

OBITUARY: *Joseph Mark Gani AM, DSc, FAA, FASSA*



Joseph Mark Gani, 1924–2016. At his office at The University of Sheffield.

Joe Gani, as he was universally known, died on 12th April 2016, in Canberra, Australia, aged 91. The years 1965–1974 were spent in Sheffield, England, during which time it became, and remains to this day, the home of his creations: the Applied Probability Trust (APT), and of its journals, *Journal of Applied Probability* (JAP), *Advances in Applied Probability* (AAP), and *The Mathematical Scientist* (TMS). This period is associated with the creation of the strong Manchester–Sheffield School of Probability and Statistics, based on the Universities of Sheffield and Manchester, and on strong Australian input. Due to his editorial and organizational activity, applied probability became an internationally recognized and prestigious area of mathematical activity. Joe’s launch of JAP in 1964, followed by AAP in 1969, came at just the right time to catch the swelling activity in applied probability (in physical, biological, social, queueing, and computing sciences), which had hitherto had no clearly defined home in an appropriately dedicated journal. Nowadays a number of journals are similarly focused, most significantly *Annals of Applied Probability*. Sir John Kingman FRS gives a succinct philosophical retrospective on the 50th anniversary of the Applied Probability Trust in Kingman (2014).

Joseph Mark Gani was born in Cairo, Egypt, on 15th December 1924, into a comfortable middle class Jewish family. His father, Marc Gani, was a business man whose parents had emigrated to Egypt from Ioannina, western Greece, in about 1891. His mother’s family had come to Egypt from the island of Corfu at about the same time, partly as a result of anti-Semitic disturbances. Joe recalled, in some autobiographical notes (for whose transcription into typed form I am indebted to Daryl Daley) of 1987/1988:

Egypt was then a country of opportunity, lacking a developed native managerial and professional class, a gap filled by Europeans until the 1950’s. ... Although I learned to read and write Arabic, I was never fluent in it ... With my mother’s family, I spoke Italian whose Venetian dialect they had brought from Corfu, and with my father’s French, the language of my schooling. ... My recollections of school, the Catholic Collège des Frères de la Salle [Salesian Brothers], are none too happy ... particularly [memorizing] the Catholic catechism whose relevance to our Judaism I could not comprehend.

The years 1932–1937 were spent in Kobe, Japan, near which Joe attended the Canadian Academy, where the language of instruction was English. Joe was in later life fond of recounting that he had learned English in Japan. And very specifically did he continue to learn it; many of his points of editing of my articles in TMS related to language expression. Returning to Cairo in 1937, Joe attended the English School as a day pupil. It was not till 1940 at the age of 15, in the fifth form of this school, that he discovered an interest in mathematics. Douglas Whiting, the then-new headmaster:

... made our geometry and algebra lessons connected and interesting. I realized for the first time the logical coherence and finesse of mathematical reasoning; the wonderment has remained with me through a lifetime. ... In the summer of 1942 Douglas Whiting found me a job at the English School as a mathematics and science student teacher. ... this job I retained until the end of the war in August 1945.

Joe had completed an Intermediate (first-year) Examination in engineering in Cairo as an external student. Douglas Whiting, with the support of the British Council, secured a university place for Joe at Imperial College, London, where at the end of the war Joe ‘launched into the second year of the mathematics degree’

From 1945 to 1948, initially as an undergraduate, Joe was influenced in the direction of statistics and probability by Emlyn Lloyd and George Barnard, and Hyman Levy and Leon Roth. He completed the Diploma of Imperial College under Barnard’s supervision in June 1948.

The Palestine (first Arab–Israel) war had broken out in May 1948, and anti-Jewish feeling in Egypt was high. The family applied for visas to English-speaking countries encouraging migration, and Australia was the first to come through, so Joe moved to Australia with his mother and siblings, working in the Mathematics Department at the University of Melbourne till the end of 1950. Although he made friendships there, he thought that the Department did not offer him avenues of progress in his interests, so he returned to Britain for a year, teaching at Birkbeck College. Finding himself stateless, without papers, with only a still-valid Australian immigrant visa, he returned in December 1951. A period of about 18 months back in Australia without academic employ was followed by a job at the University of Western Australia in Larry Blakers’ department, 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 PhD 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 the paper by H. R. Pitt (1946), which involved the theory of provisioning. Pat had been working on the theory of dams, and Joe was familiar with this theory. When he read Pitt’s paper he realized that problems in the theories of provisioning and dams were similar. This launched Joe on his research career, his first paper appearing in *Biometrika* (see Gani (1955)). He describes his jump to research in the interview Gani (2008, p. 8):

Well, once I’d seen that research was about making connections, improving what had been done slightly differently before, ... I never looked back.

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 PhD 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 PhD 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' influence, Joe developed a strong interest in the development of mathematics in Australia, and was one of the founding members, with Blakers, of the Australian Mathematical Society in 1956. His first book, *The Condition of Science in Australian Universities: A Statistical Survey, 1939–1960*, written later, had as its genesis his time in Western Australia.

On striking evidence of Joe's activity in Western Australia, Pat Moran offered him a job as Senior Fellow at ANU, where on account of the presence on the academic staff of Joe Moyal, Geof Watson, and Ted Hannan (at the nearby School of General Studies), the discipline of mathematical statistics in its broad sense flourished, and began to attract the cream of Australian students in the area, including C. C. (Chris) Heyde.

When it became clear to Joe that there was insufficient support for setting up his dreamchild, the *Journal of Applied Probability* in Australia, Joe moved in 1964 to Michigan State University, East Lansing, where he was joined by Uma Prabhu, and then almost immediately after Chris had finished his doctoral studies at ANU, by Chris Heyde. The first issue of the journal appeared in 1964. Attempts to build up stochastic processes at Michigan State encountered difficulties, and in 1965 Joe left to become Professor of Statistics at The University of Sheffield, followed by Chris Heyde, who became Joe's right-hand man at Sheffield–Manchester before Chris returned to ANU in 1968 as Reader in Ted Hannan's department.

Joe was Professor in the Department of Probability and Statistics at The University of Sheffield, 1965–1974, Director of the Manchester–Sheffield School of Probability and Statistics, 1967–1974, and Deputy Dean, Faculty of Pure Science, The University of Sheffield, 1973–1974. In the 2008 interview with the present author he said:

It was one of the happiest times in my life. Ruth bought a house in Riverdale Road, in west Sheffield ... the western part is more rural, full of trees and very attractive. She made the house into a very warm, comfortable home. Our children were basically educated in Sheffield, and in fact developed North Country accents [laugh]. ... As a result of my connection with Australia, whenever an ANU PhD was ready I would hire them. ... a lot of Australians came through Sheffield.

A partial list of Australians who were in Sheffield for a time includes Jim Pitman, Terry Speed (now FRS), Sue Wilson, Malcolm Clark, David Scott, Ishwar Basawa, and Niels Becker.

Joe speaks in the interview in some detail of David Vere-Jones and K. R. Parthasarathy ('Partha'), and Klaus Dietz in connection with the Sheffield period.

In a CV of 3 June 2005, Joe lists as his graduate students at The University of Sheffield: I. V. Basawa, Mohammed Sher Ali Khan, Niels Becker, K. Dietz (completed PhD in Germany), and David Jerwood.

Simon Tavaré, now FRS, who was an undergraduate in Joe's department 1971–1974 (together with his wife Jane, both BSc 1974, then MSc 1974–1975), PhD (1975–1977) and then visiting lecturer 1977–1978, before leaving for the USA, provided me with a recollection of some graduate students and academic staff of those times: Peter Green, now FRS, Chris Cannings, Bob Loynes, David Grey, Elja Arjas, Maurice Walker, Ian Dunsmore, Nick Fieller, Clive

Anderson, Hilda Davis, Damodar Shanbhag, U. Naik, M. B. Rao, Trevor Sweeting, Doug Kennedy, and John Whitehead. Visitors and postdocs included Toby Lewis and D. C. Rao.

In Gani (2014) Joe gave a brief history of the APT. He served as Editor-in-Chief of both JAP and AAP until 1989, and was followed by Chris Heyde, who served until his death in 2008. He was succeeded by Søren Asmussen. Joe was Founder and Editor of TMS from January 1976, and then Editor-in-Chief after the journal was taken over by the APT in 1988. He was joined later by Randall (Randy) Swift, who continues in this role.

The APT's publishing office continues to be in Sheffield, UK. In the 2008 interview, Joe said: 'Yes, ... we were very lucky that the first person to run the office was Mavis Hitchcock, an extremely capable, very strong woman.' She was the first Executive (Managing) Editor; her name will be very familiar to now-older contributors to the AP journals. She was followed in the role by Dr Linda Nash, and in 2013 by Dr Emma Talib. At the time of Joe's death the current Trustees of the APT, apart from himself, were Søren Asmussen, Daryl Daley, Peter Glynn, Frank Kelly, and Peter Taylor.

From September 1974 to July 1981, Joe was back in Australia as Chief, Division of Mathematics and Statistics, Commonwealth Scientific and Industrial Research Organization (CSIRO), where he was soon joined by Chris Heyde as Assistant Chief. The Division was based in Canberra at that time, and located close to ANU, and Joe was able to renew his strong friendships. The consensus is that the years at CSIRO went brilliantly, both in achieving what had been promised in service and research, and in a strong Visitor Program which brought out celebrated statisticians such as Sir David Cox and John Nelder.

From July 1981, Joe was Professor and Chairman at the University of Kentucky; then Professor and Chairman, Statistics and Applied Probability Program, University of California at Santa Barbara, from July 1985, where he had met Randy Swift as a student. Joe officially retired as Professor Emeritus in July 1994, at age 70.

Under a special arrangement until his retirement, Joe lived in Canberra from 1991 and worked at ANU for 9 months a year. His CV describes his position as Visiting Fellow at ANU as from September 1989–December 1997 and then from 2001 on. He was primarily located within the Stochastic Analysis Group, headed by Chris Heyde.

An indefatigable organizer, Joe lists some twenty-two items, including conferences and symposia, from 1960 to 2004, in his CV. To the present author most memorable was the conference titled 'Doebelin and Modern Probability' in Blaubeuren, Germany, 2–7 November 1991. It was organized jointly with Harry Cohn and Heinrich Hering, to honour the memory of the brilliant young Jewish mathematician, Wolfgang (Vincent) Doebelin (1915–1940), who had died while in the French army in World War 2, and had played an instrumental role in the development of Markov chains, as well as other probabilistic areas. The conference attracted the participation of greats such as J. L. Doob, K. L. Chung, M. Iosifescu, J. Hajnal, and J. F. C. Kingman, and other stars, including many from recently Communist bloc countries. The mornings of the conference were spent in the presentation of just a few talks. A communal lunch was followed by companionable walks through the pleasant green lakeside environs.

History of mathematics and statistics was one of Joe's very strong interests. A special interest was Isaac Newton on whom he wrote in TMS in 1982, and then in 1985 in the *Encyclopedia of Statistical Sciences* in 1985. In 1982 he edited a book, *The Making of Statisticians*, where individual statisticians wrote their life histories. There were expository items in teaching journals such as *Mathematical Spectrum*; and in 2001 articles in *Statisticians of the Centuries* on Daniel Bernoulli, Pyotr Dimitrievich En'ko, and Anderson Gray McKendrick, all of whom

had worked in epidemic theory. The interest in En'ko, who formulated the first epidemic model, arose through discovery and capability in Russian by Klaus Dietz (1988).

Joe's total list of articles and publications contains 351 items. A proportion of these publications are described by Joe 'as of general interest and expository' and indicated in his CV by an asterisk. They testify to his continuing social activism in the cause of mathematics and statistics. Below, a separate full list of 'books & special collections of papers' further displays these activist and historical diarist roles.

Articles published from 1987—work roughly corresponding onwards from the latter part of his Santa Barbara period—in his own full list are numbered 195 to 351, and indicate a period of intense productivity facilitated by his retirement.

In the 2008 interview he thought that his most influential papers were in epidemic theory. In the list below headed 'publications on epidemics' I have extracted these from his own total list of 351 papers from 1955 to 2016.

This extracted list displays the continuity of the often collaborative (and doubtless Joe-stimulated) work on epidemics through the various periods: Michigan–Sheffield (1965–1974), CSIRO (1978–1981), Santa Barbara (1985–1989), and ANU (1989–2016).

Publications from the year 1990 to 2000 display increasing focus on the spread of HIV, and collaboration in particular with Daryl Daley, Sid Yakowitz, and Gleb Haynatzki, whom Joe had supervised for PhD at Santa Barbara.

Joe was very gratified by the response which his book (his second) coauthored with his ANU colleague Daryl Daley, *Epidemic Modelling: An Introduction*, published in 1999, received. In Joe's words it 'contains a compendium of all the work we did in epidemic modelling'. It also includes history, and displays a great deal of the analytical apparatus, such as partial differential equation and generating function technology, used in the golden years of applied probability.

This period was followed by a period of productive collaboration, in particular with Randy Swift: some 24 joint publications beginning in 2005 and ending in 2016. Of these, six were published in 2008 and five in 2011. Two additional papers with Randy are being completed.

In my interview with Joe in 2008 I remarked:

You have a good publication rate for someone who's retired: about seven papers a year. In fact, not too many mathematicians would publish seven papers a year.

To which his response was:

Well, what else have I got to do? [laugh]. They do say it keeps the brain active. ... And it keeps me abreast of what's going on.

His research interests in applied probability and statistics had included the areas of theory of storage, queueing theory, epidemic modelling, biological models, statistical linguistics, and inference on stochastic processes.

At ANU Joe's weekday routine was as regular as clockwork. He drove in, arriving at about 8:45am. Then emails were answered, followed by editorial duties on TMS; then mentoring young people, then research to which he dedicated one third of his time.

Joe's very close friendship with Ted Hannan ended only with Ted's death on Friday, 7 January 1994. The attached photo of the group of four was taken the day before. Joe wrote a number of moving obituaries which reflected the depth of the relationship as well as the personality, achievements and life of his friend; see, for example, Gani (1994).

Sadly, Ruth, who had been an enormous source of support and influence on Joe, died in January 1997. The Ruth Stephens Gani Medal, first awarded by the Australian Academy of Science in 2008, was instituted in her honour. One of his favourite papers was written under



From left to right: Chris Heyde, Ted Hannan, Joe Gani and Eugene Seneta. ANU, Canberra, 6 January 1994.

her guidance and effectively in collaboration. Her name as coauthor is missing at her own insistence.

Chris Heyde, who had been as close family to Joe, passed away in March 2008. One obituary appeared in this journal (see Gani and Seneta (2008)).

Till the end Joe maintained his academic activism in Australia, arising out of innate interest in the social function of mathematics and his strong interest in its history, manifested by his continuing role as Editor-in-Chief of TMS, his role in many selection committees, and indeed his own continuing research productivity, still significant well into his 80s. At ANU he formed a morning Coffee Club, which became an informal forum for people to exchange views on the world. It was also a forum for Joe's Jewish jokes, for which he was famous.

Joe earned a DSc from London University in 1970. He was elected Fellow of the Australian Academy of Science (FAA) in 1976; and elected Honorary Fellow of the Royal Statistical Society in 1982. His many honours included two DScs (Honoris Causa); and the Pitman Medal of the Statistical Society of Australia in 1994. He was made Member of the Order of Australia (AM), on Australia Day, 26 January 2000; and awarded the Centenary Medal of the Australian Government in 2001.

He is survived by his children Jonathan, Miriam, Matthew, and Sarah, their families, and his brothers, Robert and Maurice.

A Memorial Service for Joe was held on 22nd April 2016, in the Great Hall of University House, ANU. Joe would have appreciated the coincidence of the date with the beginning of Passover.

Joe was a visionary leader, of indomitable physical and mental energy, who never faltered in making a decision. Something of a stormy petrel, he had a multiplicity of careers and activities, all executed with great efficiency, and in the face of frequently feeling 'mucked about'. He helped a great many people in their academic careers. I came to see Joe and the early *Journal of Applied Probability* as modern analogues of the mathematical activist A. V. Vasiliev, and the Kazan Mathematical Society's journal where Markov's foundational paper on chains was published in 1907.

Applied probability, Joe's adopted country Australia, and the world more generally, owe him much. Of him it can truly be said: 'I did it my way.'

Acknowledgements

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Publications on Epidemics

1965

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1971

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1972

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1978

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