

# Bayesian Statistics for the Social Sciences (Methodology in the Social Sciences)

By David Kaplan PhD



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Bridging the gap between traditional classical statistics and a Bayesian approach, David Kaplan provides readers with the concepts and practical skills they need to apply Bayesian methodologies to their data analysis problems. Part I addresses the elements of Bayesian inference, including exchangeability, likelihood, prior/posterior distributions, and the Bayesian central limit theorem. Part II covers Bayesian hypothesis testing, model building, and linear regression analysis, carefully explaining the differences between the Bayesian and frequentist approaches. Part III extends Bayesian statistics to multilevel modeling and modeling for continuous and categorical latent variables. Kaplan closes with a discussion of philosophical issues and argues for an "evidence-based" framework for the practice of Bayesian statistics.

Useful features for teaching or self-study:

- \*Includes worked-through, substantive examples, using large-scale educational and social science databases, such as PISA (Program for International Student Assessment) and the LSAY (Longitudinal Study of American Youth).
- \*Utilizes open-source R software programs available on CRAN (such as MCMCpack and rjags); readers do not have to master the R language and can easily adapt the example programs to fit individual needs.
- \*Shows readers how to carefully warrant priors on the basis of empirical data.
- \*Companion website features data and code for the book's examples, plus other resources.





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#### **Editorial Review**

#### Review

"Bayesian analysis has arrived--and Kaplan has written exactly the book that social science faculty members and graduate students need in order to learn Bayesian statistics. It is sophisticated yet accessible, complete yet an easy read. This book will ride the crest of the Bayesian wave for years to come."--William R. Shadish, PhD, Department of Psychological Sciences, University of California, Merced

"I like that this book is concise but very comprehensive, with topics ranging from the basic regression model to the advanced mixture model. Well-organized sections move from foundations; to model building, basic regression, and generalized linear models; to advanced topics. The author's explanations of concepts and examples are clear and straightforward. He has chosen his examples well; they address very commonly studied research questions in the educational sciences. The ability to access the code and data online will benefit researchers and students tremendously."--Feifei Ye, PhD, Department of Psychology in Education, University of Pittsburgh

"We are all Bayesians at heart--in that we all have prior knowledge--so why use a frequentist approach to statistics? This book can help you understand and implement a Bayesian approach."--John J. McArdle, PhD, Department of Psychology, University of Southern California

"This much-needed book bridges the gap between Bayesian statistics and social sciences. It provides the reader with basic knowledge and practical skills for applying Bayesian methodologies to data-analysis problems. The focus on Bayesian psychometric modeling is noteworthy and unique."--Jay Myung, PhD, Department of Psychology, Ohio State University

#### About the Author

David Kaplan, PhD, is Professor of Quantitative Methods in the Department of Educational Psychology at the University of Wisconsin–Madison and holds affiliate appointments in the Department of Population Health Sciences and the Center for Demography and Ecology. Dr. Kaplan's program of research focuses on the development of Bayesian statistical methods for education research. His work on these topics is directed toward application to quasi-experimental and large-scale cross-sectional and longitudinal survey designs. He is most actively involved in the Program for International Student Assessment, sponsored by the Organisation for Economic Co-operation and Development—he served on its Technical Advisory Group from 2005 to 2009 and currently serves as Chair of its Questionnaire Expert Group. Dr. Kaplan also is a member of the Questionnaire Standing Committee of the U.S. National Assessment of Educational Progress, is a Fellow of the American Psychological Association (Division 5), and was a Jeanne Griffith Fellow at the National Center for Education Statistics.

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