

J. R. Statist. Soc. A (2016)
179, Part 4, pp. 1117–1125

Obituaries

Peter Gavin Hall AO, 1951–2016

Peter Gavin Hall was born on November 20th, 1951, and died on January 9th, 2016. Within his lifetime he packed activity and achievements sufficient to fill the lives of several researchers. A person of remarkable gentleness, kindness and generosity of spirit, he was, at the same time, one who attacked hard mathematical problems with unrelenting ferocity and with a remarkable degree of success. His outstanding technical skills and imagination, combined with a strong work ethos and a delight in collaborating with others to help them to solve their problems, resulted in an *oeuvre* of 606 published papers with 240 co-authors in addition to four books, the first of which was co-authored with C. C. Heyde.

Peter's parents were a strikingly contrasting pair, who met through a common interest in bush walking. His father, William ('Bill') Holmen Hall, left school at the age of 14 years and became a telephone technician. He was, by all accounts, a very gentle man. His mother, Ruby Payne-Scott, was a leading radio astronomer who, together with Joe Pawsey and Lindsay McCready, conducted the first serious project in radio astronomy in Australia in the latter part of 1945. Her career in the Commonwealth Scientific and Industrial Research Organization (CSIRO) was cut short when she became pregnant with Peter, resigning in 1951 because, at that time, the CSIRO had no provision for maternity leave. Peter's sister Fiona was born 2 years after Peter; she went on to become a leading contemporary Australian artist.

From his earliest days, Peter grew up within sight and sound of steam trains, engendering a passion that remained with him throughout his whole life. (During his final illness, Fiona asked him whether he had a favourite number and he replied, without hesitation, '1008', the number of his favourite steam engine.) Other persistent childhood interests ranged from cats to mathematics and science. After attending Sydney Technical High School he started at Sydney University in 1970 with the initial intention of studying physics. However, as he progressed through the 4 years of an undergraduate Honours programme, he dropped first science and then pure mathematics from his selection of courses. He entered his final undergraduate year concentrating solely on mathematical statistics.

As the only mathematical statistics Honours student, he was assigned a reading course that included Hájek and Šidák's *Theory of Rank Tests* and Billingsley's *Convergence of Probability Measures*. One of his lecturers recalls that Peter 'helped him work through Chung [*Probability Theory*]'. He completed his undergraduate studies in 1973 and was awarded his Bachelor of Science degree in 1974, gaining first-class Honours and the University Medal in Mathematical Statistics.

In 1974 Peter enrolled for a doctorate at the Australian National University (ANU) under the direction of Chris Heyde. The topic was 'Martingale limit theory', which subsequently turned into his first monograph (*Martingale Limit Theory and Its Application*, published jointly with Heyde). However, some months after starting—and largely completing—the research for a doctorate he received a letter advising him that a forgotten application for a scholarship to study at Oxford University had been successful. He thereupon converted to a Research Master's

programme at the ANU on the topic 'Problems in limit theory' and departed later in 1974 for Oxford, travelling part of the way on the Trans-Siberian Railway—'hard' class!—to fulfil a childhood dream. His supervisor at Oxford, John Kingman, commented,

'He came having done a research MSc at ANU, and had very clear ideas of what he wanted to do next. He listened very politely to my comments, but then went his own way. His unshakeable courtesy ... made it difficult to know whether he found my remarks deficient or merely irrelevant, but he went on producing powerful theorems in an unending stream.'

Peter's Master's and doctoral degrees were, in fact, awarded in the same year, 1976. Shortly after his arrival in Oxford, he met his future wife, Jeannie Jean Chien Lo, a civil servant from the British Hong Kong Colonial Service who was also studying there; they married in 1977. Jeannie herself went on to have a very distinguished career in the Australian Public Service.

Peter returned in 1976 to Australia to join the Department of Statistics at the University of Melbourne. When he realized that his 3-year appointment would not lead to tenure, he left in 1978 to join the Department of Statistics at the ANU where he was to remain for 28 years, being promoted to a Personal Chair in Statistics in 1988. Following his primary interest in research, he eventually transferred to one of the ANU research schools. In 2006, he and Jeannie moved back to Melbourne where he took up an appointment as Professor of Statistics and subsequently Australian Laureate Fellow and then Director of the Australian Research Council Centre of Excellence for Mathematical and Statistical Frontiers at the University of Melbourne.

During the course of his career, Peter gave many distinguished lectures and took on many prestigious roles, including visiting professorships at the London School of Economics, the Carnegie Centenary Professorship at the University of Glasgow and the Saw Swee Hock Professorship at the National University of Singapore. He visited the CSIRO part time for several years, as an Honorary Fellow. In 2005, he began a one-quarter time appointment as Distinguished Professor of Statistics at the University of California, Davis, which brought him there every subsequent spring.

Top researchers are akin to top surfers as they anticipate, catch and ride intellectual waves. Some select their waves with great deliberation; others delight in mastering a variety of waves. Peter, with over 600 papers, some solely authored, others the product of collaborations with his 240 co-authors, was an outstanding exemplar of the latter group. The work of Fisher, Neyman, Wald and others led to a 20th-century formulation of mathematical statistics that relies heavily on probability models for data. Asymptotic theory within this formulation was Peter's ocean. Notable among the big waves that he rode were the bootstrap and the non-parametric estimation of functions.

Peter's earliest work, on martingale limit theory, provided a technical basis for his work in mathematical statistics. He made major contributions to the understanding of iterated bootstrapping, to computing asymptotic errors in coverage probability of bootstrap and competing confidence sets, and to effective algorithms for bootstrap resampling. In function estimation, he investigated orthogonal series and kernel techniques, pursued the asymptotic behaviour of competing bandwidth selection methods in a variety of regression and classification technologies, explored best possible rates of convergence of function estimators and analysed the use of function estimators to identify peaks. Responding to the interests of his collaborators, he treated a diversity of other problems, such as the statistical estimation of fractal dimension, procedures for high dimensional data, statistical inversion of Radon and convolution transforms observed with noise, problems in directional statistics, aspects of image analysis and of signal processing, and many more. The passage of time will bring out the influence of his vigorous, accomplished research output.

His contemporaries bestowed on Peter numerous honours and awards, including several honorary doctorates, an assortment of distinguished medals, lectures and editorial appointments, election to several national scholarly academies and various other marks of outstanding scholarly recognition. To list only some, he was an Officer of the Order of Australia, Fellow of the Australia Academy of Science and of the Australian Academy of Social Sciences, Foreign Associate of the US National Academy of Sciences, Fellow of the Royal Society of London, Corresponding Fellow of the Royal Society of Edinburgh and an Honorary Fellow of the Royal Statistical Society. He received honorary doctorates from the Catholic University of Louvain, the University of Cantabria, the University of Glasgow and the University of Sydney. He served as President of the Australian Mathematical Society, of the Bernoulli Society, and of the Institute of Mathematical Statistics. He was awarded the Pitman Medal from the Statistical Society of Australia and the Guy Medal in Silver from the Royal Statistical Society.

Peter's extraordinary research output was accompanied by his mentoring of the 28 doctoral students and 38 post-doctoral fellows who worked with him and by his warm hospitality to numerous others.

Three efficient and interlocking processes helped him to make the most of his time.

The first, experienced by some of his collaborators, occurred when they talked to Peter about a problem. When they arrived at work the next day, they might find a draft manuscript awaiting them, complete in all respects except possibly for sections labelled 'Introduction', 'Simulation study' and 'Example'. Shortly, Peter would appear to enquire when the simulations might be completed. If solving the problem required technical ideas that were unfamiliar to Peter, vigorous discussions with his collaborator(s) might go on longer, affected of course by the physical proximity of the latter, but were not prolonged. A problem was a delightful challenge to be overcome as quickly as possible and reported in a paper. As a tool towards this end, he learned touch typing from his wife, Jeannie.

Secondly, Peter regarded it as his responsibility to ensure that his graduate students and post-doctoral fellows had strong credentials for their first job, through having published a number of papers by the end of the study period. His periods of supervision were marked by remarkable pastoral care—ensuring introductions to other researchers, inclusion in social events and genuine concern for personal wellbeing.

Thirdly, many overseas researchers were beneficiaries of Peter's generosity in supporting their travel to visit his group. Funding details and payment arrangement were made clear, accommodation arranged and a social programme that might involve chasing and photographing trains or a barbecue or a visit to Tidbinbilla Nature Reserve (in Canberra) or Puffin Billy (in Melbourne) was scheduled. And then there was the opportunity to work with Peter, and to engage him in wide ranging conversation over lunch or coffee.

Outside statistics, Peter had a range of intense interests. An exceptional photographer, he published work in photography magazines and on-line photography Web sites. He invented a new type of lens that enabled him to improve the quality and sharpness of his photographs. His deep knowledge of railway locomotives was legendary among those visitors to the ANU who accompanied him on a weekend train chase, racing down unspeakably potholed rural dirt roads to catch the perfect photo. His frequent travel led him to develop a keen interest and extensive knowledge of aircraft, both civilian and military. He could recognize the type, configuration and possible roles of an aeroplane by quick inspection of its outline as it flew high overhead. In casual chats, he was a congenial companion who quickly perceived what one was saying, sharpened it mentally and then advanced the conversation to the next stage in an utterly unobtrusive way. He naturally spoke and wrote courteous, well-formulated English prose.

A scholar and a gentleman, Peter lives on in the memories of those who knew him and his work.

R. J. Beran and N. I. Fisher

Joseph Mark Gani, 1924–2016

Joe Gani, as he was universally known, died on April 12th, 2016, in Canberra at age 91 years.

He will be remembered by Fellows of the Royal Statistical Society especially for his years (1965–1974) in Sheffield, during which time it became and remains the home of his creation, the Applied Probability Trust. This period was associated with the creation of the strong Manchester–Sheffield School of Probability and Statistics, based on the Universities of Sheffield and Manchester, and strong Australian input. Joe's greatest academic love was applied probability. Because of his editorial and organizational activity, this became an internationally recognized and prestigious area of mathematical activity.

He was born in Cairo, Egypt, on December 15th, 1924. His grandparents were from western Greece and came to Egypt in about 1891. The family, which was Jewish, prospered. Both Joe's parents were born in Cairo, where he was brought up till 9 years of age.

The initial language at home was Italian, and then French, and his initial schooling in Cairo was in French schools. The years 1932–1937 were spent in Kobe, Japan, near where he attended the Canadian Academy, in which the language of instruction was English. Returning to Cairo in 1937, Joe attended the English School as a day pupil and later became a teacher there.

From 1945 to 1948 Joe was at Imperial College, London, initially as an undergraduate.

Here he was influenced in the direction of statistics by Emlyn Lloyd and George Barnard, and he completed the Diploma of Imperial College under Barnard's supervision in 1948. After London Joe moved to Australia with his mother and siblings, working in the Mathematics Department at the University of Melbourne till the end of 1950. He then returned to Britain for a year, teaching at Birkbeck College. A period of about 18 months back in Australia without academic employ was followed by a job at the University of Western Australia in the Department of Larry Blakers, who in subsequent years, by allowing generous periods of leave, helped Joe's career to flourish.

During this time Joe took up an Australian Commonwealth Postgraduate Scholarship to do a doctorate under P. A. P. (Pat) Moran, Head of the Statistics Department at the Institute of Advanced Studies, Australian National University (ANU), Canberra. After an unproductive initial period, Pat Moran asked him to read a 1946 paper by H. R. Pitt published in the *Journal of the London Mathematical Society*. This launched Joe on his research career, his first paper appearing in *Biometrika* in 1955. Joe's lines of research then followed Pat's work in two directions: dams and reservoirs, and inference for Markov chains.

In Moran's department Joe met E. J. (Ted) Hannan, also a doctoral student there. Their very close friendship ended only with Ted's death in January 1994. During the ANU years Joe met his wife to be, Ruth Stephens, also a scientist who later focused her research on human genetics. They married in September 1955, at University House, ANU.

After Joe's receiving his doctorate in 1955, he and Ruth were in Manchester, where under the influence of Maurice Bartlett Joe became interested in the theory of epidemics, which formed a large part of his subsequent research activity. Returning to Western Australia, in the period to 1960 Joe built up a strong department, which was afterwards headed by Uma Prabhu. Under Blakers's influence, Joe developed a strong interest in the development of mathematics in