

statistical society of australia incorporated

newsletter

30 November 1996

number 77

PRESIDENT'S REPORT

Although a strength of our discipline is our involvement in a diverse range of workplaces and work situations, a consequence is consciousness on the part of myself and other executive members of the difficulty of gaining accurate awareness of the workplaces of all our members, and changes therein. For many of our members, the past months have been touched by uncertainty and turmoil; indeed over recent years uncertainty and change seem to have stalked many of the varied workplaces of our members: government departments, CSIRO, universities, businesses and industry, and semi-autonomous bodies. Because statistics interacts with so many other disciplines, so too are our members affected by many different workplaces.

Change can be good or bad, but it is never simple, and can act like a magnet for all sorts of accompanying baggage. Change for the bad often seems to come from the view that any change is better than no change, or from obsessive adherence to selected principles without regard to others and the overall picture. Good change seems to come from identification of purpose and opportunities, of what is working well to be built on or what needs change; from being practical and objective, with a eye on sensible timescales, the long and the short term; and from keeping the accompanying baggage as unfluffy as possible. So good change depends on good information, thorough

knowledge of the workplace and key aspects, but with reference to the whole picture. If these sound very like essentials of TQM, it is a reminder that it's a pity that there isn't more understanding and less lipservice to such essentials.

It has sometimes been difficult to even keep up with various CSIRO convolutions during the last seven years, and the irony of the occasional full circle is not lost on both observers and participants. That the standing of mathematics and statistics seems to have grown in stature and reputation through the turbulence is a tribute to the statisticians and mathematicians throughout the organisation. It is to be hoped that the feelings of opportunity within the latest changes, that were evident in conversations during SISC-96, will come to fruition.

Various convolutions have also been experienced in government and semi-government areas, both state and federal, but knowledge of these is more local. Shared knowledge of workplace changes is of value to our Society and collective professional knowledge, so please write in, keep us informed, about relevant aspects and changes in the workplaces you know. Changes in private industry/business workplaces are even less known, due to aspects such as localness, and/or involvement of smaller groups of statisticians, and the more private nature of private enterprise.

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I took the opportunity of "conferencing" in Sydney to ask colleagues about industry/business developments. It was no surprise to find that bureaucratic/administrative excess baggage is not restricted to the public domain. But one comment was of particular interest, namely that companies currently tend to divide into those who have truly absorbed the statistical quality management message so that it was now an integral part of their operation and they wanted more from statistics, and those who seemed to have absorbed almost nothing. My apologies to my colleague for not being able to quote exactly, but my interest arises from a similar divide in those we liaise with on student industry projects, employment of graduates and in consulting. For those who understand the value of mathematics and statistics, the value seems to have increased even more, particularly if enhanced by development of generic skills right throughout the student's quantitative development. In contrast, there are those who think they want an accountant to solve statistical management problems. Another point of interest is that in real problems, and in the minds of the practical problem-solvers, statistics' lot clearly lies with the mathematical sciences; there are no boundaries within the mathematical way of thinking in the eyes of real problem-solvers because it is the way of logic and objective analysis.

And so to universities in recent months. For those members who are wondering, yes, the turmoil is real for areas like mathematics and statistics because they do not tend to be areas, or associated with areas, favoured by university hierarchies; are often taken for granted; and frequently subjected to chips-on-shoulders attitudes, even if mathematicians and statisticians do need to rectify outreach and communication problems from poor past practices. Following suggestions, the National Committee for Mathematics in conjunction with the Australian Mathematical Sciences Council is asking for information

from all mathematics/statistics groups to try to get a clear overall picture of changes in recent years. Peter Kloedens has used an Australian mathematics email list to contact all departments to obtain information. If your group or department has not received this email, please contact me. Also of note is that FASTS held a national forum on 20 November entitled "Valuing Education: the case for mathematics and science".

Although many of the developments over the last decade in both the public and private domain, emphasizing accountability with clearer and more public identification of aims and achievements, have been for the good, the excess non-productive baggage that has grown around them, particularly in larger organisations, is not helping in coping with current challenges. Much of the excess baggage has its non-productive origins in excessive generalisation and extrapolation, in over-smoothing and over-modelling. The results are over-supply of structures, window-dressing, and reporting mechanisms; inappropriate applications of procedures, principles and training across completely different areas; and, unfortunately, more ways and more imaginative ways of diverting resources before they reach the frontline, the working end of the workplace.

Many of us have to hope that our near-political bosses, particularly in a challenging economic climate, will have the ability and the will to identify and separate the wheat from the chaff in reviewing past and recent change. What can we do? As individuals in dispersed and various workplaces, we can highlight the good that has come from change, but speak out about the bad, particularly because what sometimes seems commonsense to us is often logical and quantitative problem-solving and data-handling. As a Society we can be mutual support, and an information collecting point.

Helen MacGillivray

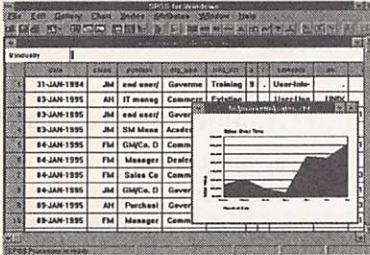
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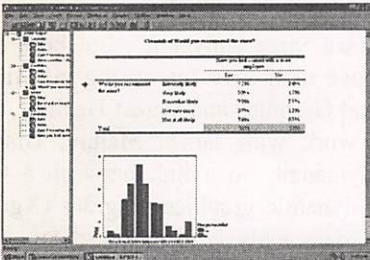
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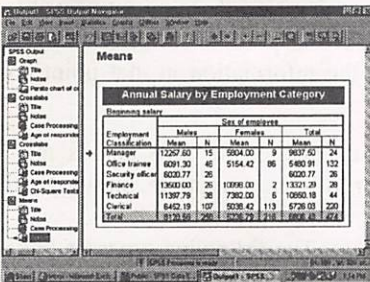
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BRANCH REPORTS

New South Wales

Methods for Estimating Patient Injury Caused by Health Care in Australia

Robert Gibberd from the Department of Statistics and Director of the Health Services Research Group at the University of Newcastle presented the lecture at the August meeting. His topic was "Methods for Estimating Patient Injury Caused by Health Care in Australia".

Robert first introduced the topic by giving the audience a brief run-down of what the Health Services Research Group does. They provide planning modules for acute care hospitals, resource allocation formulae for New South Wales and Queensland and quality modules that are not progressing very quickly according to Robert. The Quality in Australian Health Care Study that formed the basis of this talk was one such quality type activity.

The Quality in Australian Health Care Study was a large and expensive study to estimate the proportion of hospital admissions associated with an iatrogenic injury or adverse event (AE). It was designed in 1993, the data were collected during 1994 and cleaned by March 1995. Results were published in the *Medical Journal of Australia* in November 1995 (*MJA* 163, 458-471).

Much of the design and statistical analysis was carried out by the staff at the Health Services research Group while the reviewing of medical records in 28 hospitals was primarily overseen by R. Wilson and B. Harrison at Royal North Shore Hospital. The major findings indicated that 16.6% of admissions were associated with an AE and that 18/5% of the AE resulted in varying levels of permanent disability, including death.

In designing the study many statistical aspects needed to be considered and Robert's talk provided details of the approaches used. These included methods to estimate the appropriate sample size ($n=14,000$ medical records), the justification of a stratified, two stage cluster sample, with the first stage ($m=28$ hospitals) selected proportionally to their size, the use of SUDAAN software to determine the impact of the sampling design on the SS, the use of a screening tool to reduce the medical officer's time to review the records and the quality mechanisms to ensure the data were reliable/valid.

In the sample size estimation it was assumed that the proportion of admissions with AE was 3.5%, as found in a similar study in the United States, and that this rate varied from 2.8% to 4.2% between hospitals. The actual results gave a proportion of 16.6% ranging from 8% to 24% between hospitals giving a much larger SE than expected. Further investigation has found that the between hospital variation is greater for the young than the elderly.

Robert has suggested that the problem of AE cannot be tackled all at once and that priorities need to be set. One was of setting these priorities would be to target first those adverse events that are most common and that have the largest variance. He has also estimated that the

cost of additional bed-days as a result of these adverse events is around the \$1 billion mark!

The talk concluded with the reminder that the results of the study were significantly different to those anticipated before the study and hence there are many implications for the statistical design of future studies that attempt to monitor AE rates; retrospective record review is a reliable method to estimate patient injury; there needs to be more work on the between hospital variation; the implications for 'quality activities' are substantial and these is an advantage of targeting 'waste' and 'rework' rather than coming up with 'quality indicators'.

GIS, Spatial Statistical Graphics & Forest Health

The branch council was a bit concerned about the September meeting. Not the speaker, of course, but the fact that not only did the venue change to University of New South Wales but also it was on a Thursday night! Previously, meetings have only been on a Tuesday or Wednesday. We need not have worried. The quality of the speaker ensured we had a very good attendance of approximately 40 members and visitors.

Noel Cressie from Iowa State University, but born and bred in Fremantle, gave us a very interesting talk titled 'GIS, Spatial Statistical Graphics and Forest Health'. His talk described joint work with James Majure, Dianne Cook and Jeurgen Symanzik on a link between a GIS (Arcview 2.1) and a dynamic graphics program (Xgobi) to enable exploratory data analysis of spatial data. This 'link' makes it easy to link geography with dynamic graphics. For example, if you 'brush' an outlier in a graph the corresponding site will become highlighted on the geographical map enhancing the ability to resolve the question of why a particular point is so different by using knowledge of where the information in that point comes from.

Arcview is a standard package for GIS and is the next generation from Arcinfo. The linking technology, which communicates via remote procedure calls, was not available until Arcview. The following types of links are available: multivariate; variogram cloud using distance, and or $|z_1(s_1) - z_1(s_2)|^h$ calculations; spatial cumulative distribution function (SCDF). The SCDF is now the main focus at Iowa State and Noel was quick to stress that it is a statistic in its own right since it is a function of the data. Apparently there is some confusion in that some think it is a theoretical CDF.

Noel demonstrated the abilities of this linked software using the usual data set of Forest and Crown Health in Northeast United States. The goal in this example was to predict the SCDF of the crown defoliation index for small areas, look for associations, predict additional points and present results on the original scale.

After introducing the audience to the methods of exploratory data analysis used for the Forest and Crown Health data a video was played. The video showed us the truly interactive nature of the link between the software

and highlighted some very interesting patterns in the data. I must say, on behalf of the audience, that it was quite entertaining watching the speaker and the convenor trying to dim the lights in the lecture theatre. They did eventually succeed and the video playing went without a hitch. But I am sure I was not the only one who was kept in suspense during the video wondering whether the lights would go again at the end. There was a clear learning effect apparent. That is, once the convenor knew which button to press to turn the lights out he knew which to press to turn the lights on!

Noel finished his talk by identifying some current problems and future directions of their research. Currently, the model assumptions are not met. Explanatory variables are not deterministic and there is variation in the spatial determination variables. For example, we were shown a satellite image of an area that indicated the site of interest had no tree cover at all, whereas in reality the researchers new that it did otherwise the site would not have been chosen. There is continuing development of the Link with great emphasis being placed on inference.

The good news is that Xgobi is in the public domain and the bad news it that Arcview is not. But the following web site offers more information on the Link:
<http://www.gis.iastate.edu/Xgobi-AV2.html>

Special General Meeting

The October meeting was held back at the Women's College, Sydney University. This was a memorable meeting for two reasons. Firstly, a Special General Meeting was held prior to our usual lecture to vote on a proposed amendment to the Branch rules on subscriptions. The amendment was passed unanimously and should allow the Branch to save around \$10009 per year! Secondly, and possibly more importantly, it was the last meeting to be held at the women's College for the foreseeable future. The Branch has been very fortunate in having Ann Eyland, Past President of the NSW Branch, as Principal of the Women's College. Ann has now completed her time as Principal and will be moving on to other pastures in 1997. On behalf of the members of Council would like to extend a sincere thanks to Ann and the Women's College for always managing to accommodate our meetings. The structure of the program for 1997 has yet to be resolved but Council is always happy to receive suggestions on speakers, venues, formats or anything else you feel you would like to see. One definite aim for 1997 is to have one meeting out of the central Sydney area.

Exposure, Retention, Elimination and Effect

Now to our speaker for October, Geoffrey Berry from the Department of public Health and Community Medicine, University of Sydney who spoke on the topic 'Exposure, retention, elimination and effect'. A topic Geoffrey has been working on for a number of years but still feels that the conclusions leave more loose ends than were apparent at the start of the research!

The health effects of inhaled fibres are related to the intensity and duration of exposure and occur many years

(10 - 20) after exposure. Following exposure to asbestos the incidence of mesothelioma, a tumour in the chest, increases with time since exposure to a power of about 3.5. The dose responsible for disease is the amount that reaches and is retained at the target organ (the respirability), and the elimination of this over time (biopersistence). Differences in disease incidence between different types of fibre are related to respirability and biopersistence. For example, crocidolite asbestos is much more biopersistent than chrysotile asbestos, and has a much higher incidence of mesothelioma. The first two methods for estimating the incidence did not take into account biopersistence: the simple model by Nordling for continuous exposure and the more complex model proposed by Doll and Peto that allows for cumulative exposure. Elimination of fibres from the lungs can be incorporated into the model of mesothelioma incidence by including a negative exponential term. Epidemiological data on mesotheliomas after exposure do not discriminate between models with and without the elimination term during the collected range of data. This is not a problem if your are primarily interested in analysing the data collected to date implying that the simplest model is the most appropriate. On the other hand, if you are trying to extrapolate the simple model gives much higher predictions of incidence than the model allowing for elimination. Geoffrey produced other evidence to support the inclusion of the elimination rate in predictive models. There is not a lot around as most researchers in this field are getting too old to keep following up their data. This is some direct evidence that elimination does take place in rats and studies of lung burden on post mortem has shown that there is more asbestos in exposed lungs to unexposed lungs but there is a bigger overlap in lung burden of those without mesothelioma.

Man made mineral fibres, such as glass wool, are used as a substitute for asbestos and there is some concern on their safety. Early experiments involving injection of fibres whened that glass fibres and other mineral fibres produce tumours in rats. The experimental findings led to the initiation of large epidemiological studies in Europe and the USA. These studies have provided little evidence of mesotheliomas after exposure.

More recent animal experiments have shown a range of 100-fold in the dose required to produce mesotheliomas from durable to non-durable glass fibres. Short term animal inhalation experiments and in vitro studies have shown a similar range in biopersistence. Also glass fibres are much less durable than asbestos fibres.

Geoffrey concluded his talk by reminding us that the concept of elimination is very important in the classification of synthetic man-made fibres for their carcinogenic effect which it has been proposed should be based on dissolution rate, or a proxy for that rate. He also pointed out that there is an important distinction between rats and humans. The reduction in tumour rate with increasing rate of dissolution is greater in humans than rats. So aren't we the lucky ones!

Caro Badcock

Queensland

Analysis of Fear of Crime

Dr Doug MacTaggart, the State Under Treasurer, who was to have addressed the meeting, passed on his apologies that he had to cancel at the last minute due to pressing government business.

We were fortunate that Peta Frampton, a senior statistician at the Government Statistician's Office, kindly offered to step in. She gave an informative talk on an analysis of data taken from the 1991 Queensland Crime Victims Survey.

The objective of the analysis was to develop an empirical model to explain fear of crime within the community. The 1991 survey had rendered a sizeable data set (which is progressively being made publicly available) drawn from household information concerning personal experience of nine types of property offence, using a randomly selected member of the household. In particular, the survey involved 6315 people, of whom 876 identified themselves as being victims of personal offences. Peta outlined the stratification imposed to take a multi-step sample based on the Australian Bureau of Statistics Monthly Labour Force Survey, with comment on procedures for clustering in metropolitan and rural areas.

A major difficulty in the whole process was to define 'fear of crime'. It was decided to base this on perceptions of personal safety in the area of domicile after dark, although it was admitted that this might not be entirely appropriate when referring to fear of crime actually *in* the home. Ordinal outcomes were used, ranging from 'very safe' to 'not at all safe'. Explanatory variables were grouped into three broad categories:

- vulnerability (age, gender, income, education level),
- environmental (neighbourhood cohesion, incivility) and,
- experience with crime (perceived likelihood of being a victim, previous criminal experience, perception of prevalence of crime in the neighbourhood)

The analysis took the steps of exploratory data analysis, identification of the dependent variables, collapse of categorical explanatory variables to create a parsimonious model, use of proxy and derived variables, procedures to determine the inclusion or not of terms, and accounting for observations having different weights. Some discussion on GLM methodology was made.

Peta demonstrated how the model could pick out factors leading to fear of crime and the effect of sequential changes of the variables' values on the level of fear.

Rodney Wolff

South Australia

The 1996 Population Census: Turning Numbers Into Information

Mr Peter Gardner, Deputy Commonwealth Statistician for South Australia, provided an insight into the various phases of the 1996 Census of Population and Housing.

Peter addressed the three basic phases involved in this massive undertaking, viz.

- The actual collection of raw information from people.
- The conversion of raw information into useable numbers.
- Turning these useable numbers into meaningful information.

Biographical: Peter Gardner was appointed to the position of South Australian Deputy Commonwealth Statistician in 1992. He fulfils the dual role of being State Government Statistician for South Australia. For the four years immediately prior to his South Australian appointment he was the Northern Territory Statistician. Born in South Australia in 1949 Peter joined the ABS as a cadet in 1974 and has dual degrees of Bachelor of Economics and Bachelor of Arts from the Australian National University majoring in Statistics and Economics. Prior to his appointment as CEO of the Darwin office Peter's career was mostly spent in the Canberra office of the ABS. During this time he was head of a number of major surveys including the Handicapped Persons Survey, the Family Survey and the Household Expenditure Survey unit. As well as having experience with Australian Censuses he helped the New Zealand Statistics office with the development of the 1986 New Zealand Census and visited Alaska during the 1990 US Census.

Sensitivity Analysis of Scoring Methods for Ordinal Regression

Ian Saunders of the CSIRO Division of Mathematics and Statistics, Adelaide spoke to the September Branch meeting on the sensitivity analysis of scoring methods for ordinal regression.

A common approach to research in the social sciences is the collection of data, by questionnaires, interviews or focus group discussion, which is in the form of ordinal responses. It is common for such data to be analysed as if it were interval data, with responses coded as 'scores' from 1 to 5. The use of such methods implicitly assumes that the intervals on the scale can be treated as equal.

To avoid making such an untestable assumption, workers such as McCullagh (1980) and Taguchi and Wu (1980) have suggested methods that do not depend on the values assigned to the ordinal scale. However, the results of Pettitt (1984) suggest that such methods will in fact give very similar conclusions to reassigning the scores to the different points on the ordinal scale. Experience in scientific and social science studies suggests that simple methods such as equally spaced scores are usually adequate to derive the major conclusions from data and are also less susceptible to introducing model-based artefacts into the conclusions. However, this experience is anecdotal and has not been formalised or tested.

The aim of the paper was to describe an approach to testing the acceptability of simple scoring methods and specifically to develop a diagnostic test to show when they are adequate. It is hoped that the conclusions are in a form that is accessible to social science researchers and readily applicable to their research.

Biographical: Ian Saunders is Project Leader for Quality Improvement in CSIRO's Division of Mathematics and Statistics. He has many years of experience as a consultant, teacher and researcher in Statistics and Quality Management. He was until recently the Queensland Government Professor of Quality Management in the Faculty of Business at QUT, where he led a research team that undertook major studies in the areas of leadership and quality management.

His particular areas of interest include Organisational Performance Measurement, Quality Management Assessment and Implementation, Leadership and the theory of sampling.

Gary Glonek

Canberra

Spatial Nutrient Analysis in the Baltic Sea

The first August meeting of the Branch was addressed by Åsa Danielsson of Linköping University in Sweden. She opened her talk by describing the Baltic Sea. Eight million people live around the shores of the Baltic, mainly in the south. The water is brackish, with salinity levels highest near Denmark, where the Baltic meets the salty North Sea. The main nutrients of interest in the Baltic are nitrogen and phosphorus. The levels of these nutrients has increased markedly since the beginning of the century, but the levels now appear to be more or less constant.

Some of the problems Åsa encountered when conducting her analyses included

- non normal distribution in the measurements
- censoring in the measurements, particularly when measurements fell below the detection limit
- lack of interval estimates (only point estimates were available) in earlier work
- seasonal variation in sites - parts of the sea freeze over in winter and certain sites are then unusable.

Åsa then described two aspects of her studies of the Baltic. The first was an investigation of the spatial properties of nutrient concentrations, using data from 65 sites around the Baltic.

Significant differences in nutrient concentration were found across the Baltic from east to west, which may be related to the dominant currents in the sea, which travel anticlockwise. There were no significant differences observed down the sea from north to south, but this may be because the sites were in a line down the middle of the sea. Åsa explained that old habits die hard in the positioning of sites - some sites had 50 years of data attached to them and the desire to maintain these collections meant that other sites which might give more useful data were not given serious consideration.

The second study was an application of cokriging to the spatial distribution of nutrients in the Gulf of Riga sediments. Sediment type and water depth were among the variables used to determine the spatial distribution of phosphate and nitrogen in the top 2 cm of sediment. Åsa's

analysis included initial principal components analysis on the covariates, calculation of variograms and cross-validation. In general, she found the concentration of nutrients to be higher in the middle of the Gulf.

The meeting was held on Census night, which possibly accounted for the smaller than usual attendance at the talk. However, many of those at the meeting went on to enjoy dinner with Åsa, and to discuss Censuses (Censi?) around the world.

Fuelling Controversy? Petrol Temperatures across Australia

A large crowd assembled for the second August Branch meeting which was addressed by Dr Mark Westcott of the Division of Mathematics and Statistics (DMS) in CSIRO. His talk was on a project undertaken by DMS for the Australian Institute of Petroleum (AIP). The motivation for the study was twofold:

- the value of petrol is by mass but it is sold by volume;
- excise on petrol is paid on volumes corrected to 15°C, but most other transactions take place at ambient temperature.

Initially DMS was contracted for a few weeks in early 1992 to produce a methodology for studying temperature variation across the entire petrol distribution system. Four years later, a final report was delivered to AIP, covering temperature variation only at the last part of the distribution system, namely deliveries and sales at the local petrol station. Production of the final report had involved

- two CSIRO divisions: DMS and the Division of Applied Physics
- Email Electronics, who designed sensors and software to measure petrol's temperature
- the ANU, who helped produce a sampling strategy from the nearly 9000 petrol stations in Australia
- an external Project Manager with expertise in the oil industry
- 600 Mbytes of data.

What AIP got for its money was essentially two numbers: 20.4 and 21.7. These are the national mean delivery and sale temperatures at service stations, and have standard errors attached. The report also gave state and territory means, and temperature-volume profiles, but these had no pre-assigned level of accuracy.

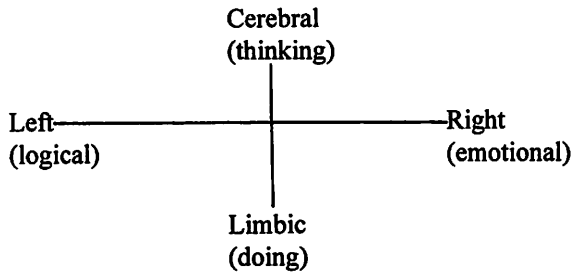
Mark's bonus at the end of the talk was a surefire recipe for saving money at the petrol pump. Buy petrol when the ambient temperature is at its lowest, just before dawn. Visit a petrol station which has not been visited for a while, so the petrol in the pump will be close to the ambient temperature. Finally, draw a small amount of petrol from each pump at the station, stopping before you reach petrol which has been sitting below ground. What you get could be up to 8 degrees colder than normal, hence saving you a massive 1% of your fuel costs . . . if you can find a service station prepared to serve you in this way!

Armed with this vital information, Branch members gathered for dinner at yet another randomly chosen Canberra restaurant.

Student Learning Styles: Implications for Them and Us

In October the Branch was addressed by Ms Marg Correll of the University of South Australia. She spoke on the different learning styles that students display, and how this might impact on the way statistics units in universities are taught.

Marg introduced two main classifications of learning styles. The first involved two intersecting scales:



Marg found that students enrolled in statistics units she taught were spread across all categories, except Left Cerebral.

The second, based on the famous Myers-Briggs personality type tests, consisted of a questionnaire which, when the responses are coded, placed learning styles onto 4 scales:

Active ----- Reflective
 Sensor ----- Intuitor
 Visual ----- Verbal
 Sequential ----- Global

Marg turned usual seminar presentation on its head by handing out copies of the questionnaire and getting the audience to do some work, filling in and coding the

responses to discover their own learning styles. Marg noted that the questionnaire is insightful for both staff and students, providing data that students can analyse during the semester, but it is not perfect. Responses are limited to two possibilities, which is restrictive, and some of the questions are rather ambiguous.

Nevertheless, application of the questionnaire to staff and students both in Australia and America shows that academics tend to be intuitors, while students tend to be sensors. Many students are visual learners, while most teaching is verbal. Lectures (still the usual mode of delivery of statistics units) are a passive mode of learning that addresses neither active nor reflective learning styles. Finally, academics are usually sequential learners, and there is a real danger that the small number of global learners are stranded by the university system.

Marg's main proposal to address the mismatch was to make teaching more visual - charts, diagrams, even videos and computer-assisted learning could be included in classes. Marg also advocated the use of small groups to allow more learning styles to be exercised within one class.

Finally, Marg drew our attention to a book describing people as either adaptors (precise, disciplined, efficient) or innovators (abrasive, dynamic, easily bored). It appears that most academics are adaptors, not innovators, and Marg left us with the question "Who will innovate in universities?"

With this question to ponder, members went on to dine at one of the Branch's favourite Canberra restaurants.

Alice Richardson

SPECIAL INTEREST SECTIONS

Medical Section

Hierarchical Modelling in Epidemiological Data Analysis

The Medical Statistics section of the Statistical Society of Australia is organizing a two-day workshop to be held at the University of Melbourne, 18-19th February 1997. The workshop will focus on applications of the ideas of hierarchical (or "multilevel") modelling in epidemiology. This is currently a very active area of research across a wide range of applications, offering the scope to model variation at different levels in complex data structures in such a way that the different sources of variation can be better understood and controlled for. For example, hierarchical models for longitudinal data enable clear separation between factors that operate at the individual level and factors that cause change over time within individuals.

The workshop will present an overview of the field and a number of case studies, but will not be a formal course. We aim to encourage informal discussion around presentations of data and work-in-progress. A leading contributor will be Dr John Witte, Department of Epidemiology and Biostatistics, Case Western Reserve University, Cleveland, Ohio, who will be visiting the University of Melbourne in January and February 1997. John has broad interests in epidemiology and especially in the application of hierarchical models to complicated data structures that often arise in modern epidemiological studies, in particular in genetic epidemiology (current project: estimating mutation-specific relative risks for breast cancer in carriers of the BRCA1 gene) and nutritional epidemiology (disease risks having a multifactorial dependence on nutrients found in multiple food items). Other contributors to the workshop will discuss other topics in these areas of application and also related approaches to the analysis of longitudinal data.

PROGRAM OUTLINE

Tuesday 18 February

am: Overview of multilevel/hierarchical modelling
pm: Applications in longitudinal analysis

Wednesday 19 February

am: Applications in genetic epidemiology
pm: Applications in nutritional epidemiology

ENQUIRIES: John Carlin (j.carlin@medicine.unimelb.edu.au; tel. 03 9345 6362; fax 03 9345 6000) or John Hopper (john@atr1.medrmh.unimelb.edu.au; tel. 03 9344 4017; fax 03 9344 7014).

We are especially keen to hear from people who would like to present work related to the theme of the workshop.

Young Statisticians

Workshop for Australia's Young Statisticians 1996

On the afternoon of Wednesday 2 October, about 55 Young Statisticians and 5 invited speakers gathered at the Charles Sturt University campus in Wagga Wagga for the sixth Workshop for Australia's Young Statisticians (WAYS96). Over the next two days, 37 Young Statisticians presented 15-20 minute talks on a variety of subjects, from the effects of gonadectomy on growing rats, to modelling electricity peak demand. The majority of Young Statisticians travelled from New South Wales, Victoria and Canberra. Only one Young Statistician from each of Western Australia, Queensland and New Zealand attended. (Yes, the invitation to attend WAYS96 was extended to our New Zealand colleagues).



Young Statisticians gather in Wagga

The invited speakers: Mr Woh Choo, NRMA Insurance, Sydney; Mr Ross Cunningham, Statistical Consulting Unit, Australian National University, Canberra; Ms Marg Correll, University of South Australia, Adelaide; Dr Brian Cullis, Agricultural Research Institute, Wagga Wagga; and Mr Paul Livingstone, CSIRO DMS, Melbourne, all gave enlightening and motivating talks.

Prizes were awarded to the best and runner-up talks in each of two categories: newcomer Young Statistician (attending WAYS for first time) and repeat Young Statistician (has attended previous WAYS). SIR Australia donated \$500.00 in cash and two latest release MINITAB statistical software packages, one for Macintosh and one for Windows. Jacaranda Wiley donated two statistics books. The winners of these prizes were:

Newcomer YS Best: Tim Higgins of ANU; Prize: \$150.00 and MINITAB for Windows "Least squares regression of mortality data (French & Dutch data)"
Runnerup: Bircan Erbas of Uni of Melbourne; Prize: \$100.00 and MINITAB for Mac "The effects of Gonadectomy on Bone Size Mass, Areal and Volumetric Bone Density in growing male and female rats"

Repeat YS Best: Petra Kuhnert of CSIRO DMS, Sydney; Prize: \$150.00 and a book "Monitoring Foetal Health"
Runnerup: Phil Dransfield of NRMA Insurance, Sydney; Prize: \$100.00 and a book "Who to work for: PS or non-PS"

There were also several joke awards, the prizes being a lolly. These included: the bravery beyond the call of duty award to David Bourne of AGB McNair in Sydney, for telling a room full of ABS employees how to run a telephone survey; the best metaphor award to Ed Bosworth of Westpac in Sydney, for explaining capital allocation for credit risk by analogy to drug dealing; and the best cop out award to Phil Dransfield of NRMA Insurance in Wollongong whose final comment in his talk (see above) was "PS or non-PS - it's up to you!!"

With a couple of hours of free time on the Thursday afternoon, many participants headed off to sample the products of the Charles Sturt Winery, while others spent the time to recover from the previous night's activities. We feasted on scrumptious Indian cuisine at the dinner on Thursday night. These activities provided the opportunity to converse with other Young Statisticians and the guest speakers at an informal level.

The workshop was very successful, thanks to organisers Damian Collins and Colin Sharp and all of the Young Statisticians who attended. WAYS97 is planned to be held in Victoria.

Melissa Dobbie

What's happening in the Young Statisticians section?

WAYS in Wagga Wagga was the sixth annual workshop for young statisticians (YS). The YS section of the society was formed about two years ago and I have been acting section chair for the last three months (since SISC-96).

One aspect of WAYS '96 which Melissa did not mention was that we made it into the local TV news (WIN). One invited speaker (Ross Cunningham, ANU) and one young statistician (Bevan Henderson, NRMA) were interviewed, the introduction to the item including "Australia's top statisticians have gathered in Wagga this week...!"

The future of YS section was discussed a number of times during the workshop, at both a formal and informal level. A major development was the nomination of a new section chair - Phil Dransfield from NRMA Insurance in Sydney. It was also agreed that the YS section should have a committee/council to assist the chair and we decided that the best format for this would be to have a YS representative in each state.

Currently we have state reps for NSW (Susan Hoffmann, NATA), Victoria (Michael Kunkler, Insureware and Bircan Erbas, University of Melbourne), ACT (Anna Poskitt, ANU) and WA (Jason Boland, Data Analysis Australia). We are still seeking volunteers from Queensland, SA, NT and Tasmania.

It is hoped that the YS representatives will not only promote contact within the community of young statisticians in their state, but will also "stay in touch with" their local branch of the society. For example, I have been nominated to be a member of the NSW branch council for 1997. As section chair Phil will maintain contact with the (national) central council of the SSAI.

We are planning to compile a database of young statisticians and possibly conduct a survey of them. Other issues of interest to YS which we will be working on are statistical education, job prospects for recent graduates and accreditation. We also hope to communicate more closely those who work in related fields such as econometricians, demographers.

A primary concern of those working with the YS section is ensuring that young statisticians hear about the section, WAYS, etc. The most difficult people to establish contact with are those working in the private sector - i.e. they need to "hear about it" before graduating from University. So, we are hoping to improve contact with student statisticians and will be seeking the assistance of our more experienced colleagues working in academia to help "spread the word".

The next WAYS will be held in Melbourne on 1-3 October 1997. We are currently compiling an organising committee, starting with the two state reps for Victoria, and seeking an appropriate (willing?) venue. It has also been suggested that the "A" in WAYS be changed to "Australasian" - to encourage more delegates from New Zealand, Papua New Guinea, Hong Kong, etc.

In addition to the annual workshop, we are also planning to hold smaller, less formal gatherings of YS, either within a city or as part of larger conferences. For example, a YS lunch was held on the last day of SISC-96 and was attended by 32 statisticians from six states of Australia, New Zealand and the USA.

As you can tell, we have lots of ideas and plans and now need lots of assistance to bring them to fruition. So if you would like to be involved in any of the activities I've mentioned, would like to contact (or be!) the YS rep in your state or if you just have comments and suggestions, please contact:

Phil Dransfield	Phone: (02) 9292 1531
NRMA Insurance	E-mail: irsdept5@magna.com.au
or	
Susan Hoffmann	Phone: (02) 9736 8295
NATA Australia	E-mail: shoffmnn@nata.asn.au

We would also encourage those who have access to e-mail to join the 'youngstats' mailing list, which currently has over seventy subscribers.

Join by sending a message to:
 listproc@maths.anu.edu.au
 with no subject and the one-line message:
 subscribe youngstats <your name>

Finally, on behalf of all the present and future members of the YS section, I would like to thank four people who were instrumental in the establishment of the section and the running of previous workshops - Paul Livingstone (the

only person I know who has attended all six WAYS!), Melissa Dobbie, Kathy Ruggiero and Angela Reid.

Susan Hoffmann

Survey and Management Section

Ken Foreman Lecture

The Ken Foreman Lecture, a joint lecture between the Australian Bureau of Statistics and the Statistical Society, was instituted in 1996 to commemorate Ken's very substantial contribution to survey methodology in Australia. The inaugural lecture was given by the Australian Statistician, Bill McLennan, as part of the Sydney International Statistical Congress in July this year, and it is intended that in those years coinciding with the running of the biennial Australian Statistical Conference, the lecture will be included in the conference program.

In the intervening years, the lecture will be held in Canberra, on a date around the middle of the year. For 1997, Professor James Durbin will be presenting the lecture in early April. Professor Durbin will be visiting Australia for the first two weeks of April, and will spend

some time with the ABS in Canberra, following on from a visit to New Zealand.

Moves towards a Swiss Center for Research on Survey Methods

The Swiss Federal Statistical Office (SFSO), will be establishing its headquarters in Neuchatel in 1998, and is taking the opportunity to improve statistical research on methodological issues associated with official statistics. A chair in applied statistics is being established on a joint basis between SFSO and the University of Neuchatel. This is the first step towards developing a joint SFSO/University Center for Research on Survey Methods. Applications for the position of Professor of Applied Statistics are currently being called for, with further information available from Professor F. Hainard, Faculty of Laws and Economics, University of Neuchatel. The formation of this centre will be another boost in the research capacity on survey methods, and will be a development to be watched with interest by those in this field.

Susan Linacre

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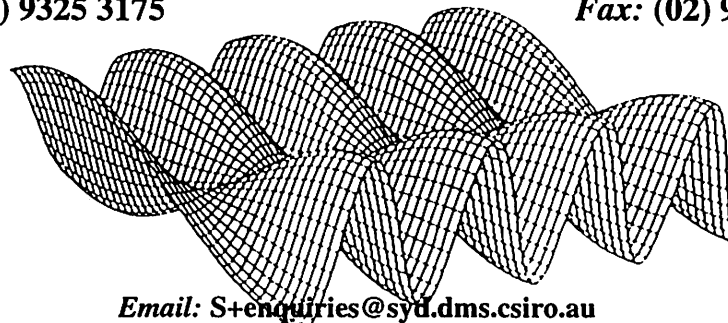
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CONFERENCE REPORTS

Workshop on Time Series Analysis and Applications

This is a report on a workshop held by the Queensland Branch on Tuesday, 2 July 1996. The Branch was fortunate to be addressed by a number of international experts on time series analysis, some who are local to Brisbane and others who detoured through Brisbane on their way to the Sydney Congress.

Professor Howell Tong and Dr Qiwei Yao (University of Kent at Canterbury, UK) tackled some difficult modelling problems posed by the (in)famous Canadian lynx data. These data, a series of 114 observations, have fascinated statisticians over the decades. Not least amongst those who contributed to their study, deriving path-breaking methodology in the process, was Australia's Pat Moran, who in 1953 conducted a Box-Jenkins analysis of the data before Box-Jenkins methods had been developed! On the log scale, Moran found no evidence of trend and a suitable fit of an autoregression to two lags.

However, he also noticed peculiar non-stationary behaviour in the variance of the residuals. His work was developed by Bartlett (1954), Hannan (1960), Campbell & Walker (1977) and Tong (1977), and the Canterbury group have maintained their interest ever since. Howell discussed limitations of linear modelling, as regards cycles, asymmetry, bimodality, non-linear regressions, reliability of prediction and non-Normality. Taking a biological perspective based on birth curves, he developed a threshold model which was more faithful to the data. He further applied SETAR models (Self Exciting Threshold AutoRegression) which were of his own creation. Qiwei went on to show that, depending on the choice of model selection criterion, the fitted model suggested either limit cycle behaviour or chaos, a curious and apparently unreconcilable choice. The audience were given a salutary lesson in model fitting when Qiwei indicated how simple features, such as autocorrelation plots and matching of moments of both the data and the fit, could betray fundamental weaknesses of a proposed model.

Dr Hamish McCallum (University of Queensland) is a mathematical biologist and his discussion centred on detecting chaos in ecology. He explored natural features which could seasonally force exploiter/victim interactions and thus lead to a chaotic system. He began with some classical models of insect populations and illustrated their broad range of deterministic behaviour, with examples taken from host/pathogen and predator/prey systems. Some aspects of parameter estimation in deterministic models were outlined. A curious result which Hamish observed was that Arctic species tend to display cyclic patterns in the population time series, whereas sub-Arctic populations appear to follow damped oscillations, stable limit cycles or occasionally chaos (such as in Nicholson's blowfly data). His direct analyses involved using various diagnostics for chaos as developed by ecologists, which supported his claim that ecological interactions have the

potential to generate chaos. He listed human diseases as other possible chaotic candidates.

Professor Tony Lawrance (University of Birmingham, UK) moved from data analytical applications to computational applications. Tony spoke on computer-generated random numbers, something which touches many wide and varied statistical applications, from a time series perspective.

After giving a brief overview of standard methods for generating pseudo-random numbers, he proposed a simple connection with an autoregression at lag one of uniform random variables and obtained a discrete error structure which would preserve stationarity properties of the series, and moreover which gave an apparently random scatter plot of the lagged variables. He commented on the curious property that this random series was completely deterministic when put into a reversed time order. When the discrete error structure was supported on a large (but finite) set, the behaviour of the resulting time series was almost chaotic. Tony's colourful displays helped to provide insight into what made non-random numbers random.

Professor Dominique Guègan (ENSAE, Paris, France) discussed some aspects of financial asset pricing, and the role of stochastic volatility plays in it. She presented the classical Black—Scholes formula as a model for asset price dynamics, but stressed that options traders do not try to predict the direction of the market, rather the volatility of the price. Based on different measures of volume (high/low/open/close), Dominique discussed how simple measures of variance computed from such statistics could be used to reference volatility. It turned out that the difference between the high and the low prices provided an optimal estimate. When considering conditional variances, Dominique showed the wide applicability of the so-called ARCH (AutoRegressive Conditional Heteroscedastic) models, particularly in relation to clustering, information about new arrivals into the system, volatility comovement between two systems, long memory and asymmetry.

Nevertheless, model identification was extremely problematic.

Dr Vo Anh (Queensland University of Technology) gave the final talk of the workshop which was on long range dependence (LRD) in air quality data. (Vo commented on a connection with Dominique's talk, in that LRD was quite possibly a cause of stochastic volatility.) Various examples of LRD were cited, such as in the Dow Jones index, Sydney ozone measurements, and texture data (which has applications in medical imaging). Vo discussed LRD in the frequency domain setting, noting that particular patterns of the spectrum (or equivalently the autocorrelations) betrayed evidence of LRD. Specifically, one examines the log periodogram for a singularity at the origin. By focusing on the joint distribution of the periodogram ordinates away from a small region of the

origin, Vo characterised the distribution of the periodogram, which in turn provided a basis for his analysis. He also discussed fractional differencing of autoregressions, thus providing a Box--Jenkins approach to the topic. Vo's findings were that there has been in fact a downward trend in air pollution levels in Sydney (possibly due to policies enforced by the Environmental Protection Agency) which standard inspections of time plots and the like would not reveal

Branch members joined the speakers afterwards at lunch in the winter sun at the City Gardens Cafe.

Rodney Wolff

Report from the Australian Subcommittee for the International Commission on Mathematical Instruction (ASICMI)

The Eighth International Congress on Mathematical Education (ICME) was held in Seville, Spain in July. According to the official list of participants there were 159 Australians in attendance. One highlight for Australia was the National Presentation sponsored by ASICMI and funded by The Australian Academy of Science and various mathematics and mathematics education organisations in Australia. The presentation consisted of an Introduction by Gilah Leder, who is a member of the ICMI Executive Committee; a segment based on a Powerpoint computer-generated 'slide show' including some quicktime movies, photos from the states involving students, and software screen dumps from significant multimedia projects; and a videotape prepared from the best video material of Australian projects which we could obtain before the Congress. Jeff Baxter and Jane Watson were in charge of preparing and presenting the program. The feedback from those who spoke to us was very positive. Several said it was the most impressive multimedia presentation at the

Congress; and those who saw the other two national presentations said Australia's was the most interesting and impressive. The video is now available for those who would like to use it in live presentations to groups to illustrate the work being done in mathematics education in Australia today.

As the National Representative for Australia, Jane Watson attended the General Assembly of ICMI which was held in conjunction with the Congress. While most of the 'business' was of a confirmatory and explanatory nature, there was some debate among the member countries about the status of the General Assembly in the decision-making process. The future of regional and full ICME congresses was discussed - the next ICME is in Japan in 2000.

The next significant conference held under the umbrella of ICMI will be a regional conference proposed for Korea, in 1998. At the moment the date that best suits the Korean organisers and venue is: August 17-21, 1998 at the Korean National University for Education in Cheongju, Cheongpu province (about 130 km from Seoul). The proposed theme of the conference is 'The Way Forward ... for Mathematics Education in East Asia' and the format will follow the recent ICMI model of plenary lectures, working groups, interest groups, plus a special symposium on 'Mathematics Education for Gifted and Talented Students'. More information on this conference will be passed on as it comes to hand in the coming months.

Jane Watson
Chair of ASICMI

ANNUAL GENERAL MEETINGS

Minutes of the Annual General Meeting of the Statistical Society of Australia Inc. (SSAI) held at 1 pm on Wednesday 10 July 1996 in the Sydney Room of the Sheraton-Wentworth Hotel Sydney.

1. **Attendance, Apologies and Proxies**
As per Attendance Book.
2. **Confirmation of the Minutes**
The minutes of the adjourned 1995 Annual General Meeting, held on 20 July, 1995 were confirmed (K. Basford/ A. Branford).
3. **Presentation of the Annual Report**
The Annual Report was presented by H. MacGillivray; it will also be published in the Society's Newsletter. The President referred to the stable state of the membership, the report of the Strategic Review into the Mathematical Sciences, and accreditation. The Report was accepted (A. Eyland/E. Brinkley).
4. **Presentation of the Treasurer's Report**
The audited financial report was presented by E. Brinkley. The Society is in a healthy state financially. Even though the audited report shows a loss over the past year the expected profit from SISC-96 will move this to a healthy surplus. The Treasurer suggested holding capitation fees for 1997 at the same level as 1996. The report was accepted (D. Griffiths/ A. Branford). A vote of thanks to the Auditor, D. Systrom, was moved from the Chair.
5. **Election of Section Chairs**
The following Section Chairs were elected unopposed:

Statistics in the Biological Sciences:	K. Basford
Industrial Statistics:	T. Dickinson and G. Robinson (joint chairs)
Statistics in the Medical Sciences:	J. Carlin
Statistical Computing:	A. Pettitt
Statistical Education:	P. Shaw
Survey & Management Statistics:	S. Linacre
Young Statisticians	S. Hoffmann.

The President noted that A. Pettitt had indicated that he wishes to stand down as Chair of the Statistical Computing Section. The Executive were having discussions with a possible successor during the conference.

A vote of thanks to all Section Chairs for their work over the past year was moved from the Chair. Special

mention was made of the work of Geoff Riley who was retiring as Chair of the Industrial Statistics Section.

6. **Appointment of signatories to operate accounts**
The following were appointed as signatories to the Society's accounts: E. Brinkley, D. Nicholls, G. van Halderen (secretary of the Canberra Branch) and A. Welsh.
7. **Accreditation**
The President gave a brief overview of the extensive discussion and consultation that was undertaken to prepare the model that was before the meeting. She thanked members who had provided feedback and had suggested word changes during the consultation process.

The Rule changes to allow the introduction of optional accreditation (with the correction of 'C.Sat.' to 'C.Stat.' in Rule 6A(5)) were put to the meeting (A. Welsh/A. Eyland) and passed with no votes registered against.

The President thanked all those who have been involved in the Accreditation process, especially Ron Sandland. The changes to the Regulations will be considered by the Central Council at its meeting on 11 July 1996.

8. **Any Other Business**
 - (a) The President reported on discussions with the New Zealand Statistical Association (NZSA). The Central Council of the Society voted unanimously on Sunday, 7 July to merge *The Australian Journal of Statistics* with *The New Zealand Statistician* to form *The Australia and New Zealand Journal of Statistics*. There have been extensive, constructive discussions of the practicalities of the merger with the NZSA Executive during the week of the Conference. Slight changes to the Rules of the Society relating to journal name and editorial structure will have to be put to a Special Meeting of the Society to allow the merger to go ahead.

The members present at the AGM expressed general support for the merger by a show of hands.

The President reported that the Central Council also voted unanimously to pursue the possibility of publishing the merged journal with a commercial publisher. At least one publisher has already approached the Society.

- (b) The President announced that Professor Des Nicholls had been elected as the new Vice-President and President-elect for the Society at the Central Council AGM and that Neville Weber was reappointed as Secretary.
She thanked Ron Sandland who was retiring from the

Society's Executive for his outstanding contribution for the Society over the past four years.

- (c) K. Basford raised the issue of the *Australian Journal of Statistics* being included in the *Science Citation Index*. I. James reported that the Journal was currently being assessed and that he hoped to receive the decision very soon. K. Basford also asked for the Society to consider closer links with the Australasian Biometrics Society.

- (d) There was a brief discussion of matters relating to the Journal including: optional subscription to the Journal; strengthening the applications section of the Journal; invited review papers in the Journal; including a 'Teachers Corner' in the Journal. I. James replied to some of the points raised indicating that members' subscriptions only partly support the cost of the Journal and that interesting application papers had been actively encouraged since this section of the journal was started. Any changes in editorial policy had to be commercially viable and take into account the international status of the Journal and service to members.

9. Date and place of the next meeting

The date and place of the 1997 Annual General Meeting will be publicised through the Newsletter and a formal notice will be sent to all Branch Secretaries.

The meeting closed at 1.40 p.m.

Minutes of the Annual General Meeting of the Australian Statistical Publishing Association Inc. (ASPAI) held on 10 July, 1996 at 1.40 pm in the Sydney Room of the Sheraton-Wentworth Hotel, Sydney.

1. Attendance, Apologies and Proxies

As per attendance book.

2. Confirmation of the Minutes

The minutes of the adjourned 1995 Annual General Meeting held on 20 July, 1995 were confirmed (A. Branford/R. Sandland).

3. Presentation of the Annual Editor's Report

The Annual Report of the Editor of *the Australian Journal of Statistics* was presented by I. James, and accepted (N. Weber/A. Branford).

The Editor thanked his editorial team. He noted that there was increasing pressure from Government for all journals to be assessed for inclusion in various research indices and so it was important for the Society's journal to maintain its status as an international research journal. The proposal to merge with 'The New Zealand Statistician' and to move to a commercial publisher should help improved the journal's status. He also referred to the possibility of electronic publishing in the near future.

The President, on behalf of the Newsletter Editors, encouraged all members to submit more news, letters and articles to the Newsletter.

4. Presentation of the Treasurer's Report

The audited financial statement was presented by E. Brinkley and was accepted (D. Griffiths/A. Branford).

5. Appointment of signatories to operate accounts

The following were appointed as signatories to the ASPAI accounts: E. Brinkley, D. Nicholls, G. van Halderen, and A. Welsh.

6. Any other business: Nil.

7. Date and place of the next meeting

The date and place of the 1997 Annual General Meeting will be the same as that for SSAI and will be publicised in the Newsletter.

The meeting closed at 1.55 p.m.

Neville Weber

AUSTRALASIAN CONFERENCES

CONFERENCE SUMMARY

Long-Range Dependence International Workshop, 28 - 30 January 1997, Queensland University of Technology, Brisbane.

Information: Barbara Firth by email, b.firth@fsc.qut.edu.au, tel. (07) 3864 1767 or fax (07) 3864 2310, or on <http://www.math.fsc.qut.edu.au/> (Further details in this issue.)

33rd Applied Mathematics Conference 1997, 2 - 6 February 1997, Erskine House Lorne, Victoria.

Information: AMC97, School of Computing and Mathematics, Deakin University, Geelong VIC 3217; email amc97@deakin.edu.au; fax (052) 272 028. (Further details in this issue.)

Australasian Biometrics Conference, 1-4 December 1997, Adelaide.

Information: Ari Verbyla, Department of Statistics, University of Adelaide, Adelaide SA 5005; tel. (08) 8303-3218; fax. (08) 8303-3696; e-mail biom97@maths.adelaide.edu.au. (Further details in this newsletter.)

APORS'97, Fourth Conference of the Association of Asian-Pacific Operational Research Societies within IFORS, 30 November - 4 December 1997, World Congress Centre, Melbourne, Victoria

Information: APORS97, c/o PR Conference Consultants Pty Ltd, PO Box 326, BALWYN VIC 3103, or Pam Richards, e-mail: APORS97@sci.monash.edu.au; tel. (03) 9816 9111; fax: (03) 9816 9287. (Further details in Newsletter 76 and this issue.)

14th Australian Statistical Congress, 6-10 July 1998, Jupiter's Casino, Gold Coast,

Information: Postal Address, ASC14, School of Mathematical Sciences, Queensland University of Technology, GPO Box 2434, Brisbane QLD 4001; Email, asc14@qut.edu.au; Facsimile, (07) 3864 2310 (Further details in this issue.)

Long Range Dependence International Conference

28 - 30 January 1997

Queensland University of Technology, Brisbane

Sponsored by

Centre in Statistical Science and Industrial Mathematics, Queensland University of Technology

Institute of Advanced Studies, Australian National University

Center for Applied Probability, Columbia University

Australian Mathematical Society with assistance given by the

Statistical Society of Australia (Queensland Branch).

The phenomenon of long-range dependence (LRD) is fundamental in a wide range of fields including hydrology, geophysics, meteorology, image processing, computer vision, economics & finance, environmental studies. Long-range dependence, overlapping with fractals and chaos, stands at the forefront of current research efforts. Many traditional methods of statistical inference, such as ARMA modelling, seem insufficient for handling LRD data. New theoretical developments, flexible parametric/nonparametric models, efficient estimation methods and fast algorithms are needed for analysis and prediction of LRD data (in various forms such as time series, multiple time series, spatial processes, random fields).

This Workshop aims to bring together researchers in the field of LRD and members of the applied community (air pollution modellers, environmentalists, hydrologists, 2D & 3D data analysts, economists, etc.) for three days of seminars and concentrated discussions. There are many outstanding issues (theoretical and practical) which merit such concentrated attention. Even the identification of possible long-range dependence can be a matter of debate and controversy in cases where there are departures from stationarity in the underlying

process. Major scientific hypotheses, such as that of global warming, are at issue here.

Organisers

Dr Vo Anh, Centre in Statistical Science and Industrial Mathematics, Queensland University of Technology, GPO Box 2434, Brisbane, QLD 4001; Phone: (07) 3864 2317; Fax: (07) 3864 2310; E-mail: v.anh@fsc.qut.edu.au

Professor Chris Heyde, School of Mathematical Sciences, Australian National University, Canberra ACT 0200; tel: (06) 249 2962; fax (06) 249 3918; email chris@wintermute.anu.edu.au

Plenary speakers

Professor Peter Robinson	London School of Economics
Professor Murad Taqq	Boston University
Dr Walter Willinger	Bellcore

Each of these speakers will present a number of lectures on latest developments in LRD and related fields. There will also be a number of invited talks.

Contributed papers

Participants are encouraged to present a paper of 20 minutes duration describing their work in the area. A number of papers presented at the Workshop will be selected to appear in an edited collection published through the Centre in Statistical Science and Industrial Mathematics, QUT, at a later stage.

Venue

Queensland University of Technology, Gardens Point Campus, 2 George Street.

Accommodation

There are several hotels located within a few minutes walk of the campus, which itself is close to the city centre. Please email

Barbara Firth, b.firth@fsc.qut.edu.au for details on accommodation and bookings.

Deadlines

Extended abstract and registration form are to be received by 29 November 1996.

Registration fees

Full fee	AUD\$150
Student fee	AUD\$75

The fee includes morning & afternoon tea, lunch on each day, and a copy of the extended abstracts. PAYMENT MUST BE MADE IN AUSTRALIAN DOLLARS.

Further information

Please contact Barbara Firth by email, b.firth@fsc.qut.edu.au, telephone (07) 3864 1767 or fax (07) 3864 2310. Information is also available on <http://www.math.fsc.qut.edu.au/>

33rd Applied Mathematics Conference 1997

Erskine House, Lorne, Victoria
2 - 6 February, 1997

The Second circular and Registration form for the annual conference of ANZIAM, a division of the Australian Mathematical Society, have been posted to all members of ANZIAM and to Mathematics and Engineering Departments Australia wide and to other interested parties. If you do not receive a copy within the next week feel free to email us to have one sent.

Venue: Erskine House, Lorne, Victoria

Erskine House has single and shared ensuite and standard rooms. Prices, listed on the registration form, include four nights accommodation, breakfast and lunch. As the number of single and ensuite rooms is limited, please provide an alternative choice in case your first is not available.

Invited Speakers

Prof Phil Davis	Brown University, USA
Prof James Greenberg	Carnegie Mellon University, USA
Prof Tony Guttman	University of Melbourne
Prof Alexei Pokrovskii	Russian Academy of Sciences, Moscow
Prof Andrew Stuart	Stanford University, USA
Prof Andrew Willmott	Keele University, UK

Call for Papers

Papers are invited in all areas of Applied Mathematics, including modelling and applications to real-world phenomena.

As well as writing the title on the registration form and indicating whether it will be presented in lecture or poster form, please forward, in suitable format, an abstract, including title and authors, either by mail or e-mail.

Templates in both html and LaTeX forms are available from the home page.

If presented in a lecture format you will have up to 20 minutes for the lecture and 5 minutes for questions. Whiteboards, overhead and slide projectors will be available.

In poster form, the posters will be on display at a set time and authors will be expected to be present to answer questions.

Format of Papers

Abstracts of all papers will be required for the book of abstracts which will be provided to all delegates. Abstracts must occupy no more than one half of an A4 page with a margin of 3cm on both sides. The format is: title, author's name(s), affiliation(s) and then an abstract of about 150 words. (A html and a LaTeX Template are available from the home page.)

Student Prizes

The conference's commitment to student participation is reflected in the awarding of the T.M. Cherry Prize. This is awarded to the best paper presented as a lecture by a student. The term "student" denotes a current postgraduate research student studying for a higher degree, or a recent student whose thesis will not have been submitted more than three calendar months before the commencement of the conference. Students are favoured by a reduced registration fee.

Student Travel Assistance

Students from a University in Western Australia who are members of ANZIAM and are presenting a paper at the conference are eligible for travel assistance of \$100. (This money will be made available after the conference provided all the conditions are fulfilled to the satisfaction of ANZIAM's Treasurer.) To join ANZIAM contact Dr W. Summerfield (william@frey.newcastle.edu.au), Mathematics Department, University of Newcastle.

Air Travel

We are pleased to announce QANTAS has been appointed official airline for the 1997 Australian Applied Mathematics Conference. As a special conference fare has been negotiated for delegates attending from within Australia, we suggest you contact Qantas Groups & Conventions Reservations (details below) to avail yourself of this, or any other promotional fares which may be applicable. A discount of 45% off the full economy airfare at the time of booking has been negotiated for the conference subject to seat availability. Please quote name of conference, destination and date of conference when making your reservation.

Qantas are proud to be part of our conference, and we know you will enjoy flying with them. The Qantas Groups and Conventions Reservations telephone numbers are: Toll Free: 1 800 650 200 or for Sydney delegates: 02 9951 4395

A New Zealand contact number is included for your convenience, but does not qualify for a conference discount. By contacting the local Qantas office, delegates will be offered the best fare of the day. New Zealand: 0800 80 8767

Airport - Lorne Buses

Conference buses will depart from Melbourne Airport for Lorne on Sunday the 2nd February, at 12:30pm and 3:30pm. Delegates are required to report to a member of the Organising Committee at the Groups and Tours Desk in the International Terminal. (Return buses will depart from Lorne at 11:00am and

2:00pm on Thursday 6th February. They take about 2.5 hours for the journey.)

Social Program

Apart from the on-site activities available, it is envisaged that the usual round of social activities will be held. Welcoming drinks, a barbecue and the Conference dinner will all be held at Erskine House.

A bus tour along the Great Ocean Road and a bush walk to the Erskine Falls will be arranged for the Tuesday afternoon.

Registration

The registration fee is AU\$200 for ordinary ANZIAM members, AU\$240 for non-members and AU\$100 for Students and Senior members. Details on the official registration form, a copy of which can be obtained from the WWW site
<http://www.cm.deakin.edu.au/~amc97>

Direct inquiries to:

Email: amc97@deakin.edu.au

Post: AMC97, School of Computing & Mathematics, Deakin University, Geelong VIC 3217; fax: (052) 272 028; email: Applied Mathematics Conference 1997 <amc97@deakin.edu.au>; home page: <http://www.cm.deakin.edu.au/~amc97>

Wavelet Methods: Theory and Applications

The Second Summer Statistics Workshop, jointly sponsored by Macquarie University and University of NSWs.

This workshop will be held on Friday February 14, 1997 at the University of New South Wales. The workshop will feature experts in the theory and applications of wavelet methods. Professor Peter Hall of the ANU is a keynote speaker.

A detailed program will be available shortly. Please contact Mrs Nefferty Narouz, the Secretary, Department of Statistics, University of New South Wales, Sydney NSW 2052; phone: (02) 9385 2968, fax: (02) 9385 1071, email: tity@alpha.maths.unsw.edu.au for further information. There will be no charge for attending the workshop except for food and refreshments.

William T.M. Dunsmuir

APORS'97

The Fourth Conference of the Association of Asian-Pacific Operational Research Societies within IFORS,

World Congress Centre, Melbourne
 30 November - 4 December 1997

FIRST CALL FOR ABSTRACTS:

For more information contact:

APORS97
 c/o PR Conference Consultants Pty Ltd
 PO Box 326
 BALWYN VIC 3103

(Pam Richards)

e-mail: APORS97@sci.monash.edu.au

phone: +61 3 9816 9111

fax: +61 3 9816 9287

ALTERNATIVELY visit our WWW site and record expression of interest directly in our data-base

URL <http://www.maths.mu.oz.au/~worms/apors/apors.html>

Australasian Biometrics Conference

1-4 December 1997

Adelaide.

The major themes of the conference will be on generalized linear mixed modelling, environmental modelling and ecological statistics

For more information, please contact:

Ari Verbyla
 Department of Statistics
 University of Adelaide
 Adelaide SA 5005

Tel: (08) 8303-3218

Fax: (08) 8303-3696

E-mail: biom97@maths.adelaide.edu.au

14th Australian Statistical Congress

6-10 July 1998

Jupiter's Casino, Gold Coast, Queensland

Programme Chair	Assoc Prof Kaye Basford
Local Organisation	Mr Walter Robb
Postal Address	ASC14 School of Mathematical Sciences Queensland University of Technology GPO Box 2434, Brisbane QLD 4001
Email Address	asc14@qut.edu.au
Facsimile	(07) 3864 2310

OVERSEAS CONFERENCES

InterCASIC '96; International Conference on Computer-Assisted Survey Information Collection, 11-14 December 1996, San Antonio, Texas, USA.

Information: AAAS Meetings Office, 1333 H St, NW, Washington, DC 20005; phone +1 (202) 326-6450; fax +1 (202) 289-4021.

IASC 2nd World Conference, 19-22 February 1997, Pasadena, CA, USA

Information: Patricia Huezo, Conference Coordinator, +1 (213) 342-2052, web sites <http://www.stat.unipg.it/iasc.html> and <http://icarus2.hsc.usc.edu/iasc>.

International Biometric Society (ENAR) Spring Meeting, 23-26 March 1997, Memphis, Tennessee, USA.

Information: ENAR Conference Manager, 11250 Roger Bacon Dr. Suite 8, Reston, VA 22090, USA; fax +1 (703) 435-4390.

Third International Conference on Health Effects of Low Dose Radiation: Challenges for the 21st Century, 11-14 May 1997, Stratford-upon-Avon, UK.

Information: Rachel Coninx, Conference Executive, BNES, One Great George Street, London SW1P 3AA, UK; fax +44 (0) 171 233 1743.

International Symposium on Contemporary Multivariate Analysis and Its Applications, 19-22 May 1997, Hong Kong.

Information: Multivar 97, c/o Dept. of Mathematics, Hong Kong Baptist University, Kowloon Tong, Hong Kong; fax: +852 2336 1505; tel: +852 2339 5056; email: multivar97@hkbu.edu.hk

1997 Joint Statistical Meetings, 10-14 August 1997, Anaheim, California.

Information: American Statistical Association, 1429 Duke St, Alexandria, VA 22314-3402, USA; email meetings@asa.mhs.com

IASS/IAOS Satellite Meeting on Longitudinal Studies, August 27-31, 1997, Jerusalem.

Information: Gad Nathan, Central Bureau of Statistics, 91905 Jerusalem, Israel; Fax: +972-2-6553-319; E-mail: gad@olive.mscc.huji.ac.il or Susan Linacre, Australian Bureau of Statistics, PO Box 10, BELCONNEN ACT 2615, Fax: 61 6 252 5239, Email: sisd.exec@abs.telememo.au

IMS and Bernoulli Society European Regional Meeting: Mathematical Statistics and its Applications to Biosciences, first week in September 1997, Rostok, Germany.

Information: F. Liese, W.R. Richter, University of Rostok, Germany.

International Meeting on Multidimensional Data Analysis NGUS'97, 10-12 September 1997, Bilbao, Spain.

Information: Kormele Fernandez-Aguirre, Avda, Lehendokari Aguirre, 83 (48015) Bilbao, Spain; fax 34 4 479 7554; email ngus@bs.ehu.es; internet <http://www.et.bs.ehu.es/ngus97.html>.

International Biometric Society (ENAR) Spring Meeting, 27 March - 1 April 1998, Pittsburgh, Pennsylvania, USA.

Information: ENAR Conference Manager, 11250 Roger Bacon Dr., Suite 8, Reston, VA 22090 USA; fax +1 (703) 435-4390.

Seventh International Congress of Ecology, Frontiers of Statistical Ecology with Environmental Statistics, 19-25 July 1998, Florence, Italy.

Information: Prof. Wolfgang Urfer, Department of Statistics, University of Dortmund, D-44221 Dortmund, Germany, tel. +49 231 755-3121, fax +49 231 755-5303, email urfer@omega.statistik.uni-dortmund.de or Dr Phil M. Dixon, Savannah River Ecology Lab, University of Georgia Drawer E, Aiken SC 29802, USA, tel. +1 803 725-2472, fax +1 803 725-3309, email dixon@srel.edu.

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