

Chapters 3–11 cover various topic areas. In Chapter 3, Harris makes the point that our social stereotypes are constructed from media presentations. To the extent that media present sensationalized, incomplete, or inaccurate information, stereotypes may be badly constructed, leading to some unfortunate consequences for the members of the stereotyped group. In Chapter 4, Harris looks at the way advertising influences our construction of reality for both the product domain and the world around us. Highlighting religious and 'family' values, Chapter 5 presents a strong argument that media does not simply reflect values, but may influence them as well. In Chapter 6, Harris looks at how media has influenced sports (e.g. the structure of league playoffs). In turn, sports have influenced our leisure habits; e.g. we see more events (on television) but attend fewer of them. Similarly, in Chapter 7, Harris notes the many ways that mass media itself influences the news. Examples include the overt intimidation of news sources by both the subjects of their coverage and their own corporate parents; and the creation/re-creation of events for the news camera. Harris also covers turf more familiar to psychologists: memory for news. Chapter 7 neatly segues into Chapter 8, which is about politics. In this chapter, Harris describes the ways politicians and political groups control our perceptions of the world through manipulation of the news media, and through their own political advertising.

In Chapter 9, Harris discusses the effects of mass media on violence. This is a topic that has scientific, societal, and political implications. Harris handles the controversies with a very even hand, and does appropriate justice to the complexities. In Chapter 10, Harris discusses mass media and sex. This chapter includes a fine discussion of sex and violence, but it, unfortunately, underplays other influences of mass media, e.g. on dating/mating, on childbearing, on the abortion debate, and so on. Chapter 11 focuses on a nice upbeat topic, prosocial media. It was quite a relief after the previous two chapters. Harris is, once again, balanced in his treatment. Prosocial media are presented as having beneficial effects, but these effects are most potent when goals are realistic, and when appropriate adjuncts are also employed (e.g. opportunities for follow-up discussion and action). Chapter 12, the concluding chapter, pulls the text together and encourages application.