

The Influence of the ANU on Statistics in Australia

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1. INTRODUCTION

The Australian National University (ANU) was founded in 1946 as a research and postgraduate training institution. Its Research School of Social Sciences was in need of a statistician, and in 1952, P.A.P. Moran (Pat, later FAA 1962, FRS 1975) was appointed as Professor and head of its Department of Statistics. He was then a Senior Fellow at the Institute of Statistics, Oxford University, and the appointment Committee may well have hoped for an individual with interests in the social sciences. But in fact Moran's statistical interests were mainly mathematical. In this brief article, we shall attempt to trace the ANU's influence on Statistics, not only in Australia but throughout the world, during the 30 years from Moran's appointment in 1952 to his retirement in 1982.

2. THE ANU DEPARTMENTS OF STATISTICS

After his arrival in Canberra, Moran advertized Commonwealth Postgraduate Scholarships in his Department, and recruited his first two PhD students during 1953. He had noticed E.J. Hannan (Ted, later FAA 1970), on leave since May 1953 from the Commonwealth Bank of Australia to study as a Research Fellow in the ANU Department of Economics, reading Cramer's "Mathematical Methods of Statistics" (1945) in the Library. Recognizing Hannan's mathematical talent, Moran persuaded him to switch his Fellowship to the Department of Statistics from October 1953. Hannan was joined at the end of the year by J. Gani (Joe, later FAA 1976), then a Lecturer in Mathematics at the University of Western Australia, who was awarded a Commonwealth Postgraduate Scholarship. Pat suggested the study of Time Series as a topic for Hannan's thesis "The theory and application of Stochastic Processes"; Gani was assigned the field of inference on Markov chains for his thesis "Some problems in the theory and applications of Markov chains".

Hannan and Gani successfully completed their PhDs towards the end of 1955, and following Moran's lead, helped to influence the development of statistics in Australia, as teachers, researchers and organizers. In 1959, Hannan was appointed the first Professor of Statistics at the Canberra University College (CUC), then affiliated with the University of Melbourne. In September 1960, this became the ANU School of General Studies (SGS), when the original ANU, now called the Institute of Advanced Studies (IAS) was joined with the CUC, now called the SGS, to form the reconstituted ANU. The two ANU Statistics Departments, one entirely postgraduate (in the IAS), and the other mainly undergraduate (in the SGS), collaborated very closely. Hannan soon also began to train PhDs in his Department, while Gani as a Senior Fellow (1960-64) in the IAS department trained PhD students, and later, as Chief (1974-81) of the CSIRO Division of Mathematics and Statistics (DMS) encouraged DMS staff to be active in research and to study for higher qualifications. For example, Murray Cameron, currently Chief of CMIS, the successor of DMS, was given leave from DMS to study for his PhD under Hannan at the ANU.

Moran's Department was never large: in 1962, it consisted of Moran as Professor, J.E. Moyal as Reader, and J. Gani as Senior Fellow, while in 1972, it had grown to six, Moran and Hannan (who had joined the IAS Department in 1970) as Professors, D.J. Daley as Senior Fellow, R.E. Miles as Fellow, R.C. Boston as Research Fellow, and R.L. Tweedie as Post-doctoral Fellow. By 1982, Boston and Tweedie had left, but M.E. Osborne and Susan R. Wilson had been appointed as Professorial Fellow and Research Fellow respectively; Moran retired at the end of the year, and Hannan then became head of the Department.

Hannan's SGS Department grew more rapidly, as the demand for statistics courses from mathematics, economics and commerce students at ANU increased. His staff in 1960 consisted of C.E. Leser as Senior Lecturer, and S.S. McBurney and G.A. Watterson as Lecturers. By 1962, the Department had grown to eight: Hannan as Professor, C.R. Heathcote as Senior Lecturer, W.J. Ewens and P. Winer as Lecturers, Barbara A. Elliot and J.H.T. Morgan as Senior Tutors, and L.G. Hopkins and E.J. Williams as part-time Lecturers. After Hannan joined the IAS Department in 1970, C.R. Heathcote became Professor and head of the Department. In 1972, the size of the Department had grown to ten, with R.D. Terrell as the second Professor, C.C. Heyde as Reader, R.A. Jarvis, S. John, J.H.T. Morgan, E. Seneta and P. Winer as Senior Lecturers, P.N. Cressey as Lecturer, and Nora F. MacNally as Senior Tutor. By 1982, the Department in the SGS, now renamed The Faculties (TF), had increased in size to thirteen, with Heathcote and Terrell as Professors, R.P. Byron, D.F. Nicholls and T.J. Valentine as Readers, S. John, J.H.T. Morgan and P. Winer as Senior Lecturers, and T.J. O'Neill, A.D. Hall, P.G. Hall, W.T.M. Dunsmuir and M.J. McAleer as Lecturers. The SGS Department, with a sizeable proportion of its staff consisting of PhD graduates from the ANU, spanned a broad range of undergraduate as well as postgraduate activities in statistics and econometrics.

Moran's and Hannan's styles of PhD supervision were quite different. Moran assumed that students had a solid training in statistical basics, and some understanding of research methods. He would propose a general area of research, and suggest books and papers which the student might read. The student was then left to his or her own devices for the specific direction to follow; this worked well with most students. In contrast, Hannan tended to present a student with a specific problem in his particular area of time series, and work closely with him or her to solve it. He often presented many new ideas on the ongoing research simultaneously, a characteristic which some students found confusing. Thus, Moran could be said to have a hands-off, while Hannan had a hands-on approach to student supervision, but between them and their staffs, they turned out a very large number of PhD graduates. There were 21 PhDs from the IAS and SGS Departments between 1960 and 1972, and 37 from the IAS and SGS (TF from 1980) Departments between 1973 and 1983.

Among these, the half dozen whose names are perhaps best known are W.J. Ewens, FAA, FRS, recipient of Oxford's Weldon Memorial Prize, and holder of a named Chair at the University of Pennsylvania, C.C. Heyde, AM, FAA, FASSA, winner of the Australian Academy of Science's Lyle and Hannan medals, and Professor in the ANU's Mathematical Sciences Institute (and Columbia University, New York for the Fall semester), E. Seneta, FAA, Professor in the School of Mathematics and Statistics of the University of Sydney, G.A. Watterson, FAA, Reader in Mathematics at Monash University until his retirement when he withdrew from the Academy of Science, C.K. Cheong, formerly CEO of Singapore Airlines and currently Executive Chairman of the Singapore-based OCBC Bank, and R.D. Terrell until recently Vice-Chancellor of the ANU. Many of the remaining graduates were also distinguished, with a large number of them holding Chairs of Statistics in Australia (among them W.T.M. Dunsmuir, C.R. Heathcote,

G.M. Laslett, D.R. McNeil, R.A. Maller, D.F. Nicholls, C.E.M. Pearce, G.H. Pollard, B.G. Quinn, V. Solo, Susan R. Wilson), Israel (P.D. Feigin), Japan (K. Tanaka), the UK (P.M. Robinson), and U.S.A. (P.J. Brockwell, D.B. Pollard). PhD statisticians trained at the ANU clearly had a widespread global reach.

3. RESEARCH DIRECTIONS

Moran's interests were very broad; the range of his scholarship is indicated by the titles of his four books "The Theory of Storage" (1959), "The Statistical Processes of Evolutionary Theory" (1962), "Geometrical Probability" (joint with M.G. Kendall, 1963), and "An Introduction to Probability Theory" (1967). Of these, the most important was undoubtedly the second, which discussed various problems of Mathematical Genetics. Moran's students Ewens, Watterson and Wilson followed up his contributions in this field, while S. Karlin of the Department of Mathematics at Stanford University as well as J.F.C. Kingman, FRS, now Director of the Isaac Newton Institute, Cambridge, were greatly influenced by it. Moran also had an interest in time series, which led him to suggest this area as a fruitful field of research for Hannan in 1953. His research on dam theory stimulated Gani to devote part of his PhD thesis to storage models.

After his retirement in 1982, Moran concentrated more on the analysis of psychological phenomena, in the ANU's Centre for Mental Health Research, where he held an honorary position. However, his last paper "Notes on permanents", written in 1988 in honour of his former student Gani was mathematical. Moran died in September 1988.

Hannan's research was focused mainly on the analysis of time series. He wrote five books "Time Series Analysis" (1960), "Group Representations and Applied Probability" (1965), "Multiple Time Series" (1970), "The Statistical Theory of Linear Systems" (with M. Deistler, 1988) and "The Estimation and Tracking of Frequency" (with B.G. Quinn, published posthumously in 2001). The most accessible of these was the first, which received immediate recognition, but perhaps the most influential was the third, which summarized his research on time series in the multivariate context. It was, however, considered difficult to read, with some of its exercises consisting of unsolved problems. All contemporary students of Time Series Analysis are familiar with Hannan's many contributions to the field. Hannan died in January 1994.

With Moran and Hannan to inspire them, the members of their Departments were encouraged to be active researchers. Daley, Gani, Ewens, Hall, Heathcote, Heyde, Moyal, Miles, Nicholls, Seneta, Terrell, Vere-Jones, Watterson and Wilson, among others, wrote on a variety of statistical topics. These spanned queuing theory, point processes, Markov chains, mathematical genetics, statistical inference, probability theory, limit theorems, martingale theory, population processes, geometric probability, time series, non-negative matrices, branching processes, regularly varying functions, econometrics, and models for seismic phenomena. Rarely has such a small group of academics been as productive in research as the members of the two ANU Departments of Statistics.

4. CONCLUDING REMARKS

Moran was Professor of Statistics at the ANU (ANU-IAS after 1960) for 30 years from 1952 to 1982. During this period, he and his staff trained a large number of PhD students, many of whom achieved positions of high standing not only in Australia but throughout the world. He and his students had an enormous influence on the development of modern Mathematical Genetics.

Hannan held the Chair of Statistics at the SGS from 1960 to 1970, and then joined Moran as the second Professor in the IAS Department. He and his students were of crucial importance in the development of Time Series Analysis. He was succeeded in the SGS Department by Heathcote and Terrell as Professors; under them the Department continued to produce PhD graduates who became highly influential in Australia, New Zealand, Israel and the UK.

Both Moran and Hannan picked their staff carefully, and supported them in the pursuit of research. They also ensured that the quality of their graduates would be maintained at a very high level. One is led to conclude that the professional statisticians trained at the ANU between 1952 and 1982 have had a large impact on statistics in Australia as well as overseas. Moran and Hannan have left us with a splendid legacy, which the ANU should strive to maintain in the 21st century, despite the financial constraints on universities, and the decline in popularity of Statistics as a subject of study.

Regrettably, the future of Statistics in Australia in 2004 does not appear particularly auspicious. Many honours courses in mathematics and statistics at Australian Universities have been cancelled, and the number of independent Statistics Departments in Universities has decreased substantially. Potential Statistics students are enrolling in competing subjects, considered more attractive or remunerative, such as actuarial studies, finance, or business management. There is a shortage of postgraduate students in statistics, and employers of statisticians such as the Australian Bureau of Statistics are finding it difficult to recruit trained personnel. In the face of this apparent decline, Australian statisticians must work all the harder to ensure that the traditions established by Moran and Hannan continue to flourish.

SUMMARY

This paper discusses the influence of the ANU on statistical training and research in Australia. Pat Moran and Ted Hannan have left the ANU a splendid statistical legacy; one should make every effort to maintain it despite the current financial difficulties of Australian Universities.

RESUME

Cet article discute l'influence de l'ANU sur l'entraînement et la recherche statistique en Australie. Pat Moran et Ted Hannan ont legue un heritage statistique splendide a l'ANU; il faudrait faire tout effort possible pour le maintenir malgre les difficultes financieres courantes des Universites Australiennes.