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THE AUSTRALIAN NATIONAL UNIVERSITY

FACULTY OF ECONOMICS

DEPARTMENT OF STATISTICS

ANNUAL REPORT 1971

Staff:

Professor and Head of Department	-	C.R.Heathcote, B.A.(W.Aust.), M.A.(Melb.), Ph.D. (from 9.7.71.)
Professor	-	R.D.Terrell, B.Ec.(Adel.), Ph.D. (from 16.8.71.)
Readers	-	R.P.Byron, M.Ec.(W.Aust.), Ph.D.(Lond.) (from 10.12.71.)
	-	C.C.Heyde, M.Sc.(Syd.), Ph.D.
Senior Lecturers	-	R.A.Jarvis, B.Eng.(W.Aust.), Ph.D.(W.Aust.)
	-	S.John, B.Sc.(Trav.), M.Sc.(Kerala), Ph.D.(Indian Stat. Inst.)
	-	J.H.T.Morgan, B.A.(Cantab.), M.Sc. (Case Inst. Tech.) (from 1.7.71.)
	-	E.Seneta, M.Sc.(Adel.), Ph.D.
	-	P.Winer, B.Sc.(Rand)
Lecturers	-	P.N.Creasy, B.Sc.(Adel.)
	-	D.F.Nicholls, B.Sc.(New Eng.), M.Sc. (from 15.12.71.)
Temporary Lecturer	-	R.K.Milne, B.A.(Vic.Wellington), Ph.D. (from 8.2.71. to 4.12.71.)
Senior Tutor	-	N.F.MacNally, B.Sc.(Lond.)
Programmer	-	P.N.McCarter, B.Sc.(W.Aust.)

General:

The Statistics Department is concerned with teaching and research in mathematical statistics, econometrics, probability theory, and also computer science. Unlike the situation in other Australian Universities the Department

is responsible for teaching in these areas throughout the University and consequently caters for students with diverse backgrounds and interests. Mainly for this reason it is intended to replace existing courses by semester units, several of which will be alternatives. The changes have been approved and will come into effect in 1972.

New developments in the Department in 1971 consisted of the establishment of sections in econometrics and computer science. Professor R.D.Terrell was appointed to the Chair of Econometrics and four of the five established posts in this field have been filled. The commencement of teaching in computer science proved popular with students, over 250 applying for the 140 places available in Computer Science I. A Super Nova computer, installed in the Copland Building, was successfully used for teaching.

Research by members of the Department was mainly in the fields of pure and applied probability (particularly limit theorems, branching processes, and characteristic functions), multivariate analysis, econometric time series, picture processing and pattern recognition, adaptive control, and interactive systems.

Participation by undergraduates in Departmental affairs was negligible and some difficulty was experienced in obtaining a nomination for the Faculty Education Committee. On the other hand close and useful contacts were maintained with the postgraduate students who were not hesitant in volunteering opinions on a variety of matters concerning the Department.

Visitors to the Department included Dr.B.M.Brown of La Trobe University and (jointly with the Statistics Department, IAS) Professor V.Zolotarev of the Steklov Institute, Moscow. Dr.Brown gave a course of five lectures to fourth year students and staff and Professor Zolotarev a sequence of seminars on his current research. It is hoped that an expanded version of Professor Zolotarev's seminars will be published in book form.

Teaching Programme 1971:

Courses offered in 1971 followed the general pattern of previous years although some changes in content were implemented in the second half of the year in preparation for the introduction of semester units in 1972. The practice of separating Honours from Pass students as much as possible in second and third years was retained although this creates considerable strain on the staff.

Details of examination results are tabulated on page 6. Comparative failure rates for students attempting the final examination are given below.

Failure Rates, %

	Stats I	Stats II (Pass plus Honours)	Stats III (Pass plus Honours)	Operational Research	Computer Science I
1967	33	29	0	-	-
1968	23	26	36	27	-
1969	18	25	6	9	-
1970	15	17	7	15	-
1971	18	20	8	3	7

The failure rate in Statistics I rose slightly to the 1969 level but the wastage plus failure rate remained almost constant. It is possible that the introduction of semester units in 1972 will see an increase in the failure rate for first year students, partly because of the way in which these units fit into the structure of the B.Ec. degree.

Both the failure and wastage rates in Statistics II increased slightly over the 1970 figures. The overall picture in Statistics III and Operational Research remained much the same as in 1970.

Of the two Final Honours students one obtained a clear first and the other H2B. There were seven postgraduate students, four enrolled for Masters degrees and three for the Ph.D. One Masters and one Ph.D. thesis were submitted during the year.

Publications:

Byron, R.P.[ϕ1] The restricted Aitken estimation of sets of demand relations. Econometrica 38, 1970, 816-830.

Creasy, P.N.[ϕ2] A console system allowing real time operations. In Data Acquisition and Real Time Systems edited by D.E.Lawrence and P.M.Fenwick. University of Queensland Press, 1971, 67-75.

Heathcote, C.R. Probability: elements of the mathematical theory. Allen and Unwin, 1971, 267.

Heyde, C.C. and Brown, B.M.[‡] On the departure from normality of a certain class of martingales. Annals of Mathematical Statistics 41, 1970, 2161-2165.

Heyde, C.C. On the growth of the maximum queue length in a stable queue. Operations Research 19, 1971, 447-452.

Heyde, C.C. and Heyde, Elizabeth[ϮI] Stochastic fluctuations in a one substrate one product enzyme system: are they ever relevant? Journal of Theoretical Biology 30, 1971, 395-404.

Heyde, C.C. Some central limit analogues for super-critical Galton-Watson processes. Journal of Applied Probability 8, 1971, 52-59.

Heyde, C.C. and Brown, B.M.[‡] An invariance principle and some convergence rate results for branching processes. Zeitschrift fur Wahrscheinlichkeitstheorie 20, 1971, 189-192.

Heyde, C.C. and Seneta, E.[Ϯ2] Analogues of classical limit theorems for the supercritical Galton-Watson process with immigration. Mathematical Biosciences 11, 1971, 249-259.

Heyde, C.C. and Leslie, J.R.[Ϯ2] Improved classical limit analogues for Galton-Watson processes with or without immigration. Bulletin of the Australian Mathematical Society 5, 1971, 145-155.

ϕ1 Based on work done while a member of Department of Economics, RSSS, IAS.

ϕ2 Based on work done while a member of the Computer Centre, ANU.

‡ Not a member of this University.

Ϯ1 Member of Department of Biochemistry, JCSMR.

Ϯ2 Members of Department of Statistics, SGS.

Jarvis, R.A. On-line automation of an X-ray diffractometer in a time-shared environment. Reprinted by request in a special issue by the Physical Society of Japan on Data Processing in Experimental Physics 46, 1971, 84-92.

Jarvis, R.A. Clustering using a similarity measure based on shared near neighbours: visual image experiments. Proceedings of Workshop on Pictorial Organization and Shape, CSIRO, Canberra, 1971.

John, S. Some optimal multivariate tests. Biometrika, 1971, 123-127.

John, S. A test of equality of block-diagonal covariance matrices and its role of unification. Journal of the Royal Statistical Society Series B, 1971, 33.

Milne, R.K.$^{\emptyset}$ Simple proofs of some theorems on point processes. Annals of Mathematical Statistics 42, 1971, 368-372.

Seneta, E. On invariant measures for simple branching processes. Journal of Applied Probability 8, 1971, 43-51. (Summary of this and other material appeared under the same title in Bulletin of the Australian Mathematical Society 2, 1970, 359-362.)

Seneta, E. Sequential criteria for regular variation. Quarterly Journal of Mathematics (Oxford) 2nd Series 22, 1971, 565-570.

Anderssen, R.S.$^{\not}$ and Seneta, E. Smoothing techniques for the removal of periodic noise of known period. Mathematical Geology 3, 1971, 157-170.

Bojanić, R.‡ and Seneta, E. Slowly varying functions and asymptotic relations. Journal of Mathematical Analysis and Applications 34, 1971, 302-315.

Scott, D.J. An invariance principle for reversed martingales. Zeitschrift fur Wahrscheinlichkeitstheorie 20, 1971, 9-28.

Terrell, R.D. and Tuckwell, N.E.‡ Efficiency of least squares in estimating a stable seasonal pattern. Journal of the American Statistical Association 66, 1971, 354-372.

$\emptyset$ Based on work done while a member of the Department of Statistics, RSSS, IAS.

$\not$ Member of the Computer Centre, ANU.

$\ddagger$ Not a member of this University.

THE AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF STATISTICS ANALYSIS OF STUDENT PERFORMANCE

1 Subject or unit		2 Enrolled as at 30.4.71.	Percentage of Number Enrolled: 3 Sitting	4 Wastage (2-3)	5 Failure	Percentage of Number Sitting: 6 Sitting	7 High Distinction	8 Distinction	9 Credit	10 Pass with Merit	11 Pass	12 Fail
I	No.	352	274*	78	49	274*	-	17	48	-	157	49
	%	100	78	22	14	100	-	6	18	-	57	18
II	No.	81	54	27	12	54	-	1	8	-	33	12
	%	100	67	33	15	100	-	2	15	-	61	22
IIH	No.	8	6	2	-	6	3	2	1	-	-	-
	%	100	75	25	-	100	50	33	17	-	-	-
III	No.	22	19	3	2	19	-	1	2	-	14	2
	%	100	86	14	9	100	-	5	11	-	74	11
IIIH	No.	9	7	2	-	7	-	4	-	-	3**	-
	%	100	78	22	-	100	-	57	-	-	43	-
O.R.	No.	45	33	12	1	33	-	2	2	10	18	1
	%	100	73	27	2	100	-	6	6	30	55	3
CS.I	No.	140	108	32	8	108	4	7	35	-	54	8
	%	100	77	23	6	100	4	6	32	-	50	7

	Enrolled (as at 30 April 1971)	Sitting	Results
Final Honours	2	2	H1, H2B.
Masters Qualifying	3	1	1 partially qualified, 2 withdrew.
Masters Degree	4	1	1 M.Sc. awarded.
Ph.D.	3	1	1 being examined.

* Three students of these 274 are to be examined by a special examination in February.

** One of these students was recorded as having passed at the ordinary (and not honours) level.