Bias and Causation: Models and Judgment for Valid Comparisons

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A one-of-a-kind resource on identifying and dealing with bias in statistical research on causal effects

Do cell phones cause cancer? Can a new curriculum increase student achievement? Determining what the real causes of such problems are, and how powerful their effects may be, are central issues in research across various fields of study. Some researchers are highly skeptical of drawing causal conclusions except in tightly controlled randomized experiments, while others discount the threats posed by different sources of bias, even in less rigorous observational studies. Bias and Causation presents a complete treatment of the subject, organizing and clarifying the diverse types of biases into a conceptual framework. The book treats various sources of bias in comparative studies—both randomized and observational—and offers guidance on how they should be addressed by researchers.

Utilizing a relatively simple mathematical approach, the author develops a theory of bias that outlines the essential nature of the problem and identifies the various sources of bias that are encountered in modern research. The book begins with an introduction to the study of causal inference and the related concepts and terminology. Next, an overview is provided of the methodological issues at the core of the difficulties posed by bias. Subsequent chapters explain the concepts of selection bias, confounding, intermediate causal factors, and information bias along with the distortion of a causal effect that can result when the exposure and/or the outcome is measured with error. The book concludes with a new classification of twenty general sources of bias and practical advice on how mathematical modeling and expert judgment can be combined to achieve the most credible causal conclusions.

Throughout the book, examples from the fields of medicine, public policy, and education are incorporated into the presentation of various topics. In addition, six detailed case studies illustrate concrete examples of the significance of biases in everyday research.

Requiring only a basic understanding of statistics and probability theory, Bias and Causation is an excellent supplement for courses on research methods and applied statistics at the upper-undergraduate and graduate level. It is also a valuable reference for practicing researchers and methodologists in various fields of study who work with statistical data.

This book was selected as the **2011 Ziegel Prize Winner in Technometrics** for the best book reviewed by the journal.

It is also the winner of the **2010 PROSE Award for Mathematics** from The American Publishers Awards for Professional and Scholarly Excellence

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