

Springer Series in the Data Sciences

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With Margaret L. Smykla

Statistics in the Public Interest

In Memory of Stephen E. Fienberg

 Springer

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Acknowledgments

Editing this book in memory of our friend, Steve Fienberg, was a bittersweet experience because even though we have already commemorated the fifth anniversary of his death, we still miss him dearly. This said, our work was also pleasant and rewarding thanks to the tremendous commitment and help we received from many individuals and institutions.

First, we wish to thank Donna Chernyk, our editor at Springer Nature, who made it all sound so straightforward and whose great attitude and positive responses to all our many queries enabled us to assemble a volume that we believe is worthy of Steve. Donna was always prompt, patient, and encouraging, and we are grateful to her for making our job so much easier.

Next, we gratefully acknowledge the Institute of Mathematical Statistics (IMS), the International Society for Bayesian Analysis (ISBA), the American Statistical Association (ASA), and Taylor & Francis, for their permission to reproduce material that had previously appeared in *Statistical Science*, the *ISBA Bulletin*, and *Chance*. Steve's younger son, Howard Fienberg, contributed many of the photos included in the last part in the book. Thank you, Howard! The *Tribune-Review* granted us permission to reprint two obituaries that appeared soon after Joyce Fienberg, Steve's wife, was murdered by a gunman who stormed the Tree of Life Synagogue in October of 2018. Heidi Sestrich, from the Department of Statistics and Data Science at Carnegie Mellon University, generously helped us to reformat some files to meet the publisher's requirements.

Several of the chapters in the book were sent out for anonymous review. Revisions suggested by these reviewers in all cases contributed to improving the readability and quality of the original manuscripts, so we wish to acknowledge their work even if they will remain unnamed.

Finally, there would not have been a book to edit without the excellent chapters contributed by a large number of authors. Just about everyone who was asked enthusiastically agreed to participate and the response was humbling. It is a testament to Steve's long and distinguished career that so many outstanding authors

from a variety of disciplinary areas were ready to honor him one more time. The collection of chapters is extraordinary, and reflect Steve's contributions, not only in terms of breadth but also in terms of scholarly quality. So thank you all so much.

Steve would have loved this book from cover to cover.

Prologue

Remembering Steve Fienberg

Obit for Stephen E. Fienberg written by Alicia Carriquiry, and reprinted with permission from the ISBA Bulletin, Vol. 24, No. 1, 2017.

Stephen E. Fienberg passed away on December 14, 2016, shortly after turning 74 years of age. He had been diagnosed with cancer about four years earlier, but kept such a demanding and productive schedule in spite of the disease that most of us were convinced that he would prevail in the end. Steve's death was a tremendous loss for statistics and for science in general, and he will be sorely missed.

Steve was born in Toronto, Canada, on November 27, 1942. In high school, it became obvious to him that he was good at, and greatly enjoyed, the sciences, in particular the mathematical sciences. Steve liked to tell that while his mother (who passed away in Toronto less than two years ago) thought that he was a genius, he was just a good student with an aptitude for mathematics and a passion for ice hockey. Steve went on to the University of Toronto, where he obtained a degree in mathematics in 1964. He applied to, and was admitted into, the doctoral program in statistics at Harvard University, and finished his PhD in 1968, under the supervision of Fred Mosteller.

Meeting Fred Mosteller and working closely with him in a variety of different projects was a life-changing experience for Steve. Mosteller at the time was a rare statistician in that he was genuinely driven by interesting applied projects. The fact that statistics could be brought to bear on so many other disciplines and to such good effect was a revelation, and these early experiences had a lasting impact on Steve's professional life. Steve had a profound respect and deep affection for Mosteller, and often spoke of how much he had learned from his years as a graduate student working with him.

After completing his PhD, Steve was recruited by William Kruskal, then Chair of the Department of Statistics at the University of Chicago, and began his career as an assistant professor. Kruskal, much like Mosteller, was also attracted to applications, and introduced Steve to many different faculty in a wide range of disciplines with

whom Steve began collaborating. In those days, political polling was becoming widespread, but polling methodology was not yet fully developed. Steve became intrigued by the political polling carried out by a local newspaper, and this interest led in part to many years of research in different aspects of survey sampling.

Even though Steve enjoyed his years in Chicago, he and his wife Joyce moved to Minnesota, largely for personal reasons. In Minnesota, Steve held his first administrative position as Chair of the Department of Applied Statistics at the Saint Paul campus of the University of Minnesota. From Minnesota, Steve and Joyce moved to Carnegie Mellon University, which Steve called his academic home and where he spent the rest of his professional life. Steve joined the Department of Statistics at CMU in 1980, and with the exception of a short stint as Provost of York University in Canada, he never left. A “Conversation with Steve” by two of Steve’s dearest friends, Miron Straf and Judy Tanur, was published in *Statistical Science* in 2013, and is reprinted in this volume and includes many biographical details about Steve. It also paints a wonderfully warm picture of Steve as a person.

Steve’s first research contributions were largely based on his dissertation research. Mosteller introduced Steve to a National Research Council study that was known as the “National Halothane Study,” and which Steve described as a “giant contingency table.” For his dissertation, Steve developed loglinear model theory and methods useful for the analyses of categorical data such as those collected in the study, and together with Yvonne Bishop and Paul Holland (also Mosteller students) published the well-known book *Discrete Multivariate Analysis* (1975), with the green covers. Throughout his career, Steve continued to advance the theory and implementation of loglinear models, but also built world-class research programs in privacy and confidentiality, machine learning, and algebraic statistics.

Steve was already interested in Bayesian theory by the time he arrived at CMU, but his career as a Bayesian statistician really took off then. Steve joined Jay Kadane and Morrie DeGroot when he came to CMU, and the three of them contributed to making the department a destination for Bayesians from all over the world. In the Mosteller and Kruskal tradition, Steve developed an interest in a wide variety of problems in other disciplines, and was instrumental in the creation and editing of journals with a focus on the principled application of statistics. These included the *Annals of Applied Statistics*, the *Journal of Privacy and Confidentiality*, and more recently, *The Annual Review of Statistics and Its Application*. Bayesians have much for which to be thankful to Steve. He was the second President of ISBA, and was largely responsible for attracting the funding for the ISBA 2000 World Meeting in Crete. He contributed the first article in the first issue of *Bayesian Analysis*, entitled “When did Bayesian inference become Bayesian?”, a historical recount of the most important developments in Bayesian statistics between the time when Bayes’ opus was published posthumously and the end of the last century. During what he called “the Bayesian Renaissance,” Steve became a tireless and effective promoter of the Bayesian paradigm worldwide.

Possibly because of Mosteller’s and Kruskal’s influences, Steve’s passion was to advance the principled and constructive use of statistics to solve real problems in other disciplines, preferably when those problems had a public policy implication.

Not long ago, Eric Lander, the renowned scientist and co-Chair of President Obama's Council of Advisors on Science and Technology (PCAST), referred to Steve as follows:

Steve Fienberg is not just a statistician—he is a *public statistician*. He has brought his considerable statistical prowess to bear on problems of great public importance (emphasis added).

Steve's first forays into public policy began shortly after he arrived at CMU: he became involved with various government agencies on matters of data collection and data sharing, and joined the Committee on National Statistics (CNSTAT) soon after it was established. Through his work with CNSTAT (which continued throughout his career), Steve had an opportunity to positively impact the work at most (if not all) federal agencies in charge of collecting, synthesizing, and sharing official statistics.

After CMU, the institution in the US that most benefited from Steve's knowledge and dedication was the National Academies of Science, Engineering and Medicine (NASEM). Steve began participating in NASEM's activities in the mid-1980s, but became truly involved after his election to the National Academy of Sciences in 1999 (one of Steve's proudest professional accomplishments). Not only did Steve focus much of his efforts on the NASEM, he also motivated many of us to follow in his footsteps and view the NASEM as an effective vehicle to introduce positive change in society through science-based public policy and decision-making. Steve served the Academies in a variety of roles, but possibly the most consequential of those was his co-chairing of the Report Review Committee, which Steve viewed as an efficient means to ensure that every report published by the Academies was based on solid science and (as appropriate) on sound statistical reasoning.

I have had the privilege of calling Steve a friend for over 25 years, and his mentoring and efforts on my behalf changed the course of my professional life. A few years ago, Steve encouraged me (and Hal Stern and Karen Kafadar) to submit a proposal to establish a NIST Center of Excellence in Forensic Statistics, which would be located at our four institutions, with "headquarters" at Iowa State. Surprisingly to me (but not to Steve!) we were successful and obtained the funds to create the center in 2015. Steve was the intellectual leader, the one with the grand vision and the far-reaching ideas, and I have great hopes that the work on which we have embarked at the center will have a positive impact on society, because Steve was instrumental in setting us off on the right path. Hal, Karen, and I are tremendously thankful to Bill Eddy, who was Steve's close friend and colleague, for jumping in and picking up where Steve left off.

Steve was an affectionate and loyal friend, and he seemed to know everyone. But his world revolved around his wife Joyce and the rest of his family. Steve adored his grandchildren and loved spending time with them. He was particularly fond of having them all descend upon him and Joyce for extended summer visits. While not religious in the usual sense, Steve was proud of his Jewish heritage and culture and strongly believed in keeping the rituals and traditions, and in observing the holidays, as a means to nurture his sense of belonging and reinforce his ties to the Jewish community to which he felt so close.

Among his many other interests and activities, Steve always found time for his other “passions”: ice hockey (which he continued practicing even into his 70s) and the *New York Times* crossword puzzle. He loved good food and fine wine (and single malt scotch) and was the instigator of the “Saturday Night Extravagant Dining” group (Jim Berger, Susie Bayarri, Merlise Clyde, Ed George, Dick De Veaux, Robert Wolpert (emeritus), Veronika Rockova, myself, and anyone else reckless enough to join us) during the Joint Statistical Meetings (JSM). But he was determined to encourage good dining habits among JSM goers long before then; remember *Belizaire*, anyone ?

Steve had a marshmallow core even though on occasion he could unsheathe the fangs. He was immensely patient with young faculty and students and with anyone who was really trying, but he did not suffer fools gladly. He loved a good competition but did his best to have the last word. He could be demanding, but he gave of himself generously and never ever expected anything in return. He was well respected by some, idolized by others, and ignored by no one, and sometimes he seemed invincible. His many friends will miss him dearly, for perhaps ever.

References

Fienberg, SE. 2006. When did Bayesian analysis become “Bayesian”? *Bayesian Analysis*, 1:1–40.

Straf, ML, Tanur, JM. 2013. A conversation with Stephen E. Fienberg. *Statistical Science*, 28:447–463.

In Memory of Joyce Fienberg

Much has happened since Steve died. Most horrifically, his wife of over 50 years, Joyce Libman Fienberg, was murdered in the worst anti-Semitic attack to be committed in the United States, when a gunman opened fire at the Tree of Life Synagogue in Pittsburgh on Saturday, October 27, 2018. Her funeral, on October 31, drew 1000 mourners.

Joyce and Steve met at the University of Toronto in 1963, where they were both enrolled. They married two years later and had two sons, Anthony and Howard. With boys in tow, Joyce and Steve traveled the world on behalf of Steve’s career to various academic posts, conferences, research centers, and more.

Joyce earned a degree in social psychology at the University of Toronto, and in 1983 joined the Learning Research and Development Center (LRDC) at the University of Pittsburgh as a research specialist, analyzing learning in classrooms and museums, and studying the practices of highly effective teachers. Even though she held a full-time job until her retirement in 2008, she dedicated time to support Steve’s career. While Steve worked tirelessly to bring out the best in his PhD

students, Joyce focused on making those students, and departmental post-docs and new faculty, feel more than welcome – special! – in what, for some, was a strange and unknown land: Pittsburgh, PA. Her home and her heart were always open to everyone, but in particular to anyone who was new in Pittsburgh and needed a friend. Students fondly remember the warmth of Joyce’s gatherings in celebration of the Jewish holidays, where there was always a place at the Seder table regardless of religious affiliation.

Anyone who had the privilege of meeting Joyce was shocked and saddened by her death. Dr Gaea Leinhardt, who was Joyce’s research partner for decades and her close friend, echoed the sentiments of many when she said: “Joyce was a magnificent, generous, caring and profoundly thoughtful human being.”

On April 20, 2019, in honor of both Joyce and Steve, the Carnegie Mellon Department of Statistics and Data Science hosted the Stephen E. and Joyce Fienberg Memorial Lecture at CMU with guest lecturer Sir David Spiegelhalter. Later that year, the Stephen E. and Joyce Fienberg Professorship in Statistics and Data Science was conferred upon Rebecca Nugent, associate department head and co-director of undergraduate studies. It was a fitting tribute not only to Steve but also to Joyce, who was such a consequential member of the CMU community.

Joyce was Steve’s rock, and the family they raised together was his greatest source of pride.

A Special Recognition for Margaret L. Smykla

While Carriquiry, Eddy, and Tanur are the editors of this volume, Margaret L. Smykla’s contribution was critical to the success of the project and deserves special recognition. Margie met Steve earlier than several of us did and worked with him for decades. Her knowledge of the Department of Statistics and Data Science at Carnegie Mellon and of its inhabitants past and present is encyclopedic, and was a tremendous resource as we assembled the pieces for the book.

We are deeply grateful to Margie for her dedication and her efforts in support of this volume honoring Steve and Joyce.

The Genesis of This Book

Steve Fienberg produced a tremendous corpus of work in statistics and the social sciences writ large. His contribution is broad and deep, and laid the groundwork for the work of many others – students, colleagues, and total strangers alike. A quick search online results in over 72,000 (!) citations of his work and an h-index of 89. In the last year of his life, the number of citations his work received exceeded 20,000, confirming that Steve was at the top of his game until the very end.

We thought that editing a volume that included an eclectic but high-quality mix of contributions by a wide range of authors would honor Steve's legacy. In mid-2017, we contacted Donna Chernyk, an Editor with Springer Nature, who encouraged us to work on such a volume. While we had hopes of completing this project over a year ago, we are now delighted to see the light at the end of the tunnel and look forward to seeing the book in print before long.

We have organized the contributions into six sections:

- Theory and Methods for Categorical Data
- Bayesian Theory and Applications
- Statistics and the Law
- Causal Analyses
- Surveys and Censuses
- Official Statistics

A seventh section, entitled "Steve and Joyce As We Knew Them", includes short contributions by some of Steve and Joyce's closest friends, reminiscences contributed by former students, colleagues, and assorted others, and a collection of photographs to remember them by.

We are tremendously grateful to everyone who contributed a chapter for this volume. Steve would have loved to read every single one and would have found much to like. A huge proportion of those we approached with an invitation to write accepted and followed through. Because of page limits, there were countless other friends and colleagues of Steve's whom we did not contact. To everyone who would have liked to participate in this project, we apologize! If enough of you request a re-do, perhaps we can convince Springer to let us publish a Volume II with another 25 contributions!

While working to put this volume together, Judy, Bill, Margie, and Alicia spent a lot of time on zoom, discussing this project but also many other things. It is fair to say that we have all four enjoyed each other's company, have grown closer, and are grateful to have shared so much during the past three years. Steve would have been pleased.

The Ides of March, 2022

Alicia L. Carriquiry, William F. Eddy, Judith M. Tanur, and Margie Smykla

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