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THE AUSTRALIAN NATIONAL UNIVERSITY

FACULTY OF ECONOMICS

DEPARTMENT OF STATISTICS

ANNUAL REPORT 1966

Staff :

Professor	-	E.J.Hannan, B.Com.(Melb.),Ph.D.
Reader	-	C.R.Heathcote, B.A.(W.Aust.),M.A.(Melb.),Ph.D. (on leave to 6.8.66.)
Senior Lecturers	-	S.John, B.Sc.(Trav.),Ph.D.(Indian Stat.Inst.)
		W.J.Ewens, M.A.(Melb.),Ph.D.
Lecturers	-	J.H.T.Morgan, B.A.(Cantab.),M.Sc.(Case Inst.Tech.)
		N.F.Nettheim, B.Ec.(Syd.),M.Ec.,Ph.D.(Stanford) (from 5.9.66.)
		E.Seneta, M.Sc.(Adel.)
		R.D.Terrell, B.Ec.(Adel.)
		P.Winer, B.Sc.(Rand)
Temporary Lecturer	-	C.Pearce, M.Sc.(Victoria University of Wellington), Ph.D.(A.N.U.) (to 31.7.66.)
Temporary Tutor	-	J.Winston, B.Sc.(M.I.T.),M.Sc.(Tufts) (from 1.8.66.)

Introduction :

The Statistics Department is concerned with teaching and research in probability and statistics (including what is usually called operations research). That is it is concerned with the study of systems in whose behaviour chance plays a major part. Somewhat uniquely it is responsible for all teaching in the subject both to economists and to students in Arts and Science. The teaching programme is fairly fully developed, with a four year course available, the major need being for the commencement of an operations research course (scheduled for 1968). Research has been heavily concentrated on stochastic processes (i.e. the study of systems whose temporal development is governed by the laws of chance). These theories have the widest application, in industry (queueing and renewal theory), in natural science (genetics, communication systems, control theory), in social science (analysis of economic time series) and have a profound mathematical content.

Teaching Programme, 1966 :

TABLE 1

Subject	Initial Enrolment	Number Examined	H.D.	D.$^{\beta}$	Cr.$^{\gamma}$	Pass	Fail
Statistics I	172	125$^{\alpha}$	1	2	21	58	43
Statistics II	44	36$^{\alpha\delta}$	2	1	6	12	12
Statistics III	13	10	-	1	2	5	2
Statistics IV	7$^{\epsilon}$	7	-	2	-	-	-
Master's Prelim.	2	2	-	-	-	1	1
Master's Thesis	8	2$^{\phi}$	-	-	-	1	-
Ph.D.	3	-	-	-	-	-	-
	249	182	3	6	29	77	58

α One student still to be examined.

β Including Hons. 2A.

γ Including Pass with Merit.

δ Results for two students transmitted to Professor of Botany.

ϵ Four students took one course only, one student took two courses only, from a total of six courses.

ϕ One student to resubmit.

TABLE 2

Failure rates for those sitting examinations

Statistics	I	II	III	IV
%	34	36	20	0

The only point deserving comment is the high rate in Statistics II. It is not easily explained as the lecturer has not changed and a careful examination of the results shows that it was not due to a change in the structure of the course. It appears to be due to students attempting a second year unit involving mathematics who would not previously have done so.

Staff :

Dr.W.J.Ewens was appointed to the Chair of Statistics at La Trobe University. Dr.Heathcote spent eight months overseas, of which most was spent at the University of Maryland, but also a substantial portion at the Bell Telephone Laboratories at Murray Hill. A paper submitted by Mr.E.Seneta to the Royal Statistical Society was chosen to be read before the Society and has attracted overseas comment, a considerable feat for a young man still

preparing his Ph.D. thesis. Professor Hannan has been elected a Fellow of the Econometric Society.

Research Programme :

(1) Fourier methods and stochastic processes (Cheong, Hannan, Nettheim, Terrell, Tuckwell). Estimation of coherence, regression problems, seasonal adjustment of data, signal extraction and smoothing problems.

(2) Probabilistic problems in genetics (Chia, Ewens, Seneta, Winston). Theory of evolution of dominance, problems of survival of mutant genes under multi-locus behaviour and in fluctuating environment.

(3) Probability theory of stochastic processes (Cheong, Heathcote, Seneta, Winer). Rate of convergence problems for limit theorems for Markov chains, approximations to ergodic properties of infinite non-negative matrices, approximations to moments of extinction times in branching processes, asymptotic expansions for sums of random variables and absorption probabilities.

(4) Classical statistical inference (Nettheim). Statistical decision theory and invariant minimax estimation.

(5) Econometrics (Terrell). Econometric problems associated with models for the wool market.

(6) Multivariate Analysis (John). Evaluation, tabulation of probabilities for special regions.

Publications :

Ewens, W.J. Linkage and the evolution of dominance. Heredity, 21, 1966, 363-370.

Ewens, W.J. and Ewens, P.M. The maintenance of alleles by mutation - Monte Carlo results for normal and self-sterility populations. Heredity, 21, 1966.

Hannan, E.J. Spectral analysis for geophysical data. Geophysical Journal of the Royal Astronomical Society, 11, 1966, 225-236.

Hannan, E.J. The concept of a filter. Proc. Camb. Phil. Soc., 63, 1966.

Heathcote, C.R. Corrections and comments on the paper, A branching process allowing immigration. Journal Roy. Statistical Society (B), 28, 1966, 213-217.

Heathcote, C.R. and Seneta, E. Inequalities for branching processes. Journal Applied Probability, 3, 1966, 261-267.

John, S. On the evaluation of probabilities of convex polyhedra under multivariate normal and t distributions. Journal of the Royal Statistical Society, Series B, 28, 1966, 366-369.

Morgan, J.H.T. Two-link material handling systems. Operations Research, 14, p.16, (1966).

Seneta, E. Quasi-stationary distributions and time-reversion in genetics, (with discussion). Journal of the Royal Statistical Society, B, 28, 1966, 253-277.

Seneta, E. Quasi-stationary behaviour in the random walk with continuous time. Australian Journal of Statistics, 8, No.2, 1966, 92-98.