Alan Agresti · Xiao-Li Meng *Editors*

Strength in Numbers: The Rising of Academic Statistics Departments in the U.S.

Springer

Strength in Numbers: The Rising of Academic Statistics Departments in the U.S.

Alan Agresti · Xiao-Li Meng
Editors

Strength in Numbers: The Rising of Academic Statistics Departments in the U.S.

Springer

Editors
Alan Agresti
Department of Statistics
University of Florida
Gainesville, FL
USA

Xiao-Li Meng
Department of Statistics
Harvard University
Cambridge, MA
USA

ISBN 978-1-4614-3648-5 ISBN 978-1-4614-3649-2 (eBook)
DOI 10.1007/978-1-4614-3649-2
Springer New York Heidelberg Dordrecht London

Library of Congress Control Number: 2012942702

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

To our mentor and friend Stephen Stigler on his 70th birthday.

Contents

Contributors

Alan Agresti Department of Statistics, University of Florida, 102 Griffin-Floyd Hall, Gainesville, FL 32611-8545, USA, e-mail: aa@stat.ufl.edu

Jesse Arnold Department of Statistics, Virginia Tech University, 406 A Hutcheson Hall, Blacksburg, VA 24061-0439, USA, e-mail: jca@vt.edu

James Booth Department of Statistical Science, Cornell University, 301 Malott Hall, Ithaca, NY 14853-3801, USA, e-mail: jim.booth@cornell.edu

John E. Boyer, Jr. Department of Statistics, Kansas State University, 101 Dickens Hall, Manhattan, KS 66506-0802, USA, e-mail: jboyer@ksu.edu

Norm Breslow Department of Biostatistics, University of Washington, Health Sciences Building F, Seattle, WA 98195, USA, e-mail: norm@u.washington.edu

Jianwen Cai Department of Biostatistics, University of North Carolina, 3101 McGavran–Greenberg, Campus Box 7420, Chapel Hill, NC 27599-7420, USA, e-mail: cai@bios.unc.edu

Ming-Hui Chen Department of Statistics, University of Connecticut, 215 Glenbrook Road, U-4120, Storrs, CT 06269-4020, USA, e-mail: ming-hui.chen@uconn.edu

Martha Coventry School of Statistics, University of Minnesota, 313 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455, USA, e-mail: coven002@umn.edu

Dipak Dey Department of Statistics, University of Connecticut, 215 Glenbrook Road, U-4120, Storrs, CT 06269-4020, USA, e-mail: dipak.dey@uconn.edu

Rebecca Doerge Department of Statistics, Purdue University, 250 N. University Street, West Lafayette, IN 47907-2066, USA, e-mail: doerge@purdue.edu

Norman Draper Department of Statistics, University of Wisconsin, 1220 Medical Sciences Center, 1300 University Avenue, Madison, WI 53706-1685, USA, e-mail: draper@stat.wisc.edu

Nancy Flournoy Department of Statistics, University of Missouri–Columbia, 146 Middlebush Hall, Columbia, MO 65211, USA, e-mail: FlournoyN@Missouri.edu

Melody Gaden Department of Statistics, University of Missouri–Columbia, 146 Middlebush Hall, Columbia, MO 65211, USA, e-mail: GalenM@missouri.edu

Joe L. Gastwirth Department of Statistics, George Washington University, 2140 Pennsylvania Avenue NW, Washington, DC 20052, USA, e-mail: jlgast@gwu.edu

Edward I. George Department of Statistics, The Wharton School, University of Pennsylvania, Philadelphia, PA 19104-6302, USA, e-mail: edgeorge @wharton.upenn.edu

Tom Gerig Department of Statistics, North Carolina State University, 2311 Stinson Drive, Campus Box 8203, Raleigh, NC 27695-8203, USA, e-mail: tom_gerig@ncsu.edu

Dennis Gilliland Department of Statistics, Michigan State University, A415/ A435 Wells Hall, East Lansing, MI 48824, USA, e-mail: gillilan@stt.msu.edu

Leon Gleser University of Pittsburgh, 2717 Cathedral of Learning, Pittsburgh, PA 15260, USA, e-mail: gleser@pitt.edu

Richard Gunst Department of Statistical Science, Southern Methodist University, P.O. Box 750332, Dallas, TX 75275-0332, USA, e-mail: rgunst@mail.smu.edu

Bill Harkness Department of Statistics, Penn State University, 326 Thomas Building, University Park, PA 16802, USA, e-mail: wlh@stat.psu.edu

John Hartigan Department of Statistics, Yale University, P.O. Box 208290, New Haven, CT 06520-8290, USA, e-mail: john.hartigan@yale.edu

Tom Hettmansperger Department of Statistics, Penn State University, 326 Thomas Building, University Park, PA 16802, USA, e-mail: tph@stat.psu.edu

Klaus Hinkelmann Department of Statistics, Virginia Tech University, 406 A Hutcheson Hall, Blacksburg, VA 24061-0439, USA, e-mail: khstat@vt.edu

David Hoaglin 73 Hickory Road, Sudbury, MA 01776, USA, e-mail: dchoaglin@gmail.com

Bob Hogg Department of Statistics, The University of Iowa, 241 Schaeffer Hall, Iowa, IA 52242-1409, USA, e-mail: rvhogg@gametrail.org

Alan Hutson Department of Biostatistics, University at Buffalo School of Public Health and Health Professions, 706 Kimball Tower, 3435 Main St., Buffalo, NY 14214-3000, USA, e-mail: ahutson@buffalo.edu

Richard Johnson Department of Statistics, University of Wisconsin, 1220 Medical Sciences Center, 1300 University Avenue, Madison, WI 53706-1685, USA, e-mail: rich@stat.wisc.edu

Karen Kafadar Department of Statistics, Indiana University Bloomington, 309 North Park Avenue, Bloomington, IN 47408, USA, e-mail: kkafadar@gmail.com

Douglas Kelly Department of Statistics and Operations Research, University of North Carolina, 318 Hanes Hall CB#3260, Chapel Hill, NC 27599-3260, USA, e-mail: dgkelly@email.unc.edu

Kenneth Koehler Department of Statistics & Statistical Laboratory, Iowa State University, Snedecor Hall, Ames, IA 50011-1210, USA, e-mail: kkoehler@iastate.edu

Michael Kosorok Department of Biostatistics, University of North Carolina, 3101 McGavran–Greenberg, Campus Box 7420, Chapel Hill, NC 27599-7420, USA, e-mail: kosorok@unc.edu

Abba M. Krieger Department of Statistics, The Wharton School, University of Pennsylvania, Philadelphia, PA 19104-6302, USA, e-mail: krieger@wharton.upenn.edu

Lynn Kuo Department of Statistics, University of Connecticut, 215 Glenbrook Road, U-4120, Storrs, CT 06269-4020, USA, e-mail: lynn.kuo@uconn.edu

John Lachin III Department of Statistics, George Washington University, 2140 Pennsylvania Avenue NW, Washington, DC 20052, USA, e-mail: jml@bsc.gwu.edu

Nan Laird Department of Biostatistics, Harvard University, 655 Huntington Avenue SPH2, 4th Floor, Boston, MA 02115, USA, e-mail: laird@hsph.harvard.edu

Lisa LaVange Department of Biostatistics, University of North Carolina, 3101 McGavran–Greenberg, Campus Box 7420, Chapel Hill, NC 27599-7420, USA, e-mail: lisa_lavange@unc.edu

Fred Leysieffer Department of Statistics, Florida State University, 214 OSB, 117 N. Woodward Ave, P.O. Box 3064330, Tallahassee, FL 32306-4330, USA, e-mail: fleysief@mailer.fsu.edu

Dennis Lin Department of Statistics, Penn State University, 326 Thomas Building, University Park, PA 16802, USA, e-mail: dkl5@psu.edu

Hosam M. Mahmoud Department of Statistics, George Washington University, 2140 Pennsylvania Avenue NW, Washington, DC 20052, USA, e-mail: hosam@gwu.edu

Glen Meeden School of Statistics, University of Minnesota, 313 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455, USA, e-mail: glen@stat.umn.edu

William Mendenhall III Deceased

Xiao-Li Meng Department of Statistics, Harvard University Science Center, 1 Oxford Street, Cambridge, MA 02138-2901, USA, e-mail: meng@stat.harvard.edu

Reza Modarres Department of Statistics, George Washington University, 2140 Pennsylvania Avenue NW, Washington, DC 20052, USA, e-mail: reza@gwu.edu

Jane Monaco Department of Biostatistics, University of North Carolina, 3101 McGavran–Greenberg, Campus Box 7420, Chapel Hill, NC 27599-7420, USA, e-mail: monaco@email.unc.edu

Donald F. Morrison Department of Statistics, The Wharton School, University of Pennsylvania, Philadelphia, PA 19104-6302, USA, e-mail: donaldm@wharton.upenn.edu

Nitis Mukhopadhyay Department of Statistics, University of Connecticut, 215 Glenbrook Road, U-4120, Storrs, CT 06269-4020, USA, e-mail: nitis.mukhopadhyay@uconn.edu

Joseph Naus Department of Statistics & Biostatistics, Rutgers University, Hill 506, Busch Campus, 110 Frelinghuysen Rd, Piscataway, NJ 08854-8019, USA, e-mail: naus@rci.rutgers.edu

James Neill Department of Statistics, Kansas State University, 101 Dickens Hall, Manhattan, KS 66506-0802, USA, e-mail: jwneill@ksu.edu

Jim Pitman Department of Statistics, University of California, Berkeley, 367 Evans Hall 3860, Berkeley, CA 94720, USA, e-mail: pitman@stat.berkeley.edu

Carol Redmond University of Pittsburgh, 2717 Cathedral of Learning, Pittsburgh, PA 15260, USA, e-mail: ckr3@pitt.edu

John Rice Department of Statistics, University of California, Berkeley, 367 Evans Hall 3860, Berkeley, CA 94720, USA, e-mail: jariceiii@gmail.com

Howard Rockette University of Pittsburgh, 2717 Cathedral of Learning, Pittsburgh, PA 15260, USA, e-mail: herbst@pitt.edu

Jim Rosenberger Department of Statistics, Penn State University, 326 Thomas Building, University Park, PA 16802, USA, e-mail: JLR@psu.edu

Jayaram Sethuraman Department of Statistics, Florida State University, 214 OSB, 117 N. Woodward Ave, P.O. Box 3064330, Tallahassee, FL 32306-4330, USA, e-mail: sethu@stat.fsu.edu

Bill Schucany Department of Statistical Science, Southern Methodist University, P.O. Box 750332, Dallas, TX 75275-0332, USA, e-mail: schucany@mail.smu.edu

Richard Scheaffer Department of Statistics, University of Florida, 102 Griffin-Floyd Hall, Gainesville, FL 32611-8545, USA, e-mail: scheaffe@stat.ufl.edu

Paul Shaman Department of Statistics, The Wharton School, University of Pennsylvania, Philadelphia, PA 19104-6302, USA, e-mail: shaman@wharton.upenn.edu

Eric P. Smith Department of Statistics, Virginia Tech University, 406 A Hutcheson Hall, Blacksburg, VA 24061-0439, USA, e-mail: epsmith@vt.edu

Margaret Smykla Department of Statistics, Carnegie Mellon University, Baker Hall, Pittsburgh, PA 15213, USA, e-mail: mk74@stat.cmu.edu

Jennifer South Department of Statistics, Texas A&M University, 3143 TAMU, College Station, TX 77843-3143, USA, e-mail: jennifer@stat.tamu.edu

Terry Speed Department of Statistics, University of California, Berkeley, 367 Evans Hall 3860, Berkeley, CA 94720, USA, e-mail: terry@stat.berkeley.edu

Sanvesh Srivastava Department of Statistics, Purdue University, 250 N. University Street, West Lafayette, IN 47907-2066, USA, e-mail: sanvesh@purdue.edu

James Stapleton Department of Statistics, Michigan State University, A415/A435 Wells Hall, East Lansing, MI 48824, USA, e-mail: staplet5@stt.msu.edu

Stephen Stigler Department of Statistics, The University of Chicago, 5734 S. University Avenue, Chicago, IL 60637, USA, e-mail: Stigler@galton.uchicago.edu

Kam-Wah Tsui Department of Statistics, University of Wisconsin, 1220 Medical Sciences Center, 1300 University Avenue, Madison, WI 53706-1685, USA, e-mail: kwtsui@stat.wisc.edu

Geoff Vining Department of Statistics, Virginia Tech University, 406 A Hutcheson Hall, Blacksburg, VA 24061-0439, USA, e-mail: Vining@vt.edu

Martin Wells Department of Statistical Science, Cornell University, 301 Malott Hall, Ithaca, NY 14853-3801, USA, e-mail: mtw1@cornell.edu

Wayne Woodward Department of Statistical Science, Southern Methodist University, P.O. Box 750332, Dallas, TX 75275-0332, USA, e-mail: waynew@mail.smu.edu

Brian Yandell Department of Statistics, University of Wisconsin, 1220 Medical Sciences Center, 1300 University Avenue, Madison, WI 53706-1685, USA, e-mail: byandell@wisc.edu

Marvin Zelen Department of Biostatistics, Harvard University, 655 Huntington Avenue SPH2, 4th Floor, Boston, MA 02115, USA, e-mail: zelen@jimmy.harvard.edu

Dale Zimmerman Department of Statistics, The University of Iowa, 241 Schaeffer Hall, Iowa, IA 52242-1409, USA, e-mail: dzimmer@stat.uiowa.edu

Statistics as an Academic Discipline

Alan Agresti and Xiao-Li Meng

Statistics as an academic discipline, having its own department in most research universities, is now well into its middle age. The recent years have seen a wealth of birthday parties. For example, the *IMS Bulletin* recently noted the seventy-fifth birthday celebration of the Statistical Laboratory at Iowa State and the sixtieth birthday of the Statistics Department at North Carolina State, and *Amstat News* highlighted the sixtieth birthday of Statistics at Virginia Tech, Biostatistics at the University of North Carolina, and Biostatistics at the University of Michigan (and the fortieth of Statistics at Michigan), and the fiftieth birthdays of Statistics at Harvard and Statistics at Wisconsin.

In fact, all but a few of the existing Statistics and Biostatistics departments have been created within the past 50–60 years. In many instances, Statistics had a significant presence on campus before the formation of a department, such as a Statistical Laboratory geared toward collaborative consulting. But in many universities Statistics consisted merely of elementary courses scattered around campus, and there was little, if any, scholarly activity in the field. The creation of a formal department typically resulted in a dramatic change-point in the magnitude and nature of such activity at a university.

University of Florida,
Department of Statistics,
102 Griffin-Floyd Hall,
Gainesville, FL 32611-8545, USA
A. Agresti (✉)
e-mail: aa@stat.ufl.edu

Harvard University,
Department of Statistics,
1 Oxford Street,
Cambridge, MA 02138-2901, USA
X.-L. Meng
e-mail: meng@stat.harvard.edu

A. Agresti and X.-L. Meng (eds.), *Strength in Numbers: The Rising of Academic Statistics Departments in the U.S.,* DOI: 10.1007/978-1-4614-3649-2_1,

Why This Book?

In many departments, the founders and the movers and shakers who fostered the growth of the Statistics or Biostatistics Department have been retiring and gradually leaving us. As an unfortunate consequence, the institutional memory of the early days of many departments is disappearing rather rapidly.

This book project began at a luncheon on September 15, 2009 at Harvard Square in which the two of us discussed the many recent birthday celebrations and our worries that the early days of Statistics and Biostatistics Departments were not well documented. The purpose of our book is to capture some of this information before it is lost forever. The book consists of 39 chapters, one for each department, that describes some of the key aspects of the history of the department, including its founding, its growth, key people in its development, notable students it produced, major research and pedagogical accomplishments, and a summary of where the department stands today and its vision for the future. Although the degrees of emphases on these aspects vary considerably with the chapters, we hope collectively they provide both a holistic and a detailed picture of the evolution of Statistics in the United States as a scientific discipline. Our goal has been to produce a volume that would arouse readers' interests by providing both historic vignettes and current snapshots of many major departments in Statistics and Biostatistics.

When we originally conceived this project, our vision was broader and included departments around the world in academia as well as in industry and government. It soon became apparent that this was overly ambitious. Because of space limitations for this book, we cover only the major U.S. Statistics and Biostatistics departments that were founded by the mid-1960s or at least had the direct roots of their founding well established by that time. If this book is viewed as successful, we hope that there will be at least one other volume to cover the "rest of Statistics," which of course is substantial.

The Evolution of Statistics/Biostatistics Departments

We hope that this book will help to show statisticians how our field has evolved, in terms of its academic development in the U.S. We envision that a young statistician who joins a department documented in this book will find it interesting to learn how that department got to where it is today and about some of the notable achievements along the way. We also hope this book could make a valuable contribution to the field of "disciplinary history," and may even encourage other scientific disciplines to consider editing analogous volumes.

Some other articles that contribute to an overview of how academic Statistics arose in the U.S. are listed in the bibliography below. As David (1998) pointed out, in the first part of the twentieth century statisticians tended to work in isolation

within departments such as Mathematics, Economics, Psychology, Education, and Business. Indeed, at the twenty-fifth anniversary of IMS, Craig (1960) stated that "prior to 1920 a scant half-dozen American colleges and universities had, as member of the department, anyone who was seriously interested in the newly developing methods of scientific inference called mathematical statistics. The American Mathematical Society took a very dim view of the whole business and looked upon these mavericks (statisticians) with a suspicion of quackery."

The first departments to focus primarily on Statistics seem to have been the Johns Hopkins Department of Biometry and Vital Statistics, founded in 1918, and the University of Pennsylvania Department of Economic and Social Statistics, founded in 1931. The Johns Hopkins group seems to have been the first department with the word "Statistics" in its title (in the U.S., as Karl Pearson's department at University College, London, started in 1911). David (1998) noted that the formation of the Statistical Laboratory at Iowa State in 1933 may have been the first grouping of statisticians recognized as deserving a unit of their own. Other groups formed before World War II included the George Washington Statistics Department in 1935 (the first in a College of Arts and Sciences) and the Statistical Laboratory at the University of California at Berkeley in 1938. Harshbarger (1976) surveyed the early development of statistics groups at many universities. He credits some whose contributions may have been forgotten over the years. (An example is A. E. Brandt, who was apparently influential in having Gertrude Cox named to head the new department at North Carolina State and who himself later founded a department at the University of Florida).

Of course, Statistics departments were not needed in order for instruction in Statistics to take place. According to an interesting overview by Fitzpatrick (1955), such instruction was available by the 1880s at universities such as Columbia, Johns Hopkins, Michigan, MIT, Pennsylvania, Virginia, and Yale. Stigler (1978) pointed out that a PhD in Mathematical Statistics was awarded at Yale in 1876. In his banquet speech on October 26, 2007, celebrating the fiftieth anniversary of Harvard Statistics, Stigler (2008) traced back at Harvard a course in probability during 1909–1910 and a course in Statistics in 1923. Indeed, by the mid-1920s, elementary statistics courses were available in a relatively large number of departments of Economics, Mathematics, and Education (Glover 1926).

About this time, advanced statistics courses became more common in mathematics departments, such as mathematical statistics courses that followed Carl West's 1918 book, *Introduction to Mathematical Statistics*, or Henry Rietz's 1924 book, *Handbook of Mathematical Statistics*, or his 1927 book, *Mathematical Statistics*. Noether (1989) observed, "At many institutions, the center of statistics instruction had moved from departments of economics to departments of mathematics. As concerned statisticians began to realize, the move often had the unfortunate consequence that mathematicians entrusted with the teaching of introductory statistics courses preferred to concentrate on mathematical, rather than statistical ideas, resulting in the increasingly held belief that statistics was simply a branch of mathematics."

Thus, Statistics departmental activity was slow to develop in the first half of the twentieth century. Hotelling (1940, 1949) gave compelling arguments for why Statistics was well deserving of its own department in the university, pointing out that academia had not been well served by having Statistics taught in various departments by teachers inadequately prepared in statistical theory. In short, "The task of leading the blind must not be turned over to the blind." In addition, he argued against Statistics being organized under the jurisdiction of the Department of Mathematics, pointing out that "The teacher of statistics must have a genuine sympathy and understanding for applications, and these are not well possessed by a great many pure mathematicians, at least in the opinion of some of those concerned with the applications. For so long as such an opinion is maintained, for example by psychologists and economists, these specialists will be suspicious that courses in statistics given by a department consisting largely of pure mathematicians are unsuitable for their purposes. The result is likely to be a sabotaging of attempts at centralization, the different departments reverting to the old and ultimately objectionable system of teaching their own separate courses in statistical methods."

Post World War II, the chapters in this book show that many renowned statisticians besides Hotelling were also influential in departmental development. Notable examples are Jerzy Neyman at Berkeley, Fred Mosteller at Harvard, and George Box at Wisconsin. Yet, at the same time, these chapters mention people not nearly as well known today yet who had their own significant influence. A prime example is W. Allen Wallis, who was responsible for founding the departments at Chicago and Rochester and indirectly responsible at Stanford and Harvard.

Hogg (1989) gave an entertaining overview of many of the personalities involved in the formation of many departments and Odell (1989) gave a related overview focusing on the Southwest, with both articles mentioning many groups formed too recently to be included in our book. The quarter century following World War II saw rapid expansion of higher education in the U.S., and the field of Statistics was no exception. Minton's discussion of the Hogg and Odell articles mentioned that by the 1970 *Amstat News* annual listing of colleges and universities offering degrees in Statistics, there were 99 departments or programs with "Statistics" in the title.

A View of the Past and a Vision for the Future

As you read this book, we think you will be pleased and perhaps a bit surprised to hear how many "success stories" there have been in academic Statistics in the U.S. Yes, there is the occasional failure, Princeton and Buffalo being most notable, but even there we see signs of regeneration and hope for the future.

But, as Statistics as an academic discipline grows rapidly, some growing pains are also inevitable. For example, as our subject expands through a variety of new

types of applications, what is the core theory material that should be taught to all statisticians? Some chapters mention how recent economic realities have forced departments to downsize substantially in numbers of faculty. This makes many "growing-pains" issues, such as balancing teaching and research, lack of staff and infrastructural support, etc., even more challenging (Meng 2004). Many administrators undoubtedly still view Statistics merely as a course that many students must take to satisfy some requirement in their chosen field. A very encouraging sign is the development of links that are happening between many departments and other disciplines around the university. In some departments, such links may be crucial to the department's survival. Also, some departments still do not have much of an undergraduate program, apart from service courses, and many (e.g., Moore 2001) have argued in recent years that our place in academia would be more secure if we offered much more than the first course.

Indeed, there has been a rather substantially increased demand for intermediate courses for graduate students from other disciplines, whose research now call for more sophisticated statistical methods than those they learned in introductory courses. Given the fact that at many colleges and universities, even finding enough qualified teachers for the introductory level courses is an ongoing struggle (Meng 2009), how to provide quality intermediate-level courses is a substantial challenge that our profession now faces. We certainly hope that a future volume of this kind, say 30–50 years from now, will consider our current period as another golden age of our discipline because we turned these "growing pains" into "growing gains," making our field larger, stronger, and more mature.

Proposed Departmental and ASA Documentation of Our History

We imagined that in preparing their articles, many authors would have or would discover interesting and useful materials archived from the past, for instance from past departmental anniversary celebrations. We have encouraged and continue to encourage departments to post such material and additional documentation such as annual reports and pictures at a link from their departmental home page that is especially devoted to history.

In conjunction with this book, we plan to ask the American Statistical Association (ASA) to set up a location at their website devoted to the history of Statistics departments. At that site, links would be created to the various departmental history sites. This material could then be periodically updated by each department to help create a historical record for each department. More broadly, we envision that a new section of ASA devoted to The History of Statistics could be created to stimulate the organization of Internet records and other archives at departmental links as well as to present sessions with historical content at national meetings. This can help to supplement the historical material that is currently

available, such as the Iowa State "Archives of Statistics" set up through the American Statistical Association, which contains 195 boxes of material including photographs, lectures and symposia, collections from famous statisticians, and other artifacts. See www.lib.iastate.edu/spcl/manuscripts/MS349.html.

Acknowledgments and Dedication

Histories are made by people and written by people, but almost never the same group of people, and the passage of time often scatters the material and challenges our memories. Our space for this book has also been very limited, as we could afford to give each department only about 5,000 words, with exceptions for a few departments with substantial history and an unusually major impact in our field (e.g., UC Berkeley). Some readers may feel we should have given more space yet to the major-impact departments at the expense of other departments. We felt, however, that each department has made its own contributions that were worthy of a full chapter at this stage of their history. And we hope that the authors of the chapters for the major-impact departments will consider writing extended, in-depth histories that can appear in future journals and books.

Because of the space constraints, it was a great challenge for the authors of each chapter not only to collect material but also to decide what to include. We therefore would like to sincerely thank all the chapter contributors for very generously devoting their time and energies to this project, and to offer our apologies to a few for whom our request for preparing such a chapter has apparently imposed more burdens than from their own deans. We also offer our apologies to those readers who might find inaccurate recollections or gross omissions. Both the chapter authors and we as editors have tried to avoid either occurrence, but unfortunately separating signal and noise is never something that can be achieved with 100% success, especially when a signal to one person can be noise to another, or vice versa. We can only hope for fewer errors in future editions or volumes of this kind. Also, we sincerely hope that all departments in this book as well as others founded since the mid-1960s will, in the future, prepare extended histories and post them at their departmental websites.

We also are very grateful to the many colleagues who made suggestions about these chapters. The referees we approached nearly unanimously agreed to help us. Their names are listed separately at the end of the book. At the beginning and throughout the project, eminent statisticians such as Sir David Cox, Ingram Olkin, and Stephen Stigler gave us helpful advice about the entire project. We especially thank Ingram for his tireless effort in helping us to review a large number of chapters, providing all of us the benefit of his long memories and vast experiences. Many thanks to John Kimmel, who as then Executive Editor at Springer, kindly encouraged and supported this project. Thanks also to Marc Strauss and Hannah Bracken for their support during the later stages. We thank Alan's wife, Jacki Levine, for the suggested

title for the book, Kat Worden for her help as our editorial assistant, and Dale Rinkel for her assistance as well.

Finally, both of us have benefitted immensely over the years from the friendship and mentorship of Stephen Stigler. Steve was Alan's major professor when he was a graduate student at the University of Wisconsin in 1968–1972. Steve was also the department chair who recruited and then served as a much valued mentor of Xiao-Li during Xiao-Li's tenure from 1991–2001 at the University of Chicago. Indeed our entire profession owes so much to this eminent historian/statistician for bringing vividly to life the fascinating history of our profession. It is therefore with great pleasure that we dedicate the book to Steve, on the occasion of his seventieth birthday.

References

Craig AT (1960) Our silver anniversary. Ann Math Stat 31:835–837

David HA (1998) Statistics in U.S. universities in 1933 and the establishment of the statistical laboratory at Iowa State. Stat Sci 13:66–74

Fitzpatrick PJ (1955) The early teaching of statistics in American colleges and universities. Am Stat 9:12–18

Glover JW (1926) Statistical teaching in American colleges and universities. J Am Stat Assoc 21:419–424

Harshbarger B (1976) History of the early developments of modern statistics in America (1920–1944). In: Owen DB (ed) On the history of statistics and probability. Marcel Dekker, New York, pp 132–145

Hogg RV (1989) On statistical education in the United States since 1920. In: Proceedings of the American Statistical Association sesquicentennial invited paper sessions. American Statistical Association, Alexandria, pp 286–292

Hotelling H (1940) The teaching of statistics. Ann Math Stat 11:457–472

Hotelling H (1949) The place of statistics in the university. In: Neyman J (ed) Proceedings of the Berkeley symposium on mathematical statistics and probability. University of California Press, Berkeley, pp 21–40

Meng X-L (2004) Statistics departments: time for the second divorce? Amstat News, pp 2–3, Nov

Meng X-L (2009) Desired and feared—what do we do now and over the next 50 years? Am Stat 63:202–210 (rejoinder 64, 26–29; 362–363)

Moore DS (2001) Undergraduate programs and the future of academic statistics. Am Stat 55:1–6

Noether GE (1989) The teaching of statistics in the USA: the early years. In: Proceedings of the American Statistical Association sesquicentennial invited paper sessions. American Statistical Association, Alexandria, pp 279–285

Odell PL (1989) A historical summary of graduate statistical education in the Southwest. In: Proceedings of the American Statistical Association sesquicentennial invited paper sessions. American Statistical Association, Alexandria, pp 293–307 (and discussion by Minton PD on pp 308–311)

Stigler SM (1978) Mathematical statistics in the early states. Ann Stat 6:239–265

Stigler SM (2008) Statistics at Harvard? A toast to the Harvard Statistics Department. Am Stat 62:246–250

Carnegie Mellon University Statistics Department

Margaret L. Smykla and with the assistance of the department faculty

The Department of Statistics at Carnegie Mellon University—then Carnegie Institute of Technology–was created in 1966. Prior to that time, Carnegie Tech's Department of Mathematics served as the training ground for an outstanding mix of young statistical talent, such as undergraduate and masters degree students Frederick Mosteller (1930s); David L. Wallace (1940s); Mel Hinich (1950s); and Henry Block, Stephen Lagakos, Gary Simon, and Miron Straf (1960s). Among the statistically oriented instructors who began their distinguished careers in the Mathematics Department were Abraham Charnes, Carlton Lemke, Lester E. Dubins, Donald P. Gaver, Jr., and M. M. Rao.

In 1957, Morris H. DeGroot joined the Department of Mathematics as it was moving toward pure mathematics, a shift that did not bode well for the future hiring of statisticians. The only other statistician in the department was former Institute of Mathematical Statistics (IMS) President Edwin G. Olds who, despite being overshadowed in numbers by mathematicians for decades, was able to effectively make the case for statistics.

Olds' influence on budding statisticians at Carnegie Tech can be traced back to the mid-1930s. In *The Pleasures of Statistics: The Autobiography of Frederick Mosteller*, Mosteller recalled having to compute the probability of casting a total of nine and ten using three ordinary dice in a physical-measurements course. When as a sophomore he asked how to solve the problem using a large number of dice, he was directed to Olds.

Carnegie Mellon University,
Department of Statistics,
Baker Hall,
Pittsburgh, PA 15213, USA
M. L. Smykla (✉)
e-mail: mk74@stat.cmu.edu

A. Agresti and X.-L. Meng (eds.), *Strength in Numbers: The Rising of Academic Statistics Departments in the U.S.*, DOI: 10.1007/978-1-4614-3649-2_2,

> He [Olds] began showing me slowly and carefully how to do the three-dice problem…The method was that of generating functions, and it magically, and I do mean magically, counted how many ways there were to get each total with the dice. Although I had loved mathematics all along, this was the first time I ever felt that I'd been working with a peashooter when I could have had a cannon…
>
> Soon I was a mathematics rather than a physics major.

Hooked on probability and statistics, Mosteller would go on to earn a PhD in Mathematics from Princeton University. In 1957, en route to becoming one of the premier statisticians of the twentieth century, Mosteller founded the Department of Statistics at Harvard University almost a decade before Carnegie Tech had one (as fate would have it, one of his early PhD students at Harvard was Stephen Fienberg, who later became head of Carnegie Mellon's Department of Statistics and dean of its College of Humanities and Social Sciences (H&SS)). In 1964, Mosteller and fellow Carnegie Tech and Princeton alumnus Wallace authored their classic book, *Inference and Disputed Authorship: The Federalist*. When it was featured on the cover of *Time* magazine for its use of statistical methodology to solve the disputed authorship of the Federalist Papers, Carnegie Tech's Mathematics Department basked in the reflected limelight.

By the mid-1960s, DeGroot's interests had been diverging from his colleagues for years, leading him to yearn for a group of colleagues with whom to share his passion for research in decision making and other statistical interests. His friend and lifelong collaborator, Richard M. Cyert, then dean of the Graduate School of Industrial Administration (GSIA; now the Tepper School of Business) agreed. Together they developed a plan for a Department of Statistics with DeGroot as its head and Gaver as the other senior faculty member. A year later, Carnegie Tech became Carnegie-Mellon University. (In 1986, the hyphen was removed and the school assumed its present name of Carnegie Mellon University.)

In its early years the department had only a few, albeit outstanding, faculty members, such as Norman Starr, Paul Shaman, Stanley Sclove, Michael Woodroofe, and Madabhushi Raghavachari. The department, while not part of any college, reported to Cyert, first as dean and then as Carnegie Mellon president. Notable graduate students during this time included Prem Goel (former chairman of the Department of Statistics at Ohio State University), the late David Hildebrand (former chairman of the Department of Statistics at the University of Pennsylvania), and Benjamin Kedem (Professor of Mathematics at the University of Maryland).

In 1969, Jay Kadane joined the department. Three years later, DeGroot stepped down as head when his wife became ill and Kadane, who was 6-years out of graduate school, succeeded him. In addition to DeGroot and Kadane, the faculty at the time consisted of John Lehoczky, William W. Davis, Paul Shaman, Al Kinderman, and Gerry Ramage. There were a handful of graduate students, no undergraduates, and two staff members.

The department's offices in the early years were on the eighth floor of the concrete-block-walled, dungeon-like Science Hall, now Wean Hall, with odd aromas provided by the nearby chemistry laboratories. While Carnegie Mellon had

Commencement 1969: (left to right): Profs. DeGroot and Raghavachari; grad student Goel; and unidentified friend

Commencement 1971: (left to right) Profs. Kinderman, Ramage, and Lehoczky

some computers which used racks of IBM cards, Statistics had none. The department also still lacked a college to call home, as it was reporting both to the dean of GSIA and to the dean of Engineering. Blazing its own path, the department decided to focus on Bayesian Statistics, applications of Statistics, and, later,

Statistical Computing, when none of these was widely recognized as crucial to a growing department. In keeping with the latter focus, Statistics rented its first terminal: an interactive terminal hard-wired into the university computer system.

An early important proposal by Kadane that was adopted by departmental consent was to evaluate applied research on the basis of whether it was a contribution to the applied area and not necessarily a contribution to Statistics. Another part of that strategy was to forego operating a consulting center for drop-in statistical advice. Instead, faculty were encouraged to participate in joint work with researchers in other fields. As a result, the department managed to develop collaborative relationships with many scholars across campus for decades to come.

George Duncan joined the department in 1974, followed by William Eddy and Diane Lambert 2 years later. As almost none of the faculty had spouses or children at the time, there was a lot of after-hours socializing, such as Wednesday evening cocktails and hors d'oeuvres in the Faculty Club in Skibo (the campus student union named after Andrew Carnegie's ancestral home in Scotland). Everyone also gathered at noon each day in their shared hallway in Science Hall to walk for lunch to Skibo.

In what would become a hallmark of the department to the present day—journal and magazine editorships—DeGroot followed up his 1971–1975 editorial work as book review editor of the *Journal of the American Statistical Association* (*JASA*) by serving as the publication's theory and methods editor from 1976 to 1978. Kadane was his deputy editor for the latter. Duncan took over that *JASA* editorship from DeGroot in 1979.

Selected Articles from the Early Years

Brown, G. F., Kadane, J. B., and Ramage, J. G. (1974). The asymptotic bias and mean-squared error of double K-class estimators when the disturbances are small. *International Economic Review*, October, 15, 667–679.

Cyert, R. M. and DeGroot, M. H. (1971). Interfirm learning and the kinked demand curve. *Journal of Economic Theory*, 3, 272–287.

DeGroot, M. H. and Starr, N. (1969). Optimal two-stage stratified sampling. *Annals of Mathematical Statistics*, 40, 575–582.

Gaver, D. P. (1968). Headstart strategies for combating congestion. *Transportation Science,* 2 (2), 172–181.

Kadane, J. B. and Lehoczky, J. P. (1976). Random juror selection from multiple lists. *Operations Research*, 24, 207–219.

Kinderman, A. J. (1974). On the distribution of the deviations from the mean. *Indian Journal of Statistics*, 36, B, 2, 209–211.

Sclove, S. L. (1968). Improved estimators for coefficients in linear regression. *Journal of the American Statistical Association*, 63, 596–606.

In 1978, Wen-chen Chen came aboard; about the same time, the department offices moved from the eighth to the seventh floor of Science Hall. Mark Schervish arrived in 1979—an important year for collaborations. During a graduate seminar taught by Kadane, Schervish met University of Pittsburgh philosophy faculty member Teddy Seidenfeld (who later became a Carnegie Mellon joint Philosophy/Statistics faculty member). Their interactions would eventually evolve into weekly research meetings and numerous papers by the trio, both of which continue today.

Meanwhile, across the Atlantic at the First Valencia International Meeting on Bayesian Statistics in Valencia, Spain, DeGroot and Fienberg were beginning their collaboration on comparing probability forecasters. At this meeting, DeGroot was able to finally convince Fienberg, whom he and Kadane were aggressively courting, to join the department a year later in 1980. The final negotiating item involved finding opportunities in Pittsburgh for Fienberg and his son to play hockey.

The dawn of the 1980s was a time of change and development, with faculty numbering about 10 and graduate students roughly 15. Among them was Luke Tierney, in his first faculty post, and PhD student Kathryn Chaloner. The couple met at Carnegie Mellon and later married. Today, both are professors and department heads at the University of Iowa—she in the Department of Biostatistics, and he in the Department of Statistics and Actuarial Science.

In 1980, statistics finally landed a home when it joined H&SS, where it remains a core department today.

In 1981, Robert Kass was hired, and Fienberg became head just as he was starting his 6-year stint as chair of the Committee on National Statistics (CNSTAT) at the National Academy of Sciences. As department head, he oversaw submission of a proposal to the first Scientific Computing Research Equipment in the Mathematical Sciences (SCREMS) program at the National Science Foundation, for which the department received funding to purchase its first mini-computer for $250,000. This was the start of the department's leadership in statistical computing beyond Carnegie Mellon, a position it retains to the present day.

Collaboration continued to flourish, as DeGroot, Fienberg, and Kadane began work on the use of statistics in legal settings, which would become the edited volume, *Statistics and the Law*. At a downtown Pittsburgh hotel, the department hosted the international Computer Science and Statistics 13th Symposium on the Interface, chaired by Eddy. This was to be the first of many conferences and workshops hosted by the department and its faculty.

Amidst a swirl of activity, tragedy struck. On July 3, 1981, while visiting family in Taiwan with his wife and 1-year-old son, 31-year-old Wen-chen Chen was found dead. Chen had undergone extensive questioning by Taiwanese authorities regarding his alleged political activities in the U.S. With DeGroot as the driving force in bringing attention to what the Taiwanese government was dismissing, he and renowned U.S. pathologist and Pittsburgh resident Cyril Wecht traveled to Taiwan. While Wecht concluded through autopsy findings that the promising young faculty member was murdered, there was no further action by the Taiwanese government.

The department continued to grow and, with the university-wide tentacles of a sprouting bureaucracy compounding regulations and paperwork, in 1982 Statistics hired its first business manager. Ruey Tsay came aboard that year also, while a year later Joel Greenhouse arrived to begin a post-doctoral position supported by a National Institute of Mental Health (NIMH) grant for training in Psychiatric Statistics with Lehoczky and DeGroot as principal investigators.

In keeping with the tradition of departmental editorships of journals and magazines, DeGroot was spearheading the creation of *Statistical Science*, dedicated to communication among statisticians regardless of specialty, while Kadane was in the middle of a 3-year stint as applications and coordinating editor of *JASA*. On the honors front, Fienberg was the 1982 recipient of the Committee of Presidents of Statistical Societies Presidents' Award (COPSS) as the outstanding statistician aged 40 or younger—the first of three Carnegie Mellon Statistics faculty to receive this honor.

Selected Books Written by Faculty

Anderson, M. J. and Fienberg, S. E. (1999). *Who Counts? The Politics of Census-Taking in Contemporary America*. Russell Sage Foundation.

DeGroot, M. H. (1970). *Optimal Statistical Decisions*. McGraw-Hill.

DeGroot, M. H. (1975). *Probability and Statistics*. Addison-Wesley.

DeGroot, M. H., Fienberg, S. E., and Kadane, J. B., editors (1986). *Statistics and the Law*. Wiley.

Devlin, B., Fienberg, S. E., Resnick, D., and Roeder, K., editors (1997). *Intelligence, Genes, & Success: Scientists Respond to "The Bell Curve"*. Springer-Verlag.

Kadane, J. B. (2011). *Principles of Uncertainty*. Chapman and Hall (free on the web).

Kadane, J. B., Schervish, M., and Seidenfeld, T., editors (1999). *Rethinking the Foundations of Statistics*. Cambridge University Press.

Kadane, J. B. and Schum, D. A. (1996). *A Probabilistic Analysis of the Sacco and Vanzetti Evidence*. Wiley-Interscience.

Kass, R. E. and Vos, P. (1997). *Geometrical Foundations of Asymptotic Inference*. Wiley.

Mockus, J., Eddy, W. F., Mockus, A., Mockus, L., and Reklaitis, G. (1997). *Bayesian Heuristic Approach to Discrete and Global Optimization* (Algorithms, Visualization, Software, and Applications). Kluwer Academic Publishers.

Mosteller, F., Fienberg, S. E., and Rourke, R. E. K. (1983). *Beginning Statistics With Data Analysis*. Addison-Wesley.

Schervish, M. J. (1995). *Theory of Statistics*, Springer-Verlag.

Wasserman, L. W. (2003). *All of Statistics: A Concise Course in Statistical Inference*. Springer-Verlag.

By the early 1980s, the department enjoyed a worldwide reputation in Bayesian Statistics and decision making, and was developing strength in statistical computation. At the same time, Carnegie Mellon was stressing these same areas, as well as cross-disciplinary research, in its strategic planning. The university's recognition of the importance of statistics in such research would result, a decade later, in the department's playing a key role in several major cross-disciplinary efforts on campus, such as the Center for the Neural Basis of Cognition (CNBC), and the Center for Automated Learning and Discovery (CALD), now the Machine Learning (ML) Department.

In 1984, the department moved from Wean Hall to two newly renovated wings of Baker Hall, almost doubling its space in faculty, staff, and student offices, and acquiring two conference rooms, a lounge, and more. To ensure frequent interaction, graduate student offices were interspersed among faculty offices. A spring evening was the setting for faculty, staff, and university officials to unite in celebration as DeGroot was recognized for his decades of contributions and achievements with Carnegie Mellon's highest honor: a University Professorship. Later in the year, Fienberg stepped down as head, and Lehockzy assumed the post.

Early 1980s: a house party with some faculty and students

In 1985, Fienberg, by now Maurice Falk Professor of Statistics and Social Science, and Eddy began developing the idea for a quarterly magazine for anyone with an interest in the analysis of data—*CHANCE, New Directions for Statistics and Computing*. It would reach fruition 3 years later, and eventually become a publication of the American Statistical Association for the next 20 years and counting. By mid-decade, the department housed about 15 faculty and 30 graduate students.

Selected Articles by faculty

Eddy, W. F. and Schervish, M. J. (1995). How many comparisons does Quicksort use? *Journal of Algorithms*, 19, 402–431.

Fienberg, S. E. (1994). Conflicts between the needs for access to statistical information and demands for confidentiality. *Journal of Official Statistics*, 10, 115–132.

Perone Pacifico, M., Genovese, C. R., Verdinelli, I., and Wasserman, L. (2004). False discovery control for random fields. *Journal of the American Statistical Association*, 99, 1002–1014.

Greenhouse, J. B., Kaizar, E. E., Kelleher, K., Seltman, H., and Gardner, W. (2008). Generalizing from clinical trial data: A case study. The risk of suicidality among pediatric antidepressant users. *Statistics in Medicine,* 27(11): 1801–1813.

Junker, B. W. and Sijtsma, K. (2000). Latent and manifest monotonicity in item response models. *Applied Psychological Measurement*, 24, 65–81.

Schervish, M. J., Seidenfeld, T., and Kadane, J. B. (2002). Measuring incoherence. *Sankhya*, 64, Part 3(i), 561–587.

Kruk, L., Lehoczky, J., Shreve, S., and Yeung, S.-N. (2003). Earliest-deadline-first for a multiple-input heavy-traffic real-time queue. *Annals of Applied Probability*, 13, 55–99.

Roeder, K., Bacanu, S. A., Wasserman, L., and Devlin, B. (2006). Using linkage genome scans to improve power of association in genome scans. *American Journal of Human Genetics,* 78, 243–252.

Tierney, L. and Kadane, J. B. (1986). Accurate approximations for posterior moments and marginal densities. *Journal of the American Statistical Association*, 81, 82–86.

Academic statistics departments were afforded a unique opportunity to acquire their own equipment as a result of the awarding of the first SCREMS funds in 1982, followed by Department of Defense funds under its University Research Instrumentation Program (DURIP). The Statistics Department moved from general availability of terminals in 1981, to a VAX 11/750 in 1983, to several workstations in 1985—all maintained by Eddy. By 1986, the department's equipment included one VAX 11/750 superminicomputer with 912 MB of disk storage, one VAXstation 500 color workstation, one CSPI Mini-Map array processor, five GIGI color microcomputers, and more. All machines were interconnected by a 10 Mb Ethernet using DECnet and TCP/IP software.