

CAUSAL INFERENCE IN STATISTICS

A Primer

Judea Pearl
Madelyn Glymour
Nicholas P. Jewell

WILEY

Please do not distribute without permission



CAUSAL INFERENCE IN STATISTICS

A PRIMER

Judea Pearl



*Computer Science and Statistics, University of California,
Los Angeles, USA*

Madelyn Glymour

Philosophy, Carnegie Mellon University, Pittsburgh, USA

Nicholas P. Jewell

*Biostatistics and Statistics, University of California,
Berkeley, USA*



WILEY

About the Authors

Judea Pearl is Professor of Computer Science and Statistics at the University of California, Los Angeles, where he directs the Cognitive Systems Laboratory and conducts research in artificial intelligence, causal inference and philosophy of science. He is a Co-Founder and Editor of the *Journal of Causal Inference* and the author of three landmark books in inference-related areas. His latest book, *Causality: Models, Reasoning and Inference* (Cambridge, 2000, 2009), has introduced many of the methods used in modern causal analysis. It won the Lakatos Award from the London School of Economics and is cited by more than 13,000 scientific publications.

His groundbreaking book, *Causality: Models, Reasoning and Inference* (Cambridge, 2000, 2009), has introduced many of the methods used in modern causal analysis. It won the Lakatos Award from the London School of Economics and is cited by more than 15,000 scientific publications. His latest book, *The Book of Why: The New Science of Cause and Effect* (with Dana Mackenzie, Basic Books, 2018), describes the impacts of causal inference to the general public.

Madelyn Glymour is a data analyst at Carnegie Mellon University, and a science writer and editor for the Cognitive Systems Laboratory at UCLA. Her interests lie in causal discovery and in the art of making complex concepts accessible to broad audiences.

Nicholas P. Jewell is Professor of Biostatistics and Statistics at the University of California, Berkeley. He has held various academic and administrative positions at Berkeley since his arrival in 1981, most notably serving as Vice Provost from 1994 to 2000. He has also held academic appointments at the University of Edinburgh, Oxford University, the London School of Hygiene and Tropical Medicine, and at the University of Kyoto. In 2007, he was a Fellow at the Rockefeller Foundation Bellagio Study Center in Italy.

Jewell is a Fellow of the American Statistical Association, the Institute of Mathematical Statistics, and the American Association for the Advancement of Science (AAAS). He is a past winner of the Snedecor Award and the Marvin Zelen Leadership Award in Statistical Science from Harvard University. He is currently the Editor of the *Journal of the American Statistical Association – Theory & Methods*, and Chair of the Statistics Section of AAAS. His research focuses on the application of statistical methods to infectious and chronic disease epidemiology, the assessment of drug safety, time-to-event analyses, and human rights.

To my wife, Ruth, my greatest mentor.
– Judea Pearl

To my parents, who are the causes of me.
– Madelyn Glymour

To Debra and Britta, who inspire me every day.
– Nicholas P. Jewell