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PITMAN MEDAL AWARDED TO E. SENETA

Professor Eugene Seneta from the University of Sydney was awarded the Pitman Medal of the Statistical Society of Australia for 1998 in recognition of his outstanding contributions to probability theory and statistics, and particularly to stochastic processes and the history of statistics. The medal was presented at the 14th Australian Statistical Conference in July 1998 by Professor Des Nicholls, President of the Society.

Eugene Seneta was born in 1941 in Stary Sambor, Ukraine. He started school in post-war Germany and in 1949 he and his family emigrated to Adelaide where he continued his schooling. Eugene completed his Bachelor of Science degree at The University of Adelaide with First Class Honours in Pure and Statistical Mathematics in 1964, followed by a Master of Science degree by research in 1965 from the same institution. Eugene's M.Sc. thesis, entitled 'Transient Behaviour in Finite Absorbing Markov Chains', was written under the supervision of John Darroch. He then joined the stream of people working on stochastic processes at The Australian National University (ANU) where he was awarded a Ph.D. for his thesis on 'Topics in the Theory and Applications of Markov Chains' in 1968.

Eugene lectured at the ANU from 1964 until 1979, being promoted to the position of Reader in 1974. In 1979 he took up his current position as Chair of Mathematical Statistics at The University of Sydney. He has held visiting positions at Cambridge University, Imperial College, Princeton University, Virginia Polytechnic Institute and State University, Colorado State University, The University of Virginia, The University of Chicago, and at L'École des Hautes Études en Sciences Sociales, Paris.

Eugene has established a major international reputation for his contributions in several fields. His early work on quasi-stationary distributions for Markov chains and his work on the asymptotics of branching processes secured his place as a leader in the area of stochastic processes. In recent years the topic of quasi-stationarity in absorbing processes has seen a vigorous revival, largely in the context of birth-and-death processes, and his papers with John Darroch (1965) and David Vere-Jones (1966) are cited for motivation. The latter paper marked the beginning of Eugene's interest in Vere-Jones's R-theory of infinite non-negative matrices, which he then applied to the study of finite approximations to infinite non-negative matrices.

The keystone to Eugene's influential results in the theory of discrete branching processes was the application of the iteration-theoretic/functional equation approach, exposited in the first paper to be published in *Advances in Applied Probability* at its inception in 1969. This emphasised his possibly best-known result, which had appeared a year earlier in the *Annals of Mathematical Statistics*, and which showed that if the offspring mean exceeds unity but is finite, there always exists a sequence of norming constants for the Bienaymé–Galton–Watson process which give a non-degenerate limit distribution. These constants are generally called the Seneta constants. The result is an ultimate form incapable of improvement in this setting. Chris Heyde showed, very soon afterwards, that the structure of the constants was such that convergence was almost sure. Other influential directions in Eugene's work concerned the intimate and natural connection between the theory of discrete branching processes and the theory of regularly varying functions (1971), and work initiated in a paper with Chris Heyde in 1972 on inference for branching processes with immigration. The authoritative monograph on branching processes by Athreya & Ney (1972) is replete with references to his papers.

Eugene is the author or coauthor of more than 150 papers in international journals and has made several contributions to the *Encyclopedia of Statistical Sciences*. His books, *Regularly Varying Functions* (Springer, 1976; 2nd edn 1985 (in Russian)) and *Non-Negative Matrices* (1973, 2nd edn 1981) are widely quoted and are standards in their fields.

In *Non-Negative Matrices*, Eugene's treatment of coefficients of ergodicity as a tool for treating inhomogeneous products of non-negative matrices led on to a highly influential synthesis on this topic, in a paper of 1979, that illuminated the use of coefficients of ergodicity for spectrum localization. His result, in 1977, that weak and strong ergodicity for backwards inhomogeneous products of stochastic matrices are equivalent, had direct significance for the model of continuing interchanges of information leading to consensus. More recently he showed how the Markov–Dobrushin coefficient of ergodicity is appropriate and easy to use as a condition number measuring the stability of a stationary distribution of a finite Markov chain under perturbation of a transition matrix.

Eugene's first paper written as a sole author, 'Quasi-stationary distributions and time-reversion in genetics', was accorded the unexpected honour of being read on his behalf before the Royal Statistical Society by Peter Whittle. In 1977, his paper in *Genetics* showed how fixed population-size Markov chain models could be generalized to randomly fluctuating population size by considering proportions of types of individuals, and resorting to martingale theory, a theme that has since been extended by others.

One of his many contributions to the history of probability and statistics was the book *I.J. Bienaymé: Statistical Theory Anticipated* (Springer, 1977), coauthored with Chris Heyde. This book was, in effect, a history of probability and statistics in the 19th and early 20th centuries. Eugene is an acknowledged expert on work of this period in France and the Russian Empire. His writings have revealed, in particular, how attribution and perception in science may be a highly politicised activity. They have focused on the probabilistic and statistical work of Pascal, Cauchy, Bienaymé, Markov, Chebyshev, Chuprov, Nekrasov and Sleshinsky.

His attempt, with his former student Kathy M. Kang in 1980, to clarify path analysis from a mathematically consistent standpoint drew wide attention and favourable response from mathematically-minded statisticians. The vg (variance gamma) model in financial mathematics, sometimes called the Madan–Seneta process, proposed by Dilip Madan and Eugene in 1990, is in use on Wall Street.

Less well known, perhaps, is Eugene's service to the wider community: he provided a theoretical basis for and oversaw the production of an algorithm for scaling Higher School Certificate marks in the early 1980s. Building on a cruder algorithm in use by the NSW Board of Senior School Studies which had withdrawn from the activity, he worked with programmers at the University of Sydney and instituted a scheme that remains the essence of today's NSW Tertiary Entrance Rank. The Victorian scaling procedure also uses some of the particular details worked out by Eugene.

Eugene's contributions to Australian research were recognised by his election in 1985 to Fellowship of the Australian Academy of Science.

In an age of increasingly superficial learning, Eugene Seneta is an extraordinary rarity: a true scholar. His deeply committed scholarship informs penetrating analyses in matters both mathematical and historical that stand with the best in the world.