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Editors

Selected Works of C.C. Heyde

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Editors
Ross Maller
Centre for Mathematics and its Applications,
and School of Finance, Actuarial Studies
and Applied Statistics
Australian National University
ACT, Australia
ross.maller@anu.edu.au

Peter Hall
Department of Mathematics and Statistics
University of Melbourne
Parkville Campus
Melbourne Victoria
Australia
halpstat@ms.unimelb.edu.au

Ishwar Basawa
Department of Statistics
University of Georgia
Athens Georgia
USA
ishwar@stat.uga.edu

Eugene Seneta
School of Mathematics and Statistics
University of Sydney
Sydney New South Wales
Australia
eseneta@maths.usyd.edu.au

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Preface to the Series

Springer's Selected Works in Probability and Statistics series offers scientists and scholars the opportunity of assembling and commenting upon major classical works in statistics, and honors the work of distinguished scholars in probability and statistics. Each volume contains the original papers, original commentary by experts on the subject's papers, and relevant biographies and bibliographies.

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The subjects of the volumes have been selected by an editorial board consisting of Anirban DasGupta, Peter Hall, Jim Pitman, Michael Sörensen, and Jon Wellner.

Christopher Charles Heyde

Preface

In 1945, very early in the history of the development of a rigorous analytical theory of probability, Feller (1945) wrote a paper called "The fundamental limit theorems in probability" in which he set out what he considered to be "the two most important limit theorems in the modern theory of probability: the central limit theorem and the recently discovered ... 'Kolmogoroff's celebrated law of the iterated logarithm' ". A little later in the article he added to these, via a charming description, the "little brother (of the central limit theorem), the weak law of large numbers", and also the strong law of large numbers, which he considers as a close relative of the law of the iterated logarithm. Feller might well have added to these also the beautiful and highly applicable results of renewal theory, which at the time he himself together with eminent colleagues were vigorously producing. Feller's introductory remarks include the visionary: "The history of probability shows that our problems must be treated in their greatest generality: only in this way can we hope to discover the most natural tools and to open channels for new progress. This remark leads naturally to that characteristic of our theory which makes it attractive beyond its importance for various applications: a combination of an amazing generality with algebraic precision."

No better description of, or prescription for, Chris Heyde's work in each of these fundamental areas, as well as in the other areas to which he made significant and original contributions, could be found.

The selection of papers in the volume to follow amply displays Chris's commitment to these principles, as it traces the growth of his interest in the classical theory of probability and stochastic processes from very early days to a full flowering decades later, as well as the broadening of his interests and expertise from its early origins in probability theory.

Chris realised early on that the theory of probability was inspired and invigorated, and should always continue to be refreshed, by the real-world practical problems from which it stems. While never diminishing or neglecting the role that theoretical investigations play, his research quickly moved on from them to encompass a remarkably wide repertoire; to mention just some of it, his work ranged from applications in applied probability, especially to branching processes and their genetic implications, to statistics, in areas ranging from times series analysis and estimating equations theory through to very applied subjects—and on to his later interests in and contributions to financial modeling and analysis.

In addition to these, Chris nurtured and maintained a deep interest in the history of probability and statistics. He returned, and contributed substantially to this subject, throughout his entire career. And above all, convinced of its utmost importance, Chris lobbied and promoted his subject, probability and statistics, as hard as he could to those who had influence, throughout his life; thus, we even see papers addressing the role of statistics, and statistical science, in his publications list.

In all that he attempted, Chris's research was up with or ahead of the times in which he worked, and at all times his work was characterised by its elegance and a striving for completeness, as well as by a willingness to attack the most difficult and fundamental areas.

The volume is arranged as follows. First, is given an "author's pick" section, comprised of comments by Chris himself on a selection of papers he considered interesting and important in the development of his, and the profession's, probabilistic and statistical thinking. Then follow four articles by colleagues and friends of Chris: Ishwar Basawa, Peter Hall, Eugene Seneta, and myself. These articles concentrate on four quite different strands of Chris's thinking, giving in all a wide ranging review of Chris's interests over a broad area of probability and statistics.

Sadly, Chris died while this volume was in preparation. His mind remained clear and focussed till the end, and he wrote a draft of his "author's pick" section in February 2008. It was typed and forwarded to me by his wife Beth just a few days before his death, and I needed only to edit it lightly into its present form. Knowing that time was short, the other contributors, Ishwar, Peter, Eugene and myself, encouraged by our series editor Anirban DasGupta, worked hard to get our pieces together in time, hopefully, to present the finished volume to Chris. Unfortunately that was not to be.

An appreciation of Chris's life and works, and the honours accorded to him, written by his long-time friends and colleagues Joe Gani and Eugene Seneta, appeared as an introduction to Gani and Seneta (2004). This was a special issue of the Journal of Applied Probability, which contained a collection of articles by his colleagues and friends. It includes a list of his publications up till 2004; that list is included, and updated, herein. Beyond these, there are papers yet to appear, as coauthors finalise them for publication. No doubt a complete list will be made available at some stage.

A published interview of Chris appeared in Glasserman and Kou (2006). An obituary by Gani and Seneta (2008) extends the introduction mentioned above. A brief biographical sketch by Joe Gani of Chris's life is included on page xxi of this volume.

In closing I would like to add my personal appreciation for Chris's support and guidance over many years, following his role as the initial supervisor of my PhD in the 1970s. He made a deep impression on me in ways I did not realise for many decades. His contribution was immense, as is the gap he leaves.

Canberra
February 2010

Ross Maller

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Contributors

Ishwar Basawa Department of Statistics, University of Georgia, Athens, Georgia 30602, USA, Ishwar@stat.uga.edu

Joe Gani Mathematical Sciences Institute, Australian National University, Canberra ACT 0200 AUSTRALIA, joe.gani@anu.edu.au

Peter Hall Department of Mathematics and Statistics, University of Melbourne, Melbourne, VIC 3010, AUSTRALIA halpstat@ms.unimelb.edu.au

Ross Maller Centre for Mathematics and its Applications, and School of Finance, Actuarial Studies and Applied Statistics, Australian National University, ACT 0200 AUSTRALIA, Ross.Maller@anu.edu.au

Emeritus Professor Eugene Seneta School of Mathematics and Statistics, FO7, University of Sydney, NSW 2006, AUSTRALIA, eseneta@maths.usyd.edu.au

Introduction

A Biographical Sketch of C. C. Heyde

Christopher Charles Heyde (Chris) was born in Sydney, Australia on 29 April 1939, and went to school at Barker College, Hornsby where he excelled in sports. In his last year at school, he became interested in mathematics, and after completing his secondary studies, he enrolled at the University of Sydney in 1957 to study mathematical statistics. He graduated in 1961 with a first class Honours degree, and was awarded the University Medal.

In 1962, Chris won a Commonwealth Postgraduate Research Scholarship in Pat Moran's Department of Statistics at the Australian National University (ANU). He was awarded his PhD in 1965 for a thesis on "Results related to first passage time problems and some of their applications". In 1963, his paper "On a property of the lognormal distribution" appeared in J. Roy. Statist. Soc. B 25, 392–393; in this, he showed that the lognormal distribution was not determined by its moments, a result which was to make him famous.

Chris was married to Elizabeth (Beth) James in 1965, and they had two sons, Neil born in 1967 and Eric born in 1969. Both are now married, each with two children who have been the great delight of their grandparents.

Chris had a very international career: his first job was at Michigan State University, East Lansing in 1964–1965, followed by the University of Sheffield in 1965–1967, the University of Manchester in 1967–1968, the Department of Statistics (headed by E. J. Hannan) at the ANU in 1968–1974. and the CSIRO Division of Mathematics and Statistics in 1974-1983. He was appointed Professor and Chairman of the Department of Statistics at the University of Melbourne in 1983, but returned to the ANU as Professor of Statistics in 1986. When the ANU School of Mathematical Sciences (now the Mathematical Sciences Institute) was established, he became its Foundation Dean. From 1993 until his death in 2008, he divided his time between the ANU and Columbia University, New York, where he was a Professor in the Department of Statistics. He founded and acted as Director of its Center in Applied Probability. He served at Columbia between September and December each Fall semester, and was at the ANU for the rest of the year.

Chris was the author of over 200 papers and wrote or edited a dozen books, all of which are recorded in this volume. Among his many contributions, Chris considered the following to be his most significant: (a) the

result that the lognormal distribution was not determined by its moments (J. Roy. Statist. Soc. B 25, 392–393); (b) the observation that the best linear predictor in a discrete time series is the best predictor if the innovations are martingale differences (Ann. Math. Statist. 43 (1972) 2058–2066, jointly with E. J. Hannan); (c) the clarification of the concept of long-range dependence (J. Appl. Prob. 34 (1997) 939-944, jointly with Y. Yang); and (d) the formulation of the fractal activity time geometric Brownian motion model for a risky asset (J. Appl. Prob. 36 (1999) 1234–1239).

Chris acted as the Editor or Associate Editor of several journals. For 18 years between 1990 and 2007, he was Editor-in-Chief of both the Journal of and Advances in Applied Probability and initiated the section on "Stochastic Geometry" in the latter. His judgment was always sound, and he was greatly valued as one of the Trustees of the Applied Probability Trust.

Chris received well-deserved recognition for his professional contributions. He was elected a Fellow of the Institute of Mathematical Statistics in 1972, the Australian Academy of Science in 1977, and the Academy of Social Sciences in Australia in 2003. He was awarded the Academy of Science's Hannan Medal in 1994 and its Lyle Medal in 1995. He served as a Council Member of the Australian Mathematical Society in 1980–1983 and was its Vice-President in 1981. He was Vice-President of the International Statistical Institute in 1985–1987 and again in 1993–1995, as well as President of its Bernoulli Society in 1985–1987. He was Federal President of the Statistical Society of Australia in 1985–1986, and was awarded its Pitman Medal in 1988. In recognition of his services to mathematics, he was awarded Membership of the Order of Australia by the Australian Government in 2003.

Chris was an eminent scientist with wide statistical interests; he was also a kind and thoughtful human being, with a strong sense of justice. He died in Canberra on 6 March 2008 from the effects of metastatic melanoma. He is sorely missed by his family, and his many friends and colleagues. His life and work has enriched us all.

Canberra
29 January 2010

Joe Gani

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