Preface

Statistics is the science of data collection, analysis, and interpretation. It plays a pivotal role in many disciplines, including environmental, health, economic, social, physical, and information sciences. Statistics not only helps advance scientific discovery in many fields but also influences the development of humanity and society. In an increasingly data-driven and information-rich world, statistics is ever more critical in formulating scientific problems in quantitative terms, accounting for and communicating uncertainty, analyzing and learning from data, transforming numbers into knowledge and policy, and navigating the challenges for making data-driven decisions. The emergence of data science is also presenting statisticians with extraordinary opportunities for increasing the impact of the field in the real world.

This volume was commissioned in 2013 by the *Committee of Presidents of Statistical Societies* (COPSS) to celebrate its 50th anniversary and the International Year of Statistics. COPSS consists of five charter member societies: the American Statistical Association (ASA), the Institute of Mathematical Statistics (IMS), the Statistical Society of Canada (SSC), and the Eastern and Western North American Regions of the International Biometric Society (ENAR and WNAR). COPSS is best known for sponsoring prestigious awards given each year at the Joint Statistical Meetings, the largest annual gathering of statisticians in North America. Through the contributions of a distinguished group of statisticians, this volume aims to showcase the breadth and vibrancy of statistics, to describe current challenges and new opportunities, to highlight the exciting future of statistical science, and to provide guidance for future generations of statisticians.

The 50 contributors to this volume are all past winners of at least one of the awards sponsored by COPSS: the R.A. Fisher Lectureship, the Presidents' Award, the George W. Snedecor Award, the Elizabeth L. Scott Award, and the F.N. David Award. Established in 1964, the Fisher Lectureship honors both the contributions of Sir Ronald A. Fisher and a present-day statistician for their advancement of statistical theory and applications. The COPSS Presidents' Award, like the Fields Medal in mathematics or the John Bates Clark Medal in economics, is an early career award. It was created in 1979 to honor a statistician for outstanding contributions to statistics. The G.W. Snedecor Award, founded in 1976 and bestowed biennially, recognizes instrumental theoretical work in biometry. The E.L. Scott Award and F.N. David Award are also given biennially to commend efforts in promoting the role of women in

statistics and to female statisticians who are leading exemplary careers; these awards were set up in 1992 and 2001, respectively.

This volume is not only about statistics and science, but also about people and their passion for discovery. It contains expository articles by distinguished authors on a broad spectrum of topics of interest in statistical education, research, and applications. Many of these articles are accessible not only to professional statisticians and graduate students, but also to undergraduates interested in pursuing statistics as a career, and to all those who use statistics in solving real-world problems. Topics include reminiscences and personal reflections on statistical careers, perspectives on the field and profession, thoughts on the discipline and the future of statistical science, as well as advice for young statisticians. A consistent theme of all the articles is the passion for statistics enthusiastically shared by the authors. Their success stories inspire, give a sense of statistics as a discipline, and provide a taste of the exhilaration of discovery, success, and professional accomplishment.

This volume has five parts. In Part I, Ingram Olkin gives a brief overview of the 50-year history of COPSS. Part II consists of 11 articles by authors who reflect on their own careers (Ingram Olkin, Herman Chernoff, Peter Bickel), share the wisdom they gained (Dennis Cook, Kathryn Roeder) and the lessons they learned (David Brillinger), describe their journeys into statistics and biostatistics (Juliet Popper Schaffer, Donna Brogan), and trace their path to success (Bruce Lindsay, Jeff Rosenthal). Mary Gray also gives an account of her lifetime efforts to promote equity.

Part III comprises nine articles devoted to the impact of statistical science on society (Steve Fienberg), statistical education (Iain Johnstone), the role of statisticians in the interplay between statistics and science (Rafael Irizarry and Nilanjan Chatterjee), equity and diversity in statistics (Mary Thompson, Nancy Reid, and Louise Ryan), and the challenges of statistical science as we enter the era of big data (Peter Hall and Xihong Lin).

Part IV consists of 24 articles, in which authors provide insight on past developments, current challenges, and future opportunities in statistical science. A broad spectrum of issues is addressed, including the foundations and principles of statistical inference (Don Fraser, Jim Berger, Art Dempster), nonparametric statistics (David Dunson), model fitting (Andrew Gelman), time series analysis (Ted Anderson), non-asymptotic probability and statistics (Pascal Massart), symbolic data analysis (Lynne Billard), statistics in medicine and public health (Norman Breslow, Nancy Flournoy, Ross Prentice, Nan Laird, Alice Whittemore), environmental statistics (Noel Cressie), health care and finance (Tze Leung Lai), statistical genetics and genomics (Elizabeth Thompson, Michael Newton), survey sampling (Rod Little), targeted learning (Mark van der Laan), statistical techniques for big data analysis, machine learning, and statistical learning (Jianqing Fan, Rob Tibshirani, Grace Wahba, Larry Wasserman). This part concludes with "a trio of inference problems that could win you a Nobel Prize in statistics" offered by Xiao-Li Meng.

Part V comprises seven articles, in which six senior statisticians share their experience and provide career advice. Jeff Wu talks about inspiration, aspiration, and ambition as sources of motivation; Ray Carroll and Marie Davidian give tips for success in research and publishing related to the choice of research topics and collaborators, familiarity with the publication process, and effective communication; and Terry Speed speaks of the necessity to follow one's own path and to be enthusiastic. Don Rubin proposed two possible topics: learning from failure and learning from mentors. As they seemed equally attractive, we asked him to do both. The book closes with Brad Efron's "thirteen rules for giving a really bad talk."

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We hope that this volume will inspire you and help you develop the same passion for statistics that we share with the authors. Happy reading!

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