J. Appl. Prob. Spec. Vol. **48A,** vii–ix (2011)

NEW FRONTIERS IN APPLIED PROBABILITY

A Festschrift for SØREN ASMUSSEN
Edited by P. GLYNN, T. MIKOSCH and T. ROLSKI

SØREN ASMUSSEN

PETER GLYNN, *Stanford University*

Department of Management Science and Engineering, Stanford University, Huang Engineering Center 357, Stanford, CA 94305, USA. Email address: glynn@leland.stanford.edu

THOMAS MIKOSCH, *University of Copenhagen*

Department of Mathematics, University of Copenhagen, Universitetsparken 5, DK-2100 Copenhagen, Denmark. Email address: mikosch@math.ku.dk

TOMASZ ROLSKI, *University of Wrocław*

Mathematical Institute, University of Wrocław, pl. Grunwaldzki 2/4, 50-384 Wrocław, Poland. Email address: tomasz.rolski@math.uni.wroc.pl

REUVEN RUBINSTEIN, *Technion - Israel Institute of Technology*

Faculty of Industrial Engineering and Management, Technion, Israel Institute of Technology, Haifa, Israel. Email address: ierrr01@ie.technion.ac.il

APPLIED PROBABILITY TRUST
AUGUST 2011

SØREN ASMUSSEN

This Festschrift celebrates the 65th birthday of Søren Asmussen. Søren has exerted a profound influence on the development of applied probability over his professional lifetime, through the impactful research that he has produced, the students and colleagues with whom he has interacted, and the scholarly community to which he has so generously given in time, energy, and leadership.

Søren was born on September 29th, 1946, the son of Svend-G. Asmussen and Hanna Nielsen, and the brother of Bodil Asmussen. Søren's father was active as an organist, choir conductor, and music publisher, and his parents frequently toured Europe to give concerts. During such absences, Søren would often spend time with his maternal grandparents. His grandfather was the eminent Danish mathematician Jakob Nielsen. Professor Nielsen made major contributions to topology and group theory, and wrote a three volume series on mechanics that was a standard text in the field for some time. For his efforts, he was elected to membership in the Royal Danish Academy of Sciences and Letters in 1926 and succeeded Harald Bohr as Professor of Mathematics at the University of Copenhagen in 1951.

As is often the case with mathematically gifted individuals, Søren had no real interest in mathematics at this time, perhaps because the concepts that were part of the elementary and high school curriculum seemed uninteresting and the calculations tedious. Nevertheless, Grandfather Nielsen did influence Søren towards a scientific career trajectory, when he made a gift of a chemistry book to his grandson during high school. This interested Søren greatly, and Søren was soon the enthusiastic owner of a chemistry set that he suitably enhanced by purchasing additional chemicals (!) from the local pharmacy. Upon graduation from high school, he performed his compulsory military service, during which time he was advised by a friend of his father's to consider a university curriculum combining both biology and mathematics; the idea that mathematics could play an important role in the modelling of populations was particularly appealing to Søren. In view of this advice, he started a biology program at the University of Copenhagen. An early required course in the curriculum was one on 'Advanced Mathematics for non-Mathematicians'. Fortunately for our field, the elegance of the linear algebra taught in this course caught Søren's attention, and he subsequently followed a more mathematical trajectory that ultimately awarded him two Candidatus Scientiarum (Cand. Scient.) degrees, one each in Mathematics and Statistics (each roughly equivalent to a Master's degree elsewhere); it should be noted that there was, at that time, no Bachelor's degree that was offered by the University.

As one of the requirements for the Cand. Scient. degree, he did a thesis on branching processes, having been exposed to the topic in a course offered by Niels Keiding. He then pursued a doctorate at the University of Copenhagen under the supervision of Søren Johansen, a statistician who later turned to econometrics and who has since become known for his contributions to the theory of cointegration. Dr Johansen gave his student considerable freedom, and permitted Søren to continue studying branching processes more deeply. One of the visitors to the University at that time was Krishna Athreya, himself a major researcher in the theory of branching processes, who suggested that Søren use a grant he had received to visit Cornell University, where Harry Kesten and Frank Spitzer were pushing forward on a range of exciting

https://doi.org/10.1017/S002190020009906X Published online by Cambridge University Press

probability developments. During this visit, Søren met Heinrich Hering, a physicist who was there to work with Kesten. The collaboration with Hering turned into a series of papers and, ultimately, a book related to their common interest in branching processes. It will come as no surprise that Søren was already exhibiting an unusual ability to productively interact with multiple scientists concurrently, and so also published with Keiding and Tom Kurtz during this period. In light of all this activity, Søren received his Licentiate (PhD) from the University of Copenhagen in 1977, and was tenured shortly thereafter at the University. This period in which branching processes was a central research focus in Søren's work culminated in his 1982 degree of Doctor Scientiarum, a post-PhD degree roughly equivalent to the German habilitation.

Other major events during this period included the birth of his son, Christian Geisler Asmussen, in 1974. This was also a time in which Søren was actively pursuing his love of the outdoors through mountaineering. This interest was stimulated through earlier visits to the mountains of northern Sweden to engage his passion for fishing. While active as a mountaineer, he made ascents of a number of peaks in the Alps (including Mont Blanc and Monte Rosa), made several trips to Greenland, topped Mount Cook in New Zealand, and even climbed Trisul, a 7000 m mountain in the Himalayas.

The decade following his PhD were ones in which Søren moved actively into a number of other research areas, ones in which his work has both been highly influential and in which he has continued a significant research involvement over the subsequent years. These areas include simulation, queueing theory and related connections to random walks, ruin theory, large deviations, and conditional limit theorems. In 1987, he published his book *Applied Probability and Queues*, a book that continues to this day (with its 2003 second edition) to be the central reference for a careful mathematical treatment of the core topics in this subject area.

In 1987, Søren moved to the University of Aalborg, spending 1990 at Chalmers Institute of Technology, before returning to become a Research Professor at Aalborg in 1990 and holding that position until his move to Lund University in 1995 as Professor of Mathematical Statistics. In this period, he continued his activity in all the above areas, but also initiated a string of important papers on matrix-geometric methods in queueing theory, statistical issues related to phase-type distributions, and asymptotics for queues and insurance firms in the presence of heavy tails. While on the faculty at Lund, Søren met his current wife May Lise Hegrand, who was living not too far from Aarhus. Aarhus University recognized the unique opportunity that this situation presented and, not surprisingly, Søren made the decision to become Professor of Applied Probability there in 2003. Aarhus has been his professional home in the years since, and Søren has, in the intervening years, had the pleasure to indulge another of his passions, namely tending to the lovely garden kept by May Lise and Søren. In addition, he has become an active and enthusiastic organ player, returning to a family musical tradition nurtured by his parents.

Søren also completed the book *Ruin Probabilities* in 2000, showing the same high standards of exposition, taste, and scholarship as in his other books. This book was later substantially revised and updated in his 2010 joint work with Hansjörg Albrecher. Benefiting from Søren's amazing capacity to both generate new and exciting research, and to simultaneously pursue major book-writing projects, one of us (PG) was privileged to co-author the book *Stochastic Simulation: Algorithms and Analysis* with him in 2007. Over the last fifteen years or so, Søren has became further involved in insurance and financial mathematics, and has made a number of significant contributions to the area of rare event simulation, in addition to maintaining activity in many of the areas in which he has previously worked. As becomes clear in looking at his entire research output over the years, Søren is both broad and deep in terms of his research,

and has a wide-ranging appreciation for the subject, understanding both what is important theoretically and what is useful at a practical level. During this period, Søren also became the grandfather of Aksel (in 2008), and proudly watched his son Christian become established as a faculty member at the Copenhagen Business School, specializing in international business and strategic management, with several prizes to his name.

The very unusual degree of both breadth and depth indicated above gives Søren exactly the perspective necessary to be an effective editor. He has served a number of major journals that cover the area of applied probability in the capacity of Associate Editor, including *Stochastic Models* (1983–1990), *Stochastic Processes and Their Applications* (1989–1996), *Queueing Systems and Their Applications* (1994–2009), *Bernoulli* (1999–2001), and *Foundations and Trends in Stochastic Systems* (since 2004). But Søren has also been willing to generously serve the community as Editor-in-Chief for several of the flagship journals of our community, starting with *Annals of Applied Probability* (2000–2002) and later joining the *Journal of Applied Probability* and *Advances in Applied Probability* as Co-Editor-in-Chief, jointly with Chris Heyde, in the period 2005–2007, and becoming Editor-in-Chief of the two journals in 2008 upon Professor Heyde's passing.

In view of Søren's major research contributions, he has (not surprisingly) been recognized through a number of distinguished awards. These include the 1999 Marcel F. Neuts Applied Probability Award, the 2002 and 2008 INFORMS Outstanding Simulation Publication Awards, and, most recently, the 2010 John von Neumann Theory Prize awarded by INFORMS to individuals who have made fundamental and sustained contributions to theory in operations research and the management sciences. The citation states (in part) that

> Søren Asmussen has made fundamental contributions in many areas of applied probability and stochastic operations research, including queueing systems, large deviations and rare events, heavy-tailed phenomenon, insurance-risk models, matrix-analytic algorithms and the theory of stochastic simulation.

He has also been an active educator and mentor at the PhD level, having supervised dissertations by Lars Nørvang Andersen, Mogens Bladt, Bjarne Højgaard, Zbigniew Michna, Jakob R. Møller, Anders Rønn Nielsen, Mats Pihlsgaard, Sebastian Rasmus, Leonardo Rojas-Nandayapa, and Mikael Signahl.

We are grateful both to the Applied Probability Trustees for their support in making this Festschrift possible, and to the many friends and research colleagues of Søren who have contributed papers to this volume and helped referee the submissions. We also thank Emma Talib for her efforts in producing this book, and her patience in working with us under tight deadlines. As friends and collaborators of Søren, it gives us great pleasure to offer him this Festschrift as a token of the high esteem and deep affection in which he is held by the applied probability community.

Stanford University, California — Peter Glynn
University of Copenhagen, Denmark — Thomas Mikosch
University of Wrocław, Poland — Tomasz Rolski
Technion - Israel Institute of Technology, Israel — Reuven Rubinstein