

statistical
society of
australia

newsletter

november 1977

number 3

THE TRAINING OF STATISTICIANS

In this article we present a summary of some of the views expressed at a Panel Discussion held at the June meeting of the Canberra Branch of the Statistical Society. Two panel members, Mr Ron Fergie of the Australian Bureau of Statistics (ABS) and a former lecturer at the Asian Statistical Institute and Government Statistician of Papua-New Guinea, and Dr Joe Gani, Chief of the CSIRO Division of Mathematics and Statistics (DMS), spoke on the needs and attitudes of two of the major employers of statisticians in Canberra; whilst the other two members, Professor Chip Heathcote of the Australian National University, and Mr Hugh Mahon of the Canberra College of Advanced Education, represented the educators of statisticians at a tertiary level. The discussion was chaired by Professor Toby Lewis of the University of Hull.

Dr Gani and Mr Fergie opened the discussion by giving their views on the types of training needed in their differing areas. The meeting was then thrown open to general discussion, with Professor Heathcote and Mr Mahon commenting as part of this. The discussion was lively and extended, being largely provoked by Mr Fergie's comments on the inadequacy of the present educational system to provide the training desired in some areas of government statistics. The general comments of the meeting seemed to indicate that, whilst the current emphasis in the university syllabus did provide an adequate basis for statisticians in academic or scientific areas, it did not meet the less well defined needs of data-collection and large scale analysis encountered in the ABS. No real remedy for this emerged at the meeting, and below we give the

basis of Dr Gani's and Mr Fergie's remarks, together with a few comments from the more general discussion which followed: we hope that any members of the Society who see other needs in the training of statisticians, or who have other ideas on ways of meeting the differing requirements of employers of statisticians, will use this forum to discuss further this important aspect of the statistical profession.

For what purpose do we need to train our statisticians? Dr Gani began the Canberra meeting by suggesting that possible aims of such training included: the teaching of statistics at undergraduate or postgraduate levels; general consulting in social or economic research; consulting in certain areas of operations research and management; specialised consulting in industry; general statistical advisory work in government; and detailed planning and analyses of sample surveys and censuses. Dr Gani concentrated on three aspects of particular relevance to DMS: training, consulting apprenticeship, and the need for constant interaction between theory and practice.

Dr Gani said he believed that a mathematics degree with a reasonable statistical content (or a statistics degree with a sound mathematical basis) was now essential for the professional statistician. He classed Statistics as a sub-field of Applied Mathematics. Because of the practical origins of statistics, he deemed it essential that statistical training should bring students into contact with real data and its analysis, and, since computers are now so important in such analysis, students should be taught how to use them and learn how to programme competently.

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The views of contributors to this Newsletter should not be attributed to the Statistical Society of Australia.

Dr Gani suggested that young graduates should be inducted into consulting by a process of apprenticeship. While they may understand text-book methods and even know how to apply them to real data, they are often unprepared for the exacting demands of the consulting situation. Aspiring statisticians need to acquire confidence in their capacity to cope with problems not generally outlined in the literature; as apprentices they rapidly acquire it. Dr Gani explained that in the DMS new recruits are often set to work under the wing of experienced statisticians. They soon learn what can and cannot be done and generally after 6 months to one year, are ready for independent action, and are encouraged to consult separately, but with the advice of senior statisticians to support them if they need it.

With respect to the interaction between theory and practice, Dr Gani thought that since statisticians differed in their tastes, some gravitated towards a regime of consulting, computing and practical work, while others preferred theorems and lemmas only occasionally diluted by data. Dr Gani's view was that those totally involved in practical consulting soon fell behind in the methods at their command, and so ended by giving deficient advice, while confirmed theoreticians proved theorems which receded gradually into the world of fiction. Ideally, theory and practice should be closely interwoven, with the first illuminating the second, while the latter led to interesting problems to be solved theoretically.

Mr Fergie represented a viewpoint of the Government statisticians; the 1000 or so professionals who are responsible for developing and managing the national system of economic and social statistics in Australian government statistical services. His contention was that Statistics Departments of universities around the world had failed to recognise their needs; the statistical literature had largely ignored their problems; and there has been little contact between the academics and practitioners in this field. He believed that the basic problem was that, while the theory and practice of national statistics deserved to be treated in a disciplined manner, it lacked any natural academic home. It was *not* at home in the mathematical or theoretical statistics departments of universities; there was generally little interest in either the conceptual or operational issues which arose in collecting and managing data on a national scale.

Referring to the literature, Mr Fergie stated that while hundreds of textbooks existed on statistical tools and their applications to data, there were hardly any textbooks on the problems confronted daily by professionals in government statistical offices. The literature that does exist consisted largely of manuals produced by government statisticians themselves through the United Nations Statistical Office and other United Nations specialised agencies, and the publications of National Statistical Offices. He stated further that judging from the literature, the academic community was not interested in this field, nor were

they interested in developing and teaching any comprehensive theory relating to national statistical services or national data systems.

Mr Fergie believed that, as a consequence, graduates entering the national statistical service from universities, with majors in economics or statistics, had no intellectual framework or preparation for the kind of work they would do, and found difficulty in obtaining any such framework on the job. Government statistical organisations had tried to bridge the gap by internal training or by sending staff to specialised academic institutions such as the Asian Statistical Institute in Tokyo which was set up to meet the need of the statistical services of developing countries. The response of the ABS had been to conduct its own training courses for about 24 graduates each year over the years 1965-72. But even this scheme eventually ground to a halt. The dilemma for the ABS had been that, on the one hand, it could not handle the training effectively on an 'in house' basis, while getting on with the job of running its statistical operation; yet on the other hand the subject was not likely to be taught adequately by academics in statistical faculties, who were clearly not in touch with the statistical operations performed within the institutional framework of a national statistical service.

Mr Fergie explained that the increasing gap between theory and practice was a world-wide situation - Bjerve drew attention to it in his Presidential address to the 1976 meeting of the International Statistical Institute, Moser raised the problem earlier this year at the Washington Seminar on *Statistical Services in 10 Years Time*, and the Asian Statistical Institute this year had held a panel discussion on communication and cooperation between theoreticians and practitioners (various details of which are given elsewhere in this *Newsletter*).

In conclusion, Mr Fergie suggested that this was a central problem for the discipline of statistics and that it was time the principles involved in developing national statistical systems were studied and taught systematically by statisticians. He mentioned the beginning of such a project, in the course of Official Statistics being taught at the Canberra College of Advanced Education (this course is the subject of an article in the Statistical Education section of this issue of the *Newsletter*).

In the discussion, Dr Gani suggested that one approach would be to establish a chair of official statistics to facilitate teaching and research in this field. Mr Mahon put forward the idea that academic statisticians perhaps felt that official statistics was not their job. The academics at the meeting tended to agree. Professor Lewis thought that it was the employer's job to provide the further training after the university education of graduates. Mr Mahon thought that the trend might be changing. He had, for example, tried to make the statistics courses at the Canberra College of Advanced Education more vocationally oriented.

Much of the discussion from the floor concerned the obvious need to acquaint academic statisticians with details of the areas in which the government statisticians felt their recruits lacked training. Whilst some ideas, such as that of academics spending sabbaticals in the ABS, were mooted, it appeared that there would be no easy way of overcoming this difficulty. It appeared, as the meeting concluded, that the main difficulty of training statisticians for the areas described by Mr Fergie remained the lack of definition of those areas: since, as he himself had said, there was no intellectual framework developed for describing the collection and management of large-scale data, it was extremely difficult for courses on such topics to be set up in the traditional academic situation. The problem, then, is not with the training of statisticians: it lies in the present subject-matter of the discipline of statistics,

and until this expands to cover the area in question, the debate will no doubt continue. Professor Heathcote felt that two different populations of statisticians were being discussed, and that in many ways the skills Mr Fergie was talking about were more those required of economists than of statisticians. He said that within the three years of a pass degree it was not possible to produce people with all the tools of professional statisticians: part of their training had to take place later, either on the job or in later academic work. Although it might be possible to cover most of what was needed in a four year course, it would probably take at least five years of training to provide the mathematical and scientific skills needed by professional statisticians as well as teaching the data-handling techniques discussed by Mr Fergie.

NEW SOUTH WALES BRANCH

MEETINGS

August

Professor D. R. Cox (Imperial College) spoke on *Tests of Multivariate Normality*. His talk included a discussion on the levels of meaningfulness of the problem, a review of the literature (Andrews, Burnaby, Healy, Day, Mardi, Malkovich and Afifi), and consideration of tests (both coordinate dependent and coordinate free) based on linear combinations of variables.

September

Professor H. Mulhall reviewed the early history of probability.

October

Dr J. Robinson introduced a model for transmitter release by nerve impulses and outlined estimation procedures.

November

Professor C. A. McGilchrist discussed the maximum likelihood method for the estimation of genetic and environmental effects in a study of serum cholesterol.

SYMPOSIUM

A full report on the Branch Symposium on *Developments in Simulation Theory*, held on 17 - 18 November, will appear in the next issue of the *Newsletter*. Copies of the papers presented at the symposium are available from the Branch Secretary (Dr G. Cooney, Department of Mathematical Statistics, Sydney University) at \$10 a copy. The symposium papers comprise:

GENERAL INTRODUCTION

Dynamic Displays and the Fundamental Properties of Continuous Models

P. R. Benyon

An Introduction to Modelling of Large Process Systems

R. G. H. Prince

THEORETICAL ASPECTS OF SIMULATION

Random Number Generation

E. Oakenfull

Jackknife Techniques

A. Eyland

Variance Reduction Techniques

A. J. Miller

Uses and Abuses of Simulation Techniques

D. R. McNeil

BUSINESS APPLICATIONS

Simulation in Steelworks

R. A. Brand

Simulation as a Contribution to Decision Making

I. Sadler

Simulation of Computer Systems

J. Flanagan

GAMING SIMULATION

Gaming Simulation - Model for Environmental Systems: Formal Presentation and Game Demonstration

G. Wright and G. Sheather

The Employment of Probabilistic Rules in War Games

T. Millane

PRACTICAL APPLICATIONS

Macro Economic Applications of Simulation Analysis

J. F. Henderson

Stochastic Modelling of Stream Flows

T. A. McMahon and R. Srikanthan

Simulation Experiences in Agriculture and Economics

J. Anderson

SOCIAL GATHERINGS

It is hoped to organise further social evenings for statisticians and their spouses/friends, separately from the meetings of the Sydney Branch early in the new year. All those interested in such an occasion in February should contact either Ken Russell (662 2061) or Rhonda Gock (662 2056) at the School of Mathematics, University of New South Wales.

VICTORIAN BRANCH

GRAPHICAL METHODS

The August meeting was addressed by Professor D. R. Cox who spoke on *The Role of Graphical Methods in Statistics*. After some historical remarks about the early use of graphs for economic and mortality data by such people as Playfair, Priestley, Florence Nightingale and others, Professor Cox considered a number of criteria he felt were important in making graphs clear and unambiguous. These included naming the axes, marking the scale and the units on each axis, using a scale break for a false origin and giving a self-explanatory legend. With the aid of a number of examples, he discussed how to present the results of a statistical analysis. This involved such principles as: (i) points plotted should have independent and preferably equal errors, or the size of the error should be shown at each point; (ii) departures from standard conditions should be shown as a departure from linearity or from total randomness; (iii) variables used should have some physical reality; (iv) plots should utilise any invariances inherent in the data. Further ideas on displaying supplementary information by annotating points on the graph, representing multivariate data by shapes, as in the Andrews' Plot, and reducing dimensionality in other ways, were also introduced.

POPULATION GENETICS

In September, Professor Warren Ewens of Monash University addressed the meeting on *Population Genetics - A Sister Subject to Statistics*. Both these fields have their origin in the work of the biometricians during the latter half of the 19th century. Several techniques (e.g. of correlation and regression) which are now of importance in statistics were first introduced in connection with the pre-Mendelian attempts to quantify the evolutionary process, and continue to be useful even though evolutionary arguments are not carried out in Mendelian terms.

Population genetics theory proper started soon after the rediscovery of Mendelism in 1900. The main aim of the subject is to quantify evolutionary process in Mendelian terms, although an important subsidiary area concerns

plant and animal breeding. In connection with the latter it was soon found necessary to quantify that proportion of the variation in a character which is due to genetic causes. This requirement led to the development of the concept of the analysis of variance in the work of Fisher: this concept now permeates statistical thought. Several other examples can be found of genetical concepts which led to fundamental statistical theory.

A further link with statistics arises through stochastic processes. Since population sizes are finite there is always a random component to changes in gene frequency and this leads to evolutionary processes being described in stochastic terms. In particular Markov chain theory, diffusion theory and branching processes are frequently of use in population genetics theory. Current work in theoretical population genetics uses statistical inference and suggests directions which research in inference theory should take. In particular, it is necessary in genetical inference to assess large bodies of data of varying types and with varying degrees of precision, all related in different ways to one specific hypothesis. The condensation of such data for inference purposes is presently of some importance in population genetics theory.

OPEN UNIVERSITY

At the October meeting Dr P. R. Rayment, of the Gippsland Institute of Advanced Education, who recently spent a year at the British Open University, spoke about *Statistics education - the British Open University approach to teaching at a distance*. It is hoped that a more detailed report on this meeting will be given in a subsequent issue of the *Newsletter*.

1977 BELZ LECTURE

The Belz Lecture for this year will be given on Tuesday, 22nd November by Dr Niels Becker of Latrobe University who will speak on *Models and designs for experiments with mixtures*. The lecture will be followed by the Annual Dinner to be held in University House at the University of Melbourne.

SOUTH AUSTRALIAN BRANCH

A meeting of the Society was held on Wednesday, November 9, 1977, with 23 people attending. Dr John Nelder of Rothamsted Experimental Station spoke on *Tables and Their Margins*.

There is considerable disagreement about the specification of models for data in the form of multi-way tables, about the presentation of non-orthogonal analysis of variance, and about the formation and interpretation of marginal tables. The speaker presented a unified approach to the analysis of

tables of measurements, counts, and proportions using parsimonious models and distinguishing between the smoothing and predictive phases.

After the meeting, a very successful barbeque was held, with 16 participants; this enabled members and guests to meet the speaker informally. It is planned to hold several such gatherings after meetings next year. Those wishing to be kept informed of such meetings should contact A. G. Constantine or J. B. F. Field at CSIRO Division of Mathematics and Statistics (phone 793605).

WESTERN AUSTRALIAN BRANCH

June Meeting

This was held on Wednesday, 1st June. Dr F. C. (Gypsy) Durling of the Department of Mathematics, W.A.I.T., gave a talk entitled *A Look at the bivariate Burr distribution*. He suggested that the bivariate Burr distribution would be useful for estimation and simulation purposes etc. for a wide variety of types of continuous distributions, particularly if a bivariate form with the appropriate marginals is not known. This distribution and its marginals were looked at, including its relationship to the Pearson curves. Some examples of the use of the Burr system of distributions were included.

July Meeting

This was held on Tuesday, 5th July. John Hill, of the Welsh Plant Breeding Station, University of Aberystwyth, gave a talk entitled *The saga of genotype-environment interactions - a plant breeder's viewpoint*. An article describing this aspect of biometry will appear in a later edition of the *Newsletter*.

August Meeting

This was held on Wednesday, 3rd August. Professor Terry Speed of the Department of Mathematics, University of Western Australia, gave a talk entitled *The use and misuse of probability in human affairs*. Examples from a number of fields such as the law, medical diagnosis, and nuclear reactor safety were given, and there was some consideration of

commentaries from a number of authors such as J. Bernoulli (1713), C. S. Peirce (1878), and J. M. Keynes (1921) on this topic.

September Meeting

This was held on Tuesday, 6th September. Graham Hopper, of the Department of Mathematics, W.A.I.T., gave a talk entitled *Teaching statistics to ardent non-statisticians*. He considered ways of attempting to make statistics more meaningful, and hence more palatable, to students in Service units who are not accustomed to step-wise thinking (logic?). He gave, en route, some illustrations of concepts such as confidence intervals and sampling distributions, together with examples of traps for the unwary, which might be of use in more rigorous units.

October Meeting

This was held on Wednesday, 5th October. Piet Roes, of the University of Technology, Delft, The Netherlands, gave a talk entitled *A distribution-free confidence region for the common point of intersection of N straight lines*. In enzyme kinetics, the steady-state velocity v and the substrate concentration s are related by the Michaelis-Menten equation $v = Vs/(K+s)$, when V and K are unknown parameters. If one has a number of observations of the velocities $v(i)$ at various concentrations $s(i)$, a confidence region for (V, K) can be derived. The generalization to planes in 3-space does not appear to be straightforward.

CANBERRA BRANCH

KNIBBS LECTURE

The Knibbs Lecture was given by Professor D. R. Cox of Imperial College, London, who spoke on *Foundations of Statistical Inference: the Arguments for Eclecticism*. As with previous Knibbs Lectures, his talk will be included with discussion in a future issue of the *Australian Journal of Statistics*.

Professor Cox stated that he believed there was no all-embracing theory of inference. The problems encountered in statistics are so varied that they need different sorts of approaches; for example, problems may be either richly or poorly formulated. Professor Cox then discussed the role of foundations in inference; the importance of disagreements; the role of decision analysis in inference; importance of descriptive statistics and the role probability has in the specification of problems and the interpretation of statistics; and the importance of formulation in inference.

He also discussed the three main approaches to inference:

(i) Sampling Theory (of great practical use)

(ii) Likelihood (not all that useful in practice)
 (iii) Bayesian (of limited practical use)

He commented on each of the three approaches in turn as well as making comparative remarks.

Invited discussants were Professors Moran (Australian National University), Finch (Monash University) and Lewis (University of Hull).

CAUSALITY

Professor Clive Grainger addressed the Branch on Tuesday, 25 October, on the subject of *Testing for causality*. A definition of causation, suitable for both experimental and non-experimental situations, was suggested; this definition is in a time-series context. Professor Grainger discussed the strengths and possible weaknesses of the definition. Attention was then focussed on how to test actual data for causation. A number of alternative test procedures were outlined, including some indication of difficulties that might occur in their use. Professor Grainger illustrated the ideas presented with aggregate data relating advertising to consumption.

FORTHCOMING ISSUE OF THE *JOURNAL*

THE AUSTRALIAN JOURNAL OF STATISTICS

Volume 19, Number 2

August 1977

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STATISTICAL PUBLICATIONS

National Statistics

The following publications may be of particular interest to government statisticians:

Computing in National Statistical Services Beyond 1980
(United Nations Computing Research Centre, Bratislava)

This 81 page study group report of the Computing Research Centre, Bratislava, published in July last year, surveys the present problem areas in this field and looks ahead to the implications of new techniques and the changing role of national statistical services.

Conference of European Statisticians Seminar on Statistical Services in Ten Years Time
(United Nations Conference of European Statisticians, Geneva)

The papers in this seminar, held in Washington DC in March 1977, cover a wide range of topics and include some very interesting speculations relating to the organization and coordination of statistics and the management of data bases in the new technological environment.

New Journal - *Journal of Statistical Planning and Inference*

The *Journal of Statistical Planning and Inference* has been established to provide a common medium for the dissemination of significant information in all branches of statistical planning and related inference problems. The scope of the journal will encompass problems of handling or transmission of data and information.

The journal will publish applied and theoretical papers, short notes, survey articles, book reviews, announcements, summaries of research papers and proceedings of conferences. Among the many important subjects to be covered are: (a) All areas of application (b) Experimental design theory (c) Sampling theory (d) Combinatorial mathematics related to statistical planning (e) Information Theory (f) Computer oriented problems (g) Search theory and search design (h) Statistical inference, both parametric and distribution-free (i) Reliability.

The Editor-in-Chief is Prof. J. N. Srivastava, of the Department of Statistics, Colorado State University, Fort Collins, Colorado, 80523, USA.

SEASONAL ADJUSTMENT OF UNEMPLOYMENT FIGURES

Charles Aspden,
Australian Bureau of Statistics, Canberra

Within 18 months of the abrupt and massive increase in unemployment in late 1974 it became clear that the seasonal adjustment of the ABS unemployment statistics was deficient. Reverse or contra-seasonality became apparent with the seasonally high months becoming lows in the seasonally adjusted figures and vice versa. In this article I will attempt to describe the story of how a modified adjustment was developed for the ABS quarterly series of Labour Force Survey unemployment statistics.

Since 1966 the ABS has used the US Bureau of the Census Method II X-11Q seasonal adjustment program to seasonally adjust quarterly time series. The program has two model options - additive and multiplicative. The additive model is of the form

$$Y(t) = C(t) + S(t) + I(t),$$

where Y = original data, C = trend-cycle component, S = seasonal component, I = irregular component and t = time index.

This model is based on the assumption that the trend-cycle, seasonal and irregular components are independent of each other. The multiplicative model is of the form

$$Y(t) = C(t) \times S(t) \times I(t)$$

The irregular and seasonal components are assumed to be proportional to the trend-cycle in this model.

Neither model perfectly represents the behaviour of the unemployment series (nor indeed any major economic time series) but overall the multiplicative model comes closer. Prior to 1974 the adaptive nature of the seasonal estimation largely overcame the deficiencies in the multiplicative model giving a satisfactory seasonal adjustment.

In late 1974 the level of the series roughly tripled while the amplitude of the seasonal component just failed to double in size. The change was too sudden and too great for X-11Q to adapt quickly enough to the new proportional relationship between the seasonal and trend-cycle components. Consequently the seasonally adjusted figures began to display a seasonality which was the reverse of the original series. This reverse seasonality in the adjusted figures had become clearly apparent by mid-1976 and it prompted a review of the method of adjustment.

If the series continued to be adjusted as they had been prior to 1975 with just a straight X-11Q run (including a few prior corrections for changes in definition) on all the data from 1964 then it would take at least three years for X-11Q to adapt to such a large change in the seasonal pattern, and during those transition years the adjustment would be inadequate. An alternative was to

ignore the pre-1975 data and just analyse post-1975 figures. This would have the advantage of not having an adaptation period but the seasonal estimates would suffer from low reliability until sufficient observations were available, say five years (end of 1979).

The third alternative, a switch over to an additive adjustment, was rejected on the grounds that the seasonal amplitude had increased markedly during late 1974, and the additive model had proved to be less appropriate than the multiplicative model in the past.

Fortunately, other than the change in ratio of seasonal amplitude to the trend-cycle, no substantial change in the seasonality was apparent. That meant only one seasonal parameter needed to be estimated, not three (for a quarterly series), with a large reduction in the number of observations required to get a reliable estimate.

One approach to quantifying the change in the ratio is to estimate the level of the trend-cycle at which its ratio to the post-1975 seasonal amplitude is the same as the ratio prior to 1975, i.e.

$$(S/C)(pre\ 1975) = S/(C-k) (post\ 1975)$$

A least squares estimate k^* of k minimizes the function

$$(1) \quad \sum [(Y(t) - k)/S(t) - (C(t) - k)]^2$$

and gives

$$(2) \quad k^* = \frac{\sum Y(t)[1 - S(t)]/S(t)^2 - \sum C(t)[1 - S(t)]/S(t)}{\sum [1 - S(t)]/S(t)^2}$$

where the sums run from $t = 1$ to 4 if the minimum span of data, a year, is used. However, any span of data greater than a year can be used; at August 1976 six observations at the new level were available and (1) and (2) were modified to give the function

$$(3) \quad \sum W(t)[(Y(t) - k)/S(t) - (C(t) - k)]^2$$

which gives the value

$$(4) \quad k^* = \frac{\sum W(t)Y(t)[1 - S(t)]/S(t)^2 - \sum W(t)C(t)[1 - S(t)]/S(t)}{\sum W(t)[1 - S(t)]/S(t)^2}$$

where now the summation runs from $t = 1$ to 6 and $W(t) = 1$ for those quarters appearing once (i.e. $t = 3, 4$) and $1/2$ for those quarters appearing twice (i.e. $t = 1, 2, 5, 6$). The additive form of (3) is inconsistent with the multiplicative model but gives a more tractable solution than its multiplicative counterpart and should detract little from the result.

The X-11Q estimates of trend-cycle from 1975 appeared to contain seasonality and were inappropriate for use in (3). A linear approximation of the trend-cycle for February 1975 to May 1976 seemed reasonable so a straight line was fitted to the seasonally adjusted figures.

The value of k was estimated to be 130,000 for the series *Unemployed Persons Excluding 15-19 Year Olds Looking For Their First Job*, and could be subtracted

from post-1975 observations prior to seasonal adjustment and then added back again:

$$[Y(t) - k^q/S(t) + k^q]$$

Because it was preferred to continue the adjustment in the established manner, factors were calculated which could be applied to the original series prior to 1975, which would make the seasonality before and after end-1974 consistent:

$$\beta(t) = \frac{[Y(t) - k^q/S(t) + 2k^q + [Y(t+4) - k^q/S(t+4)] / [(Y(t)/S(t)) + (Y(t+4)/S(t+4))], t = 1, 2, 3, 4}{[Y(t) - k^q(1 - S(t))/Y(t)], t = 3, 4}$$

X-11Q could then be run on this prior corrected data.

Since the initial analysis using the modification in August 1976 more data have become available and k has been reestimated with values so close to the first estimates that it has been unnecessary to revise the seasonal correction factors. The modified seasonal adjustment of the last few years appears to be satisfactory. The relative stability of the series during 1975 and 1976 has given way to substantial growth in unemployment this year, which could lead to another change in the ratio of seasonal amplitude to trend-cycle.

STATISTICAL COMPUTING

INTERNATIONAL ASSOCIATION FORMED

The International Association for Statistical Computing (IASC) has recently been formed as a section of the International Statistical Institute (ISI). It will hold its inaugural meeting in conjunction with the ISI meeting at New Delhi in December. The following details are taken from the statutes of the Association.

The objectives of the Association shall be to promote the theory, methods, and practice of statistical computing, and to foster interest and knowledge in effective and efficient statistical computing through international contacts among statisticians, computing professionals, organisations, institutions, governments and the general public in different countries of the world.

The Association endeavours to accomplish its objectives by:

- (a) recommending and helping to arrange programmes of relevant meetings during sessions of the ISI;
- (b) organising international regional meetings, seminars, conferences, research and training programmes and theoretical or practical investigations, independently or in collaboration with other organisations;
- (c) assisting participants to attend meetings;
- (d) collaborating with international, national, regional

and other organisations and institutions having objectives similar to those of the Association;

- (e) promoting means for collaborative efforts;
- (f) fostering evaluations of statistical computing techniques and programs;
- (g) promoting and facilitating exchange of computer programs and their documentation;
- (h) publishing periodicals, reports and documents such as pamphlets, books, information circulars, independently or in cooperation with other organisations;
- (i) promoting means and methods of training individuals in sound and useful statistical procedures;
- (j) performing business transactions, undertaking or participating in cooperative activities and taking necessary actions for the promotion and advancement of the objectives of the Association.

The membership of the Association shall be open to individual members and institutional members, which may be educational and scientific institutions, government and non-profit organisations, business enterprises, etc.

Ordinary meetings of the Association shall be convened normally not less than once in two years, and, if possible, conjointly with each ordinary session of the ISI.

BACK ISSUES STILL WANTED

The Secretary/Treasurer, Mr K. R. W. Brewer, is grateful to the member who supplied back issues of the *Journal* in response to the request in the last issue of the *Newsletter*. Back issues are still needed urgently. In particular the following holdings are very depleted: Volume 5 No 3 (2 copies held), Volume 6 No 3 (1 copy held), Volume 7 No 1 (2 copies held), Volume 8 Nos 1 and 2 (1 copy held), Volume 9 No 1 (2 copies held), Volume 9 No 2 (1 copy held), Volume 9 No 3 (3 copies held) and Volume 12 No 1 (7 copies held).

At the moment the Society cannot offer copies of Volumes 5 - 9 to potential subscribers. Members who have copies of these issues for which they have little or no further use, or who have friends with such issues, would be doing the Society a good turn if they could have them sent to

Mr K. R. W. Brewer
ANU Survey Research Centre
P. O. Box 4
Canberra, ACT 2600

STATISTICAL EDUCATION

A COURSE ON NATIONAL STATISTICAL SYSTEMS

Hugh Mahon,

Canberra College of Advanced Education.

In their Dictionary of Statistical Terms, M. G. Kendall and W. R. Buckland define statistics as *numerical data relating to an aggregate of individuals or the science of collecting, analysing and interpreting such data*. Other well-known general purpose dictionaries give similar definitions.

In Australia, tertiary level courses on statistics have traditionally been concerned almost exclusively with techniques for analysing data, with particular emphasis upon methods of inference when dealing with stochastic material. Relatively little attention has been paid to the issues involved in large scale collections of official data. This is particularly surprising in the light of the important part which this data plays in the formation of major economic and political decisions and of the large number of people and the amount of resources devoted to the collection, assembly and presentation of this information.

The initial development of courses in statistics at the Canberra College of Advanced Education was based upon a philosophy of presenting material which would be vocationally oriented and concerned with application. Many College students are employed during or following their course by the Australian Bureau of Statistics, whose central office is almost adjacent to the College Campus. It was therefore most appropriate that issues arising in the development and operation of an official statistical service should be included.

These issues are covered in the College's one-semester unit Official Statistical Collections. (A more appropriate title, under consideration, is "National Statistical Systems".) This unit was originally offered as one of several optional components in the College's recently accredited eight unit Graduate Diploma course in Statistics. However, since its inception, a strong demand has been demonstrated by students wishing to undertake the unit alone or as part of undergraduate work in mathematics, statistics, computing or administration. A significant proportion of interested students have come from government departments and instrumentalities other than the Australian Bureau of Statistics.

It would not have been possible to design and mount the course without the substantial help which has been

received from Bureau officers. In particular, the encouragement received at an early stage from Mr E. K. Foreman and the syllabus structure designed by Mr R. W. Fergie were invaluable. Lectures on specific topics within the course and regular tutorial classes have been given by a number of senior officers of the ABS and agencies using official statistics. However, careful attention has been given to ensuring that the topics and treatment were relevant to national statistical systems in general rather than providing descriptions of Australian practice. The lecture notes are very complete and constitute what may become a useful text of some general interest.

The course consists of 42 hours of lectures and 10 three-hour tutorial sessions. Following a general introductory session the lecture programme is divided into :

Basic elements of government statistical services and information systems. Five lectures are devoted to a description of the nature of government statistics, the legislative basis and organization of basic facilities for a national statistical system, the standard-setting process and international standard-setting organisations.

Statistics as a process. Sixteen lectures cover:

- (a) the logical steps in a statistical programme - assessment of need, design, data collection, dissemination of results;
- (b) the concept of integration over time and across subject fields and the concept of statistical data bases;
- (c) estimation by analytic processes;
- (d) application of statistics to problem solving;
- (e) adaptation of system to user requirements and priorities;
- (f) generalized systems for collection, processing and presentation.

These topics are illustrated through a sequence of case studies to bring out the special characteristics of the operations of a national statistical system.

Statistics as a body of information. Nineteen lectures analyse the major subject matter fields insofar as they constitute conceptual systems. Thus economic statistics are examined against the framework of the UN *System of National Accounts* and the fields of demographic and social statistics are approached through UN *Towards a System of Social and Demographic Statistics*.

As a result of the encouraging response to the course from students it is proposed to re-offer the unit annually and the possibility of providing follow-up units in specific areas of national statistical systems is being explored.

STATISTICAL EDUCATION

RMIT POSTGRADUATE COURSE 1978 QUANTITATIVE METHODS

The Graduate Diploma in Quantitative Methods aims to present the theoretical foundations for application of quantitative techniques by professionally qualified engineers, scientists and others in industry and commerce.

RMIT also offers Graduate Diplomas in Applied Statistics and in Operations Research. Applicants must be graduates or diplomates in mathematics from a college of advanced education or a university.

For further information and application forms :

RMIT Admissions Office,
Building 1, 124 La Trobe Street, or
Box 2476V, GPO,
Melbourne, 3001.
Telephone: 341 2260/1

The closing date for admissions to these courses is 20 January, 1978.

THE AUSTRALIAN NATIONAL UNIVERSITY MASTER DEGREE IN STATISTICS

In 1978 the Department of Statistics, School of General Studies will offer a course work program leading to the degree of Master and suitable for qualified honours graduates from Arts, Economics or Science backgrounds. The program is designed primarily as further training for persons wishing to pursue careers as statisticians in industry or organisations such as the Australian Bureau of Statistics or CSIRO.

The eight-unit program may be undertaken on a full-time basis for one academic year or on a part-time basis involving two academic years.

Units available in 1978 include: Applied Probability, Case Studies, Experimental Design, Multivariate Analysis, Procurement and Analysis of Data, Time Series Analysis, Topics in Inference, Robust Estimation, Sample Surveys, Stochastic Models.

Applicants intending to study full-time are eligible to apply for postgraduate course awards offered by the Commonwealth Government or Australian National University Master Degree Scholarships.

Further particulars and application forms are obtainable from:

The Department of Statistics,
Faculty of Economics,
The Australian National University,
P.O. Box 4,
Canberra, ACT 2600.

THE AUSTRALIAN NATIONAL UNIVERSITY

FACULTY OF ECONOMICS

LECTURER/LECTURING FELLOW IN STATISTICS

Applications are invited for appointment as Lecturer or Lecturing Fellow in the Department of Statistics in the Faculty of Economics of the University. It is hoped that the appointee will take up duty by mid-July 1978.

Preference will be given to an applicant with research interests in statistical inference or biometrics, and possessing a knowledge of computer oriented statistical methodology.

Salary on appointment will be in accordance with qualifications and experience within the Lecturer/Lecturing Fellow range, \$14,632 - \$19,262 p.a.

Appointment as Lecturer is for three years in the first instance with possibility of reappointment, after review, to retiring age; Lecturing Fellow for three years in the first instance with possibility of reappointment for a further two years.

Reasonable travel expenses are paid and assistance with housing is provided for an appointee from outside Canberra. Superannuation benefits are available.

The University reserves the right not to make an appointment or to make an appointment by invitation at any time.

Prospective applicants should write for further particulars before applying to the undersigned, with whom applications close 16 DECEMBER 1977.

PO Box 4
Canberra ACT 2600

G.E. Dicker
Academic Registrar

SUBSCRIPTIONS

The *Newsletter* of the Statistical Society of Australia is supplied free to all members of the Society. Any others wishing to subscribe to the *Newsletter* may do so at an annual cost of A\$3.00 per year, for an issue of three numbers. Enquiries and subscriptions should be sent to:

K.R.W. Brewer,
Secretary/Treasurer, Statistical Society of Australia,
Survey Research Centre,
ANU, PO Box 4,
CANBERRA ACT 2600.

ASIAN STATISTICAL INSTITUTE NARROWS THE GAP

The problem of the communication gap between theoreticians and practitioners in the field of statistics (which was raised in the Canberra Branch's Panel Discussion on Statistical Training at their meeting of 28 June 1977), has been receiving much attention recently in international conferences.

Some positive recommendations on the problem were published in January this year in Occasional Paper No. 6 by the Asian Statistical Institute. This reports the proceedings of a two day discussion on communication and cooperation between theoreticians and practitioners in statistical and other fields belonging to twelve organisations in Tokyo. We have included the recommendations because we thought they may be of interest to many readers of the *Newsletter* who would not have access to the Occasional Paper.

Curriculum in Statistics in Universities

The curriculum of university education in statistics should be gradually modified to make it more responsive to the requirements of practical work in the relevant fields. In the case of statistics, it was considered desirable that university education should cover not only the theoretical aspects of statistical analysis but should also emphasise data production aspects such as planning for data collection, data collection techniques and processing of data. Further, students should be exposed to practical problems, and both theory and methods should be explained with illustrations from real-life situations.

A balance in research work in universities should be achieved by encouraging the research scholars to work on theoretical as well as practical aspects of the problems. It was desirable to send some of the university staff to statistical offices on secondment with a view to exposing them to the types of problems faced in practice and also to familiarising them with the operational conditions under which statistical work was normally done.

Work of Statistical Offices

In-service training should be organised and conducted for the professional staff of the statistical offices by applied statisticians and theoreticians for providing an understanding of the framework within which the statistical personnel operated. This training should also furnish the necessary conceptual and theoretical background which might enable the staff to formulate their problems and to communicate with applied statisticians and theoreticians.

A spirit of research should be introduced in the statistical offices by setting up one or more applied research cells and by assigning or recruiting qualified staff to work in these cells. The staff of these cells should be given freedom to (i) work on methodological problems which might have relevance to present or future work of the statistical offices; (ii) publish their results in established journals; and (iii) attend seminars,

professional meetings, etc.

The statistical offices should seek the cooperation of non-official theoreticians and subject matter specialists by inviting them to participate in their standing committees on a continuing basis so that the practitioners could get the benefit of the knowledge of the theoreticians and the subject matter specialists and the latter could get acquainted with the practical limitations and difficulties involved in statistical work of data collection, analysis and interpretation.

Broad-based Consultations

Since the development efforts are ultimately meant for the improvement of the lot of the common man, he should be involved in the planning process from the very outset. It was important that all factors relevant to the development efforts should be discussed by theoreticians, practitioners, policy makers and representatives of the public to ensure involvement of a broad base and subsequent wider acceptance. Commencement of the process of consultation from the grass-roots level was highly recommended so that the development efforts could really reflect the conditions and the aspirations at that level.

There should be forums at the local, national, regional and international levels where theoreticians and practitioners could meet and discuss freely and frankly the problems involved, taking into account the limitations and potentialities of theory and methods and also the operational conditions under which the practical work has to be done.

Collaboration between the United Nations Statistical Office and the United Nations Specialised Agencies, which were mainly engaged in promoting data collection and compilation, and the International Statistical Institute and its Sections, whose membership mainly consisted of theoreticians, would be fruitful in bringing the theoreticians and practitioners together for the development of statistics. International statistical institutes have been performing a very useful service in promoting statistical training in applied fields. These activities need to be strengthened.

Publication of Theoretical and Applied Research Work

Professional journals should review and modify their editorial policy to encourage publication of practical results of methodological interest and formulation of practical problems for possible solution by theoreticians. Further, the editorial boards and referee panels should be enlarged to include practitioners and subject matter specialists to ensure publication of papers with a practical bias.

To promote better communication between theoreticians and practitioners, subject matter dictionaries should be prepared and published explaining not only the meaning of the terms involved but also the relevant concepts, theories and procedures.

CONFERENCES

EIGHTH CONFERENCE ON STOCHASTIC PROCESSES AND THEIR APPLICATIONS

6 - 10 JULY 1978

The Eighth SPA Conference is to be held at the Australian National University (ANU) Canberra, Australia in conjunction with the Fourth Australian Statistical Conference (11 - 14 July 1978) of the Statistical Society of Australia, details of which are given below.

The Conference will be held under the auspices of the Committee for Conferences on Stochastic Processes (CCSP) of the ISI's Bernoulli Society for Mathematical Statistics and Probability. It is sponsored by

THE AUSTRALIAN ACADEMY OF SCIENCE

and cosponsored by

THE AUSTRALIAN MATHEMATICAL SOCIETY

THE AUSTRALIAN SOCIETY OF OPERATIONS

RESEARCH

THE STATISTICAL SOCIETY OF AUSTRALIA

OBJECTIVE

The intention of the SPA Conference is to promote the understanding and use of stochastic processes by bringing together experts in both the theory and the application of stochastic techniques in modelling real world phenomena.

PROGRAMME

The SPA Conference will be similar in format to the previous conferences in the series (Rochester USA (1971), Louvain Belgium (1972), Sheffield UK (1973), Toronto Canada (1974), Baltimore USA (1975), Tel Aviv Israel (1976) and Enschede Holland (1977)).

It will last from Thursday morning, July 6 until Monday afternoon, July 10. No sessions will be held on Sunday, July 9. The programme will feature invited speakers as well as providing sessions for contributed papers. A (tentative) list of invited speakers includes: A. A. Borovkov, J. Gani, E. J. Hannan, T. E. Harris, D. L. Iglehart, J. F. C. Kingman, K. Krickeberg, R. Leadbetter, P. A. W. Lewis, B. B. Mandelbrot, R. Pyke, Yu. A. Rozanov, V. V. Sazonov, E. Seneta, D. Vere-Jones.

CONTRIBUTED PAPERS

Those wishing to present contributed papers should submit a title and abstract before March 31, 1978. The abstract should be of no more than a single page, complete with references, and must carry the author's name and affiliation. Abstracts will be reproduced and distributed to participants at the conference. They will subsequently be published in *Advances in Applied Probability*. It is anticipated that each contributed paper will be allocated 20 minutes including discussion.

ACCOMMODATION

College accommodation is available on the ANU campus within a very short distance of the venue. This consists of single rooms with shared bathroom and toilet facilities (\$A18 per day for full board (3 meals)). There are also several motels near ANU and within walking distance of the venue. The centre of Canberra City is also within convenient walking distance of the venue. Meals for non-residents will be available at the colleges.

SOCIAL EVENTS

A comprehensive social programme is planned together with an excursion on Sunday, 9 July. A reception will be held at the Academy of Science on Thursday, 6 July and a Conference Dinner at Bruce Hall, one of the ANU Colleges, on Saturday, 8 July.

REGISTRATION

The registration fee for the SPA Conference is \$A50 (\$A20 for students). Alternatively registration will be available for this conference on a daily basis (\$A10 per day) for those who do not wish to participate for the full period. Registrants who pay the full SPA rate will be offered a reduced registration fee of \$A10 for the Australian Statistical Conference. Those attending the Australian Statistical Conference but not the SPA Conference will pay a fee of \$A30.

SECOND CIRCULAR

Further details concerning the conference and registration forms will be provided in the second circular which will appear by February 28.

All those who plan to attend the conference, who wish to reserve accommodation on the campus, who wish to present a contributed paper or who wish to receive further information about the conference should write to:

Dr C. C. Heyde
Conference Organiser, Eighth SPA Conference
CSIRO Division of Mathematics and Statistics
P. O. Box 1965
Canberra City, ACT 2601, Australia.

FOURTH AUSTRALIAN STATISTICAL CONFERENCE

11 - 14 JULY 1978

The Fourth Australian Statistical Conference of the Statistical Society of Australia is to be held at the Australian National University Canberra. The conference will be immediately preceded by the Eighth Conference on Stochastic Processes and Their Applications which will take place on 6 - 10 July, 1978 at the same venue.

CONFERENCES

PROGRAMME

The Australian Statistical Conference will be a meeting of broad spectrum, similar in format to its predecessor held in Melbourne in August 1976. It will feature invited speakers and provide sessions for contributed papers on a wide variety of statistical topics. The conference will be held in conjunction with the Annual Conference of the CSIRO Division of Mathematics and Statistics.

CONTRIBUTED PAPERS

Those wishing to present contributed papers should present a title and abstract before April 30, 1978. The abstract should be of no more than two pages, complete with references and must carry the author's name and affiliation. Abstracts will be reproduced and distributed to participants at the conference.

ACCOMMODATION

College accommodation (single rooms with shared bathroom facilities) will be available at \$18 per day. Details are as for the SPA Conference above.

SOCIAL EVENTS

Various social events are planned. A Conference Dinner will be held on Wednesday, 12 July and an excursion on the afternoon of Thursday, 13 July.

REGISTRATION

The registration fee for the Australian Statistical Conference is \$30 (\$12 for students). A reduced registration fee of \$10 will be offered for registrants who have also registered for the SPA Conference.

Further details concerning the conference and registration forms will be provided in the second circular which will appear in March. Those wishing to receive the circular, or who plan to attend the conference or present a paper, should communicate with Dr C. C. Heyde at the address above.

FIRST AUSTRALASIAN MATHEMATICS CONVENTION

UNIVERSITY OF CANTERBURY

CHRISTCHURCH, N.Z.

15 MAY - 19 MAY, 1978

This conference contains a significant component of statistics and probability, with invited speakers including (as at August 1977) D. Griffiths (CSIRO), J.M. Hammersley, FRS (Oxford), D.V. Lindley (University College, London) and P.A.P. Moran, FRS (ANU).

Further information can be obtained from:

The Convention Secretary
Mathematics Department
University of Canterbury
Christchurch, New Zealand

FOURTH AUSTRALIAN TRANSPORT RESEARCH FORUM

PERTH, 24 - 26 MAY, 1978

Details of this conference can be obtained from:

Gary Bettison
Organising Secretary, 4th ATRF,
Office of the Director-General of Transport,
Exchange House,
68 St. George's Terrace,
Perth, WA 6000

1977 JOINT CONFERENCE of CSIRO DIVISION OF MATHEMATICS AND STATISTICS and AUSTRALIAN REGION OF THE BIOMETRIC SOCIETY

This Conference was held at the Newcastle CAE on 29 August - 2 September 1977. Over 200 people participated, and the invited speakers included Prof. D. R. Cox and Dr A. M. Herzberg of Imperial College, London and Prof. D. R. Brillinger of the University of California at Berkeley.

A full account of the conference is given in the November issue of the *DMS Newsletter*, copies of which may be obtained from:

J. B. F. Field
DMS, CSIRO
Private Bag No.2,
Glen Osmond, SA 5064.

2ND CONFERENCE ON SAMPLE SURVEY THEORY AND PRACTICE

This was held in Melbourne on 28 - 30 September, 1977, under the sponsorship of the CSIRO Division of Mathematics and Statistics. There were 85 participants, of whom 50 were from CSIRO and the remainder from government departments, universities and other educational institutions, and industry. There were more than 20 papers presented on a wide variety of sampling problems, with an emphasis on practical case studies. A more detailed report is available in the November issue of the *DMS Newsletter*, copies of which may be obtained from the address above.

OVERSEAS CONFERENCES

41st Biennial Session of the International Statistical Institute (includes meetings of the Bernoulli Society for Mathematical Statistics and Probability and the International Association of Survey Statisticians), New Delhi, 5 - 15 December, 1977.

Information: C. R. Rao, Jawaharlal Nehru Professor, Indian Statistical Institute, 7, S.J.S. Sansanwal Marg, New Delhi 110029, INDIA. All correspondence regarding registration, accommodation, etc., should be addressed to V.R. Rao, Director, Central Statistical Organization, Sardar Patel Bhavan, Parliament St., New Delhi 110001, INDIA.

International Statistical Institute Seminar on Statistical Problems arising out of the World Fertility Survey, New Delhi, 16 December, 1977.

Information: C.R. Rao, address above.

International Conference on Optimization in Statistics, Bombay, India, 20 - 22 December.

Information: J.S. Rustagi, Dept. of Statistics, Ohio State University, Columbus Ohio 43210 USA.

International Statistical Institute, 42nd Biennial Session, Manila, 1979 (date to be specified). The programme for the 42nd Session will be established during the 41st Session. Members are invited to submit suggested topics to the respective programme chairmen.

I.S.I.: Professor P. A. P. Moran, Australian National University, Box 4, G.P.O. Canberra, ACT 2600.

Bernoulli Society: Professor J. Roy, Indian Statistical Institute, 203 Barrackpore Trunk Rd., Calcutta 35, India.

IASS: Professor M. R. Sampford, Department of Computational and Statistical Sciences, The University, P.O. Box 147, Liverpool L69 3BX, United Kingdom.

Fifth International Symposium on Multivariate Analysis, Pittsburgh, USA, 19 - 24 June, 1978.

Information: P.R. Krishnaiah, Dept. of Mathematics and Statistics, University of Pittsburgh, PA 15260, USA.

Institute of Statisticians Conference on Time Series Analysis, Cambridge, United Kingdom, 12 - 15 July, 1978.

Information: O. D. Anderson, 9 Ingham Grove, Lenton Gardens, Nottingham NG7 2LQ, United Kingdom.

American Statistical Association, 138th Annual Meeting, San Diego, California, 14 - 17 August, 1978.

Information: ASA, 806-15th Street, N.W., Washington D.C., 20005, USA

Institute of Mathematical Statistics, Annual Meeting, San Diego, California, 14 - 17 August 1978

Information: G. J. Resnikoff, Exec. Secretary IMS, Office of Graduate Studies, California State University, Hayward, Cal. 94542 USA

Bernoulli Society for Mathematical Statistics and Probability - European Regional Committee, 11th European Meeting of Statisticians, Oslo, Norway, 14 - 18 August, 1978.

Information: Professor E. Spjotvoll, Dept. of Math. and Statistics, Agricultural University of Norway, 1432 Aas-NHL, Norway.

COMPSTAT 1978, Third Symposium on Computational Statistics, Leyden, Netherlands, 21 - 25 August, 1978.

Information: COMPSTAT 1978, C/o Centraal Reken Instituut, Univ. of Leyden, Wassenaarseweg 80, Leyden, Netherlands.

United States Winter 1977 Econometric Society Meeting. The 1977 joint meeting with the American Economic Association will be held in New York City, from December 28 - 30, 1977, as part of the annual meetings of the Allied Social Sciences Associations.

American Statistical Association, 138th Annual Meeting, San Diego, CA, Town and Country Hotel, August 14 - 17, 1978.

Information: ASA, 806 15th St., N.W., Washington, D.C. 20005, USA.

Eighth Prague Conference on Information Theory, Statistical Decision Functions and Random Processes, Prague, 28 August - 1 September 1978.

Information: Eighth Prague Conference, IITA, Czechoslovak Academy of Sciences, 18076 Prague 8, Czechoslovakia.

Bolyai Janos Mathematical Society, Colloquium on Point Processes and Queueing Theory, Keszthely, Hungary, 4 - 8 September 1978.

Information: Dr J. Fritz, Mathematical Institute of the Hungarian Academy of Sciences, 1053 Budapest, Hungary.

Second International Ecological Congress - Satellite Programme In Statistical Ecology, Jerusalem, Israel, 10-16 September, 1978.

Information: Dr G. P. Patil, 318 Pond Laboratory, Pennsylvania State University, University Park, PA 16802, U.S.A.

Details of the following conferences may be obtained from:

The Deputy Secretary, Institute of Mathematics and Its Applications, Maitland House, Warrior Square, Southend-On-Sea, Essex, SS1 2YJ, U.K.

International Conference on Markov Decision Processes; University of Manchester, England, July 17 - 19, 1978.

International Conference on the Analysis and Optimisation of Stochastic Systems; University of Oxford, England; September 6 - 8, 1978.

VISITORS

The Editors are particularly keen to receive information on visitors with statistical expertise who are not at the Mathematics and Statistics groups of CSIRO or the Universities.

One of the main aims of this section is to enable institutions other than the principal host institutions to invite overseas visitors to spend some time with them. We would, however, ask that anyone wishing to issue such an invitation to a visitor do so in cooperation with the listed contact for enquiries; this will considerably ease the contact's task of coordinating the visit as a whole.

The details in this section are laid out in the order: visitor's name; visitor's home institution; whether accompanied or not; areas of interest; date of visit; host institution; name of contact at host institution.

Prof Gregory W. Bennett; University of Waterloo, Canada; ? ; multivariate statistics; February 1978 - April 1978; University of Adelaide; Prof A. T. James.

Prof Vasant P. Bhapkar; University of Kentucky; wife and children; statistics; January 1978 - December 1978; CSIRO DMS Canberra; Dr M. Westcott.

Dr Y. Chikuse; Radiation Effects Research Foundation, Hiroshima; unaccompanied; multivariate analysis; October 1977 - October 1978; CSIRO DMS Adelaide; Dr A.G. Constantine.

Prof R.M. Cormack; University of St Andrews; unaccompanied; statistics; February 1978 - April 1978; CSIRO DMS; Dr M. Westcott.

Prof F. Eicker; University of Dortmund; unaccompanied; mathematical statistics; October 1977 - November 1977; Australian National University; Prof P.A.P. Moran.

Prof G.H. Golub; Stanford; unaccompanied; computing science; January - February, 1978; CSIRO DMS Canberra and ANU; Dr R.L. Tweedie.

Dr J.M. Hammersley; University of Oxford; unaccompanied; probability, statistics; 15 April 1978 - 22 May 1978; CSIRO DMS and University of Canterbury; Dr M. Westcott, Prof G.M. Petersen.

Dr G. Nathan; Hebrew University of Jerusalem; wife and children; sample surveys; September 5 - December 3, 1977; ANU Survey Research Centre; Mr K.R.W. Brewer.

Dr J.A. Nelder; Rothamsted Experimental Station; wife; statistics, computing; 1 November - 3 December, 1977; CSIRO DMS; Dr M. Westcott.

Dr H.D. Patterson; University of Edinburgh; wife; experimental design; February - March, 1978; CSIRO DMS; Dr E. Williams.

Dr V.N. Reddy; Indian Institute of Management, Calcutta; wife; sample surveys; November 1977 - November 1978; CSIRO DMS Melbourne; Dr J.S. Maritz.

Prof A. Scott; University of Auckland; unaccompanied; sample surveys; November 1977 - December 1977; ANU Survey Research Centre; Mr K.R.W. Brewer.

Prof Galen R. Shorack; University of Washington; wife and children; probability theory; September 1977 - June 1978; CSIRO DMS Canberra and Australian National University; Dr C.C. Heyde.

Prof R.G. Stanton; University of Manitoba; unaccompanied; statistics and computing; July 1977-March 1978; CSIRO DMS Adelaide; Dr A.G. Constantine.

Mr P. Tuominen; University of Helsinki; unaccompanied; Markov Chain theory; July 1977 - July 1978; CSIRO DMS Canberra; Dr R.L. Tweedie.

Dr D.G. Watts; Queens University, Canada; unaccompanied; time series; June, 1978; CSIRO DMS; Dr M. Westcott.

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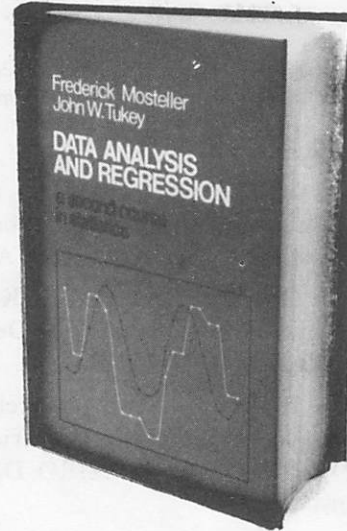
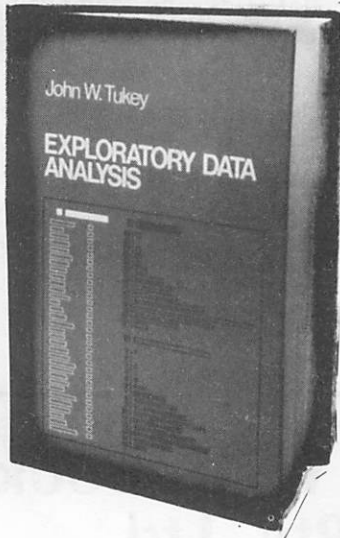
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