

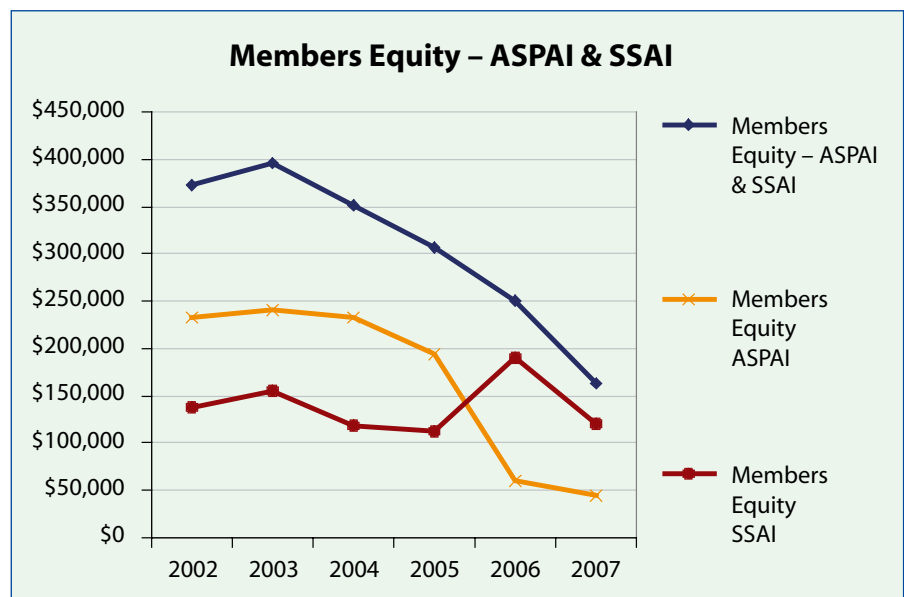
## Planning for the future of your Society

The July 31 AGM's for SSAI and ASPAI were hosted by the Canberra Branch at the Belconnen offices of the ABS, and followed by the excellent Foreman lecture delivered by Susan Linacre.

The next day Central Council met. A major focus of their all day deliberations was on the current and projected future financial situation that the Society faces. This formed the basis for decisions taken by Council and for strategic planning.

Several years ago Council decided to significantly enhance the professionalism of the SSAI, and took a number of decisions and actions in that direction. Initiatives included a public awareness program, introduction of the professional accreditation program and a review of statistical education in Australian schools and universities. These programs have had impacts which have previously been reported on by Kaye in her President's news items. The accreditation program is gathering momentum, with nearly 25% of our members now accredited and more and more university programs seeking accreditation. Council plans to build on these initiatives in the near future. In order to support these and other initiatives Council at that time also decided to upgrade the staffing of the Canberra office.

To me, there is no doubt that the professionalism of the society, and awareness of it, has grown and that the Canberra office provides many services to members not previously available. However, these initiatives have come at a substantial cost to the previously large financial reserves held by SSAI and ASPAI. At the same time, membership levels have remained stable overall over the past several years. It was clear to Council that without significantly increased membership and increased



income the Society's reserves would be exhausted in two to three years. The Central Council meeting agreed it had to act with a strong sense of urgency in order to address these financial pressures.

Prior to the Council meeting, a thorough review of the Societies finances led to the conclusion that additional sources of revenue are required to sustain the previously developed operational model. Subscription fees were raised last year but this proved insufficient to reverse the trend in depletion of reserves, and Council was again this year faced with difficult decisions regarding options for increasing income. Various options were discussed vigorously, and several key decisions were taken as a result.

Council decided that the subscription fee for a full member should be set at \$200 (including GST), to which Branches will add a component to support Branch activities. They also set the subscription for retired members at \$100 (including GST) and \$20 for students. These

represent increases of \$60 per annum for full members, \$30 for retired members, and \$5 for student members. Concern was raised about assisting students make the transition to full membership and a new 'transitional member' fee was set at 50% of the full member fee for student members for their first year when entering the workforce.

Council recognises that increasing fees is not a workable long term solution. As a result it spent considerable time looking at ways to increase and diversify sources of revenue to the Society while containing costs.

In particular it was decided to change to an e-only Newsletter, available only to members, by July 2008. This decision will lead to a substantial saving on printing and distribution costs while allowing for increased flexibility and frequency of member communications.

Council also focussed attention on the need for enhanced professional

# SSAI Central Council and future planning

*From page 1*

development of members in particular and users of statistics more generally. A key part of the decisions of several years ago was to provide Continuing Professional Development (CPD) short courses and workshops to members, and particularly to support the professional accreditation programs. Council decided to develop a portfolio of CPD activities to provide value to existing members, to attract new members, and to provide a substantial long term revenue stream.

Other activities planned are to provide the expertise of Members to the wider community of users of statistics through short courses.

Other activities that Council will be focussing on in the coming year are enhancing recruitment, seeking greater corporate sponsorship for its activities, and upgrading web based services to members aimed at improved communications, convenience and functionality. A key decision taken by Council was to conduct a member survey in the near future in order to

guide these activities and I would urge you to respond to the survey when you receive it.

Council has also agreed to meet quarterly by teleconference for the foreseeable future to ensure that the decisions and plans just made are implemented in a timely and effective way.

I would be very happy to discuss these decisions and future strategic directions and would be pleased to hear from you.

*William Dunsmuir*

## Australian Statistical Conference 2008

**30th June to 3rd July 2008 – Hotel Sofitel, Melbourne**

Confirmed International Speakers

- ◆ Environmental Statistics – Adrian Raftery, University of Washington, Seattle
- ◆ Statistical Genetics and Bioinformatics – Elizabeth Thompson, University of Washington, Seattle
- ◆ Medical Statistics – Simon Thompson, Cambridge MRC Unit; Michael Hernan (Harvard)
- ◆ Stochastic Modelling and Statistics in the Social Sciences – Fiona Steele, University of Bristol
- ◆ Statistical Methodology – Alistair Young, Imperial College

Conference website: <http://www.asc2008.com.au>



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# 2007 Foreman Lecture

The Foreman lecture for this year was held at the ABS (Australian Bureau of Statistics) in Canberra on Tuesday 31 July. This is a special lecture held every year which commemorates Ken Foreman's major methodological contribution to ABS work in a career which spanned from 1951-1984. Ken introduced a wide range of statistical frameworks and methodologies to the ABS which are still largely in use today. The speaker this year was Susan Linacre, Deputy Australian Statistician, ABS. Susan's talk was titled 'How things change – or do they? Australia and the working life of an official statistician over 30 years'. Like Ken, Susan has had a long and interesting career at the ABS and having her deliver this lecture was certainly very appropriate.

Susan joined the ABS in the mid 1970's and she knew Ken personally. Susan's talk began with a brief introduction about Ken Foreman and she showed two pictures of Ken. The first was of Ken in a plane (flying was a hobby of his) and Susan concluded from this perspective that not much has changed in the last 30 years since the ABS still uses aerial maps in survey design. The second picture was of Ken in his office with the caption 'What's missing?' and Susan's answer to that was 'computer'. So some things have changed but others have not and this was



*Susan Linacre*

the flavour of Susan's talk throughout the rest of the lecture.

Susan went on to talk about some of the changes in life in Australia from 1976 to 2006 as told by our Censuses and other key data sources. A wide range of different graphs measuring changes in population growth and characteristics, education and employment, health and happiness and population mobility were discussed. For example, Susan mentioned that today there are more one parent families and there is growing number of people with no religion. Employment is heading back to the level of the 1970's and Australia has been below replacement fertility for a generation. It was very interesting to see

Australian life analysed from these many different perspectives.

Next Susan talked about how the job of the official statistician has changed in the last 30 years. In particular today there are changes in what is measured and how it is measured and this provides an interesting environment for a statistician to work in. As an example the ABS is currently working on a census data enhancement project which will provide a longitudinal view of the census. This will probabilistically match 5% of the census data across time and will enable the ABS to track special at risk groups in the population. For example through the census data enhancement project the ABS would be in a position to answer questions like 'Are there socio-economic characteristics in 2006 that predict which 15-19 year olds will be neither employed nor in full time education in 2011?'. Addressing questions like these will help the government make more effective policy decisions.

Susan's talk concluded with the question 'How should statisticians sell the value of their work to improve community acceptance of the use of data for statistical purposes?'. This is an important question to address since confidentiality issues prevent the use of many potential sources of data for statistical analysis.

*Janice Wooton*

## Looking for a job?

For a listing of current statistical vacancies in Australia or New Zealand visit:

**<http://www.statsci.org/jobs>**

*Do you have a job to advertise on the website?*

Email a position description to:

**[mrobinson@wehi.edu.au](mailto:mrobinson@wehi.edu.au)**

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**DEADLINE FOR  
NEXT ISSUE:  
10 November 2007**

## Editorial

This issue of the newsletter is focused on the Society at a national level. Firstly, the Annual Report appears in this newsletter.

Secondly, the Society's President addresses some very important facts regarding the Society's financial position. Please take the time to read his articles. As part of the cost-saving measures that the Society is embracing, the Newsletter is going to be produced in purely electronic form.

Other societies have of course embraced differing levels of electronic availability of newsletters. Here is a (totally non-)random sample of societies and the production format of their society newsletter.

American Statistical Association. Monthly, hard copy, around 80 pages.  
Royal Statistical Society. Monthly, hard copy, around 24 pages.  
Biometric Society. Quarterly, three electronic and one hard copy, around 24 pages.

New Zealand Statistical Association. Six-monthly, hard copy, around 24 pages. Website contains material appearing on a continuous basis.

Some things of course won't change. The format of the newsletter will remain as a fully typeset document which you can read on screen or print out if desired.

We look forward to your input on the electronic access aspect of the new newsletter, and also look forward to your continued support in providing material for the newsletter to print!

## Member News

### SSAI Members awarded in Queens Birthday Honours List

Dennis Trewin AO. For services to statistics as the Australian Statistician, and particularly through the reform of reporting standards and practices and support for a range of national and

international organisations, and to the community.

Ron Sandland AM. For services to science and technology, particularly in the area of research management and through contributions to the Commonwealth Scientific and Industrial Research Organisation.

## Conferences

### ICAS-4 – Advanced Statistical Integration and Analysis, Fourth International Conference on Agricultural Statistics

22-24 October 2007, Beijing, China  
<http://www.stats.gov.cn/english/icas>

### IBS Australian Region, 'Biometrics on the beach'

2-6 December 2007 – Coffs Harbour, NSW  
<http://www.biometrics.org.au>

### BioInfoSummer07

### ICE-EM Summer Symposium in BioInformatics

10-14 December 2007, Australian National University, Canberra, ACT  
<http://www.maths.anu.edu.au/events/BioInfoSummer07/>

### Australian Statistical Conference 2008

30 June – 3 July 2008, Melbourne, VIC  
<http://www.asc2008.com.au>



# President's Corner

As incoming President of the SSAI I would like to thank Kaye Basford for her wonderful contributions over the past two years and look forward to working with her over the coming year as she continues as Vice President.

On Page 1 of this Newsletter I have outlined the decisions that Council took at the recent August 1 Central Council meeting. The thrust of these decisions is to ensure that the SSAI continues to operate within budget and without further drawing on reserves other than for strategic initiatives. They also aim at significantly increasing value to members. With these decisions come a number of significant challenges to Council, the Executive Committee and to the Canberra Office, all of which are responsible for the smooth running of the Society. Council worked hard on your behalf and I personally want to thank them for their efforts as well as to publicly acknowledge the support of their employers for allowing them the time to attend. Working with your representatives to Central Council was a rewarding experience reinforcing to me the fact that this Society is run by volunteers who give up a lot of their time to ensure that members' views are heard and their needs are met. I am also very grateful for the ongoing support that Jane Waslin provides to members and as well as the excellent ongoing contributions made by the members of the EC through monthly review meetings and other activities.

A major decision taken at the recent Central Council meeting was to significantly develop provision of short courses and workshops as part of a nationally based continuing professional development activity. Branches have been active in this regard over the past few years and we are planning to substantially enhance such activities on a national level in 2008. There are two Branch workshops/courses in the pipeline at present – one a course on R will be run in Canberra in September 2007, and a workshop entitled "Advanced Regression Models with R" will be held in Melbourne in February 2008.

The preparations for the ASC2008 in Melbourne are continuing with the program committee lining up a number of high-profile keynote speakers from overseas. Details of these are included in the ASC information below. Registration

forms and information about submitting papers will be sent to all members with the December 2007 issue of the Newsletter. The conference website (<http://www.asc2008.com.au>) will be updated as planning progresses and arrangements are confirmed. Planning for the ASC2010 in Perth is also well advanced.

Later in the year the Society's Awards Committee will be calling for nominations from the members for the Pitman Medal, Honorary Life Membership and SSAI Service Awards. The rules governing these can be found at: <http://www.statsoc.org.au/resource/pdfs/regulations.pdf>. If you know a member you wish to have recognized please contact your Branch Council in the first instance.

In addition to its Branch structure the Society also has a number of special interest sections that have been set up to provide focus for members across geographical regions. Sections work well when they have champions who are willing to actively develop them. The Young Statisticians section has been thriving in recent years and goes from strength to strength. For next year the Young Statisticians will be represented by two members: Richard Hutchinson from Canberra and Pamela McCaskie from WA. I envisage that Sections will play a vital role in the future plans for expanded continuing professional development activities and the EC will be looking at ways to energize the sections that are currently inactive. If you have ideas for new or existing sections or would like to play a more active part in their activities I would be pleased to hear from you.

Recently I have been involved in discussions to wind up the Australian Mathematical Sciences Council. This body was set up some years ago to facilitate the election of a FASTS Board Member from various professional societies involved in mathematical sciences in Australia. It was agreed that AMSC was no longer needed and a new mechanism for electing the Board Member from the various groups involved was developed.

With the recent decisions made at Central Council the Society aims to strengthen its professionalism and to enhance benefits to members and their employers. The challenges lie in increasing membership (for which a recruitment task force has been established), in increasing professional development short



courses and workshops (for which plans will be developed over the next three months or so), in continuing to increase awareness amongst employers about the need for professional statisticians, and, in continuing to implement the key recommendations of the Review of Statistical Education report.

All of these challenges will call on members to be creative and generous with their time and I look forward to hearing from you with ideas and offers to help.

*William Dunsmuir*

*Email: [W.Dunsmuir@unsw.edu.au](mailto:W.Dunsmuir@unsw.edu.au)*

## WORKSHOP

**Advanced  
regression models  
with R**

**13 February 2008,  
Melbourne**

For further information:

[www.statsoc.org.au/whatsnew](http://www.statsoc.org.au/whatsnew)

# Mathematics and Statistics in Industry Study Group

This year's ANZIAM Mathematics and Statistics in Industry Study Group (MISG2007) was held at the University of Wollongong, 5-9th February 2007.

A/Prof. Tim Marchant was the Director, Dr. Maureen Edwards the Associate Director while Ms. Joell Hall and Ms. Sue Denny acted as the Administrators.

The event attracted about 100 delegates, including twenty postgraduate students, who worked on six industry projects. Five of these projects were submitted by Australian companies and one from New Zealand.

These projects covered diverse fields such as financial mathematics and statistics, operations research, solid mechanics and mathematical modelling.

MISG2007 was fortunate in attracting Prof. Robert McKibbin, from Massey University, as invited speaker. His wealth of experience in Industrial Mathematics resulted in him presenting two very entertaining and stimulating seminars. Thanks also to Dr. Mike Camden, from Statistics NZ and Dr. Jeff Dewynne, from Oxford University, for their seminars at the student workshop.

MISG2007 was opened by Mr Stephen Lowe, General Manager Trading, Integral Energy and Prof. Margaret Sheil, DVC-Research at Wollongong (who is now CEO of the ARC). Thanks to both these individuals for their attendance and comments at the opening ceremony.



*From left, Dr. Maureen Edwards, MISG Assoc. Director, Prof. Robert McKibbin, Invited Speaker, A/Prof. Tim Marchant, Director and Mr. Joe Maisano, Trading Technology Australia.*

MISG2007 attracted significant media publicity; an article appeared in the local newspaper, the Illawarra Mercury, and the director was interviewed twice on local ABC radio.

The conference dinner was held at the City Beach function centre, which enjoys spectacular views over Wollongong Harbour and the coastline. Other social events included a cocktail reception on the Monday evening, a student workshop followed by pizza on the Tuesday and of course, the annual volleyball grudge match, Australia vs The World.

Due to the broad range of skills required to tackle modern industrial mathematics problems many high-profile scientists from the Australian and NZ Statistics and Financial Mathematics communities attended MISG2007 as delegates or moderators.

If the MISG meeting is to remain relevant and important in the coming years then this multi-disciplinary approach to industrial problem solving needs to continue, with participation at MISG from all the Mathematical Sciences.

Moderation of an MISG project is a challenging task involving problem solving, people management and a very tight deadline. So our thanks and gratitude go to the moderators of each of the MISG2007 projects. Following on the tradition from MISG2006 in NZ, each project also included a postgraduate student as moderator.

See our web-site [www.misg.math.uow.edu.au](http://www.misg.math.uow.edu.au) for the industry project descriptions from MISG2007, the equation-free summaries of the projects and the outcomes, and also pdf files of the project reports, as they become available. The web-site also provides details of MISG2008, to be held 28th Jan.-1st Feb. 2008. We hope to see everybody at UOW for the 2008 event.

*Tim Marchant and Maureen Edwards*



*Delegates from MISG2007 working on the Tranpower NZ Industry Project.*

# Three Doors with Borek Puza (Edition 11)

Welcome to the 11th edition of *Three Doors*. Last time I presented The Largest Value Puzzle and am now pleased to announce Terry Neeman as the current winner of The Three Doors Prize, a cheque for \$60 as donated by SSAI. We now present the solution, and the next puzzle follows

## The Largest Value Puzzle

*If the largest value in a sample is removed, what happens to the sample variance?*

## Solution to The Largest Value Puzzle

The sample variance may decrease, increase, or stay the same, depending on the sample values. For example, suppose that the sample values are  $-1, 1,$  and  $1+d$ , where  $d > 0$ , and  $1+d$  is removed. Then it can easily be shown that the sample variance decreases if  $d > 0.73205$ , increases if  $d < 0.73205$ , and stays the same if  $d = 0.73205$ . More generally, it can be shown, with straightforward but tedious algebra, that when the largest value,  $L$ , is removed from a sample of size  $n$ , the variance decreases if  $L > A + S$ , increases if

$L < A + S$  and stays the same if  $L = A + S$ , where  $A$  is the average of all  $n$  values and  $S$  is the square root of  $(n-1)/n$  times the sample variance of all  $n$  values.

## The Alternative Confidence Interval Puzzle

*Suppose that a number  $y$  is randomly chosen from the uniform distribution from 0 to  $k$ , where  $k$  is an unknown constant between 0 and 5. Consider the statement*

$$0.8 = P(0.2T(k) < y/k < 0.8 + 0.2T(k)),$$

*where  $T(k)$  is a suitable function of  $k$  or a constant. For the case  $T(k) = 0.5$ , the statement can be inverted to yield an 80% confidence interval (CI) for  $k$  given by  $(y/0.9, \min(5, y/0.1))$ . Now suppose that  $T(k) = k/5$ . Then the statement can be inverted to yield an alternative CI for  $k$ . Find the general form of the alternative CI and evaluate it for  $y = 3.0$ . Why might the alternative CI be considered preferable?*

For your chance to win a fabulous mystery prize, please send your solution to [newsletter@statsoc.org.au](mailto:newsletter@statsoc.org.au).

# Update on "Biometrics by the Beach" conference

As previously advertised, the International Biometric Society Australasian Region (IBS AR) will hold its next biennial conference from Sunday 2 December to Thursday 6 December 2007 at the Novotel Pacific Bay Resort in Coffs Harbour, NSW.

The conference theme, **Biometrics safeguarding our future: our health and our air, land and water**, broadly encompasses the intended topics of our eight local and international invited speakers, whose abstracts and biographies appear on the conference website ([www.biometrics.org.au/conf](http://www.biometrics.org.au/conf)). As part of the conference program, we will also hold a dedicated poster session and are hoping to hold a "Meet the editors" session and a SSAI Biological Sciences-organised session.

Contributed papers and posters related to the conference theme or on other biometrical topics are welcome, with abstracts now due by 31 August 2007 (Note that the deadline has been extended from 3 August).

On Sunday 2 December, the program will feature two short courses. Peter Diggle is presenting a course on model-based geostatistics and Kerrie Mengersen will present a course on "Bayes for Beginners". Full details of both courses can be found on the conference website.

Socially, the program includes a welcome reception on Sunday evening, a break on Tuesday afternoon when delegates can take advantage of organised activities including a guided walk in Dorrigo National Park, a kayaking adventure or a visit to a local winery, and the conference dinner (on Wednesday 5 December) being held at the Pet Porpoise Pool in Coffs Harbour.

The conference website [www.biometrics.org.au/conf](http://www.biometrics.org.au/conf) is comprehensive so take a look at it for further information on registration, the program, courses, the venue, accommodation and travel to Coffs Harbour. We look forward to seeing you there!

*Melissa Dobbie*

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**Further contact details for Society Secretaries and Section Chairs can be obtained by contacting the Society on (02) 6249 8266**



# NSW Bayesian Methods Workshop

On the 17th and 18th of July, the NSW Branch hosted a workshop at the University of Technology, Sydney introducing Bayesian Methods. The workshop was presented by Kerrie Mengersen from the Queensland University of Technology.

This workshop proved to be very popular, having attracted 58 attendees, with a strong representation from the pharmaceutical industry with such companies as Roche, Eli Lilly, GlaxoSmithKline, Colmar Brunton, Covance and Amgen represented. There were also several attendees from the public service and academia. Some of the attendees came from New Zealand or interstate to attend.

Kerrie presented the Bayesian framework using plenty of examples to support the theoretical background, and supplemented this with tutorials in WinBUGS. There were also plenty of opportunities to reinforce this framework within the lectures through well chosen exercises.



Some areas of interest were Monte Carlo Markov Chain methods, formulation of typical models in terms of prior distributions, selection of prior distributions, as well as Bayesian methods for spatial and mixture models.

Feedback from the workshop showed that attendees found the course very useful, and would recommend it to others. One strong message that came back was that while the participants had

very differing backgrounds in statistics, they all were able to take away some new insights, and have a greater appreciation of the usefulness of Bayesian methods.

The NSW Branch of the Statistical Society would like to thank Kerrie for her efforts in conducting this workshop. In addition, the branch would like to thank Caro Badcock, Davy Wong, Boris Choy, Connie Lam and Wai Yin for their efforts behind the scenes.

*Stephen Bush*

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## SSAI Workshop on Integrating Statistical Ideas into Mathematics

This half-day workshop was organised by the NSW Branch of the Statistical Society of Australia and held at Macquarie University on 25 July 2007. Its aim was to bring together those involved with and interested in the development of the statistical components of the secondary school mathematics syllabi to discuss issues involved in educating high school students in (i) statistical thinking skills, in general, and (ii) some foundations for the kinds of formal courses in statistics that are nowadays required in many university degree programmes. The number and calibre of the speakers and attendees signal the strong interest there is among educators in tackling the challenges of providing statistical education at the appropriate level to the appropriate students at the appropriate time.

Fifty-two people attended the workshop (eight of them as speakers and Chair). Another four expressed a strong interest but were unable to attend. Attendees came from private and state schools, TAFE colleges, universities,

policy type organisations such as the Board of Studies and other organisations.

Speakers covered a range of topics including reporting on the recommendations from two recent reports produced on statistics and education in universities and secondary schools, viz Statistics at Australian Universities: An SSAI-sponsored Review. December 2005 and Mathematics and Statistics: Critical Skills for Australia's Future, The National Strategic Review of Mathematical Sciences Research in Australia. December 2006; the new Stage 6 Mathematics syllabi due to be rolled out in NSW schools in 2010; the Stat Smart ARC linkage project; the Schools Statistics Poster Competition; teaching statistics to other disciplines at university and ideas on how to make mathematics and statistics components coherent in the secondary schools mathematics syllabus.

Some of the suggestions and possible future links from the day include:

- Improving the clarity around qualifications required for Mathematics

teachers. The Statistical Society of Australia could work with NSW Institute of Teachers to share information on the value of accredited statistics courses and their contribution to mathematical teacher education

- Improved support for Mathematics teachers in delivering the statistical components of the syllabus. Universities may be able to work more closely with the schools in their footprint to provide in-service courses to support teachers. Universities may also be able to provide more support to schools in regards to the variety of careers that require statistical skills. The MANSW may also be able to help in this area.
- Increasing the involvement of university educators interested in statistical education in the development of the school mathematics syllabi. Individual universities may liaise directly with the Board of Studies and possibly the SSAI will continue to have these types of forums to encourage communication.

*Caro Badcock*



# Statisticians Stand Tall at ARCS

It was really exciting to see the number of statisticians presenting and their topics at the recent ARCS conference. ARCS (Association for Regulatory and Clinical Scientists) is the professional association that supports scientists involved in the development of therapeutic products. Members come from functions such as clinical research, data management, biometrics, regulatory affairs, medical writing, health economics and so on.

When I attended my first ARCS conference in 1995 there were very few of us actively involved in the industry in Australia. In fact, you only needed one hand to count us, and even then not all fingers. In those early years we were lucky if one of us presented. Over time our numbers in the industry have increased particularly with the set up of regional biometrics units by Roche, Eli Lilly and Pfizer. We are also becoming more involved across the health care industry as evidenced by the formation of the APBG (Australian Pharmaceutical Biostatistics Group), the increased involvement in health economic projects and the increased collaboration between functions throughout the clinical trial process from design to publication.

This year the ARCS conference was three days with each day consisting of a plenary session in the morning and five concurrent offerings in each of the two afternoon sessions. Three of the thirty concurrent sessions focusing on statistical issues with all statistical speakers being statisticians accredited by the Statistical Society of Australia and almost all also being members of the APBG! Two of these sessions were organized by the Health Economics Educational Subcommittee and one by the Data Management and Biostatistics Educational Subcommittee, chaired by me. In addition, the statistical function was represented in a session on managing projects from project concept to final publication. This gave a total of 11 statisticians speaking or chairing sessions! All sessions were also extremely well attended. In fact the rooms were full with around 70 people in each session, very few of them statisticians!

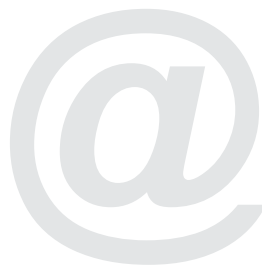
On the first day I chaired a session 'Statistics and Clinical Trial Design – old hat or modern miracle'. The aim of the session was to share with the audience the idea that statistics is still an evolving science so that like other research we

should be considering a variety of ways to analyse data rather than just stick to the old tried and true methods.

Speakers were: Annie Solterbeck, Director, Statistical Revelations on multiple comparisons, Robyn Attewell, Associate Director, Biometrics Operations, Covance on analysis of repeated measures data, and Ian Marschner, Director, Asia Biometrics Centre, Pfizer on adaptive trials.

As Chair I was concerned i) that we would not get attendees and ii) that we would not get many questions for the speakers given the subject matter. Obviously my first concern was totally unfounded with the room being full. I think this is an indication of the need and hunger for an understanding of statistics and statistical methods throughout the industry.

In preparation for my second concern I decided to prepare a question about each of the presentations to ask the audience. The questions were not theoretical or even heavily statistical. They aimed to get the audience thinking about how the issues covered in each talk impacted on them as an individual in their everyday working life. Unsolicited feedback for this approach has been all positive. In fact, one comment was that I was an extremely hard chair making the audience think so much. If that is what the session made them do then I think it was a success!



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On the second day there were the two health economic sessions. The first one was titled Conducting Indirect Comparisons of Therapies – a Statistical Approach. This session aimed to provide a conceptual overview and methodology into how to conduct indirect comparisons, where we wish to compare two treatments, but only have data on each treatment compared with another treatment (for example, placebo treatment).

Speakers were: John Defina, Director, Sirius Research, giving an introduction and overview, Ian Gordon, Director, Statistics Consulting Centre, University of Melbourne, on methodology of indirect comparisons and meta-analyses, Philippa Clarke, Senior Outcomes Research Statistician, Pfizer, on "Are all comparators identical?", and Philip McCloud, Site Head of Biostatistics, Roche, on the pros and cons of the appropriateness of indirect comparisons.

The second health economics session was titled Survival Analysis and Modelled Economic Evaluation. This session aimed to provide a conceptual and methodological overview of how survival analyses over a limited time period can be incorporated into a modeled economic evaluation over a longer time period.

Speakers were: William Reece, Senior Project Statistician, Eli Lilly, on survival analysis, including Kaplan-Meier curves, Michael Adena, Director, Statistical Consulting, Covance, on extrapolation of survival curves, and Malcolm Hudson, Professor, Department of Statistics, Macquarie University, on incorporating Quality of Life information into survival analyses.

Last, but not least, Manjula Schou, Senior Statistician, Asia Biometrics Centre, Pfizer presented in the session Project Management: Across Functions to Final Report and Publication. She shared her experiences on how she applies project management principles on a daily basis in her role at Pfizer.

All in all an excellent result for statisticians in the pharmaceutical industry – well done to everyone.

*Caro-Anne Badcock  
Consultant Statistician, Statistical  
Revelations  
Committee member, ARCS Data  
Management and Biostatistics ESC  
President, NSW Branch SSAI*

# SSAI Annual Report – April 06 to March 07

The Society was founded in 1962 as a national “umbrella” organisation to support and further the work of the state statistical societies. The overall objective of the Society is to further the study and application and good practice of statistical theory and methods in all branches of learning and enterprise.

The Society is incorporated in the Australian Capital Territory (ACT). The constitution was revised in accordance with the Associations Incorporation Act 1991 (ACT) on 5 July 2006.

In order to hold Annual General Meeting of the SSAI and the annual meeting of Central Council in association with Australian Statistical Conferences or other mid-year conferences, the financial year for the Society is from 1 April until 31 March. Branches may choose, through their own constitutions, to retain a different financial year.

## 1. Membership of the Society

At 31 December 2006 the Society had 646 ordinary members, 2 Members at Large, 67 student members, 36 retired members, making a total of 751. There are also 19 Honorary Life Members. Equivalent figures (including Honorary Life Members) since 1994 are 966, 956, 971, 898, 927, 874, 789, 733, 764, 761, 743, 764.

## 2. AGM and Central Council

The Annual General Meeting of the Society was held on 5 July 2006 at Skycity, Auckland, New Zealand in conjunction with the Australian Statistical Conference 2006. There were two Central Council meetings; one was held on 2 July 2006 at Skycity, Auckland, New Zealand, and the second was held on 21 February 2007 via teleconference. The Executive Committee of the Society has had monthly teleconference meetings during the year.

The Central Council for 2006–2007 comprised:

<i>President</i>	K.E. Basford
<i>Vice-President</i>	W. Dunsmuir
<i>Editor</i>	K. L. Mengersen
<i>Secretary</i>	D.E. Shaw
<i>Treasurer</i>	S.R.T. Horn
<i>Accreditation Committee Chair</i>	J. Henstridge
<i>Newsletter Editor</i>	M. Adena
<b>Branch Delegates</b>	

### *Branch Presidents Representative*

A. Branford (Co-opted)

### *Sections Representative*

A. Verbyla (Co-opted) (resigned)

### *Canberra Branch*

B. Henderson, J Wooton

### *New South Wales Branch*

C. Badcock, A. Pope

### *Victorian Branch*

B. Phillips, M. Silvapulle

### *Queensland Branch*

J Eccleston, I. Wood

### *South Australian Branch*

M. Swincer, J Jones

### *West Australian Branch*

B. Clarke, A. Munday

Much of the Society’s business is conducted by the SSAI Executive Committee on a monthly basis by telephone hook-up. Members of the SSAI Executive Committee for 2006–2007 were:

<i>President</i>	K.E. Basford
<i>Vice-President</i>	W. Dunsmuir
<i>Editor</i>	K. Mengersen
<i>Secretary</i>	D.E. Shaw
<i>Treasurer</i>	S.R.T. Horn

### *Branch Presidents’ Representative*

A.J. Branford (co-opted)

### *Young Statisticians’ Representative*

J. Wooton (co-opted)

### *Sections Representative*

A. Verbyla (co-opted) (resigned)

The Executive Officer, Jane Waslin, attends SSAI Executive Committee meetings as an observer.

## 3. Association with other bodies

The Society is an affiliated organisation of the International Statistical Institute, with the President as the Society’s *ex officio* member.

The Society is a constituent member of the Australian Mathematical Sciences Council, and through this Council a member of the Federation of Australian Scientific and Technological Societies (FASTS). K.E. Basford represented the Society on the Council.

The Society was represented on the National Committee for Mathematics of the Australian Academy of Science by N. Bartlett and W. Dunsmuir.

The Society is a corporate member of the New Zealand Statistical Association.

The Society is a member of the Australian Foundation of Science. S.R. Wilson was the Society’s representative this year.

## 4. Finances

The Society’s financial affairs for the year are detailed in the Financial Statement.

The capitation fee was increased for membership year 2007. This, with no growth in member numbers, still results in a shortfall on operations, after splitting out strategic activities. The latter comprising workshops, conferences, campaigns and initiatives promoting the Society’s aims as set out in its Strategic Plan, while important, are insufficient to balance the operational deficit. The Society has been using reserve funds to fund its operational and administrative activities as well as strategic initiatives. From 2006 the SSAI Newsletter has been published by SSAI rather than by ASPAI, as was the case previously. Publishing the ANZJS is now the only activity conducted by ASPAI. The Society will continue to recover costs for administrative support for the ANZJS.

## 5. Review of Statistics at Australian Universities

The Society continues to work towards implementing the recommendations arising from the Review of Statistics at Australian Universities. The need for this was reinforced by the outcome of the National Strategic Review of Mathematical Sciences Research. Following follow-up from these reviews with the government the disciplines of mathematics and statistics in Australian universities will be placed into a higher funding band. This will have a major impact on those statisticians working in tertiary institutions, with resulting positive benefits for their students. The SSAI Strategic Plan incorporates activities to follow through the recommendations of the Review of Statistics at Australian Universities.

## 6. The Australian and New Zealand Journal of Statistics

During 2005 arrangements were completed to transfer copy editing and type setting to the publisher (Blackwell) so that ANZJS would become available in an enhanced electronic version.

The structure of SSAI/ASPAI has been reconsidered so that financial reporting can be streamlined and NZSA has a more direct formal role in considering non-editorial matters for ANZJS.

The Society would like to thank Managing Editor Kerrie Mengersen and Editors Stephen Haslett, Ken Russell, Russell Millar and the Editorial Board for their contributions to the smooth production of the journal in 2006.

### 7. Accreditation

The accreditation process continues to run smoothly thanks to the efforts of the Accreditation Committee and the Society's Executive Officer, Jane Waslin. The Committee meets once a month, generally via teleconference, and spends a considerable time examining each of the applications and referees' reports to ensure that a high standard for accreditation is established.

A re-accreditation process has been established and re-accreditation is now taking place for those members whose accreditation has expired. Another issue currently under consideration is how to provide better support and professional development opportunities to existing Accredited members.

2005 saw the introduction of the opportunity for universities to apply for accreditation of their programs. To date two programs have been accredited and there are several applications pending.

At 25 July 2007 there were 134 members with current AStat status and 54 members with GStat status.

We would like to take this opportunity to thank all members of the Accreditation Committee for their efforts.

### 8. Planning

Central Council is in the process of reviewing the Strategic Plan for 2007-2011 in order to incorporate implementation of the Review of Statistics and changes achieved under previous versions of the Strategic Plan.

### 9. Public Awareness Campaign

After several years of slow progress, a Public Awareness Campaign was concluded in June 2006. Its twin thrusts were: the need for professionalism in the practice of Statistics; and to support Professional Accreditation, hence its campaign slogan: *Statistics: A Job for Professionals*.

## 10. Conferences, Workshops and Symposia

Branches conducted a number of workshops during the year, with support from the central office provided for collection of registration fees and payment of accounts. These workshops were especially successful with very strong support from members and others.

Branch	Workshop	Date	Number of attendees
Canberra	Bayesian Methods	14-45 Sept 2006	20
South Australia	AusCan Scholar	24 Oct 2006	15
Victoria	Bayesian Methods	28-29 Nov 2006	21
New South Wales	AusCan Scholar	28 Sept 2006	27
	Oncology Trials	28 Sept 2006	69
	Indirect Comparisons in health assessment	30 Mar 2007	65

ASC2006 in Auckland was a scientific and social success, but unfortunately not a financial one (as the conference lost over \$25,000). We honoured John Darroch and Daryl Daley as Pitman Medallists for 2005 and 2006. ASC 2008 will be held in Melbourne from 30 June – 3 July 2008.

The Young Statisticians organised a very successful Young Statisticians Conference on 13-14 April 2007 in Canberra. The theme for the conference was 'We're Young and We Count'. Eighty-eight delegates from all states and territory and New Zealand participated in the conference.

### 11. Named Lectures

- The E.K. Foreman Lecture was given by Ray Chambers.
- The Knibbs Lecture was given by Richard Jarrett.
- The Belz Lecture was given by Rob Hyndman.
- The H.O. Lancaster Lecture was given by Chris Heyde.
- The E.A. Cornish Lecture is biennial and was not given in this reporting period.

### 12. Sections

Sections and Chairs for 2005-2006 were:

*Bayesian Methods Section*

K. Mengersen

*Survey and Management Statistics Section*

V. Rodriguez

*Statistical Computing Section*

K. Kumar

*Environmental Statistics*

P. Kuhnert

*Statistics in the Biological Sciences Section*

A. Verbyla

*Statistical Education Section*

M. Martin & P. Howley

*Industrial Statistics Section*

R. McVinish

*Young Statisticians Section*

J. Wooton

*Statistics and the Social Sciences*

M. Haynes

Other Sectional and Branch activities have been detailed in the Society's Newsletter.

For the Society,

W. Dunsmuir

Vice President

Secretary

D.E. Shaw

July 2007

## WORKSHOP

**Analysing Spatial  
Point Patterns  
with R**

**12-13 November  
2007, Perth**

For further information:

[www.statsoc.org.au/whatsnew](http://www.statsoc.org.au/whatsnew)



# Obituary

## David Lewis Jones

February 2 1926, Adelaide SA –  
December 18 2006, The Entrance NSW.

David was a doctor, mathematician, academic, scholar, humanitarian and family man. After an early career as a General Practitioner in Busselton W.A., he sought to combine his career loves of medicine (University of Adelaide, 1950) and mathematics (B.Sc., University of Adelaide, 1963). David was introduced by Professor Lancaster (Uni. Sydney) to the emerging field of medical statistics. He became a research fellow at the Lung Cancer Registry then the first medical statistician in the NSW State Health Department.

David worked as a medical statistician on several ground-breaking and interesting projects. He worked extensively on aboriginal health in the 1970's, with Dr



Fred Hollows on the National Trachoma Project, and with Dr Max Kamien on aboriginal health in Bourke, outback NSW. The humanitarian aspects of his work gave him great joy. He also set in

place sampling protocols for studying height and weight of children, and produced a landmark report comparing urban, rural and immigrant children. He also had a brief foray into New Guinea with the Department of Tropical Medicine. In 1985, he graduated with an M.Sc. in statistics (Macquarie Univ.).

David was a staunch church-goer and an intellectual with remarkably broad interests, ranging from the sciences, to music, classical literature and languages. In retirement, he learnt to play the organ, sung in a choir and learnt Welsh. David was a reclusive, self-effacing man with an inner generosity who demonstrated an incredible humanitarian spirit. Family was the centre of David's life. He is sadly missed by his wife Ena, daughters Ceridwen, Euronwy and Menna, and seven grandchildren.

*Menna Jones*

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# Branch Reports

## QUEENSLAND BRANCH NEWS

### June meeting

On Tuesday June 5th Dr Wang of CSIRO Mathematical and Information Sciences, Indooroopilly, spoke on *Smoothing for estimating asymptotic covariance matrices with applications in quantile regression and rank regression with censored survival data*. In an interesting talk, Dr Wang's starting point was that rank based methods are very efficient, but the corresponding estimating equations are not smooth. Therefore it is difficult to estimate standard errors of median based estimators. Based on some asymptotic normal results, Dr Wang illustrated how smoothed estimating equations could be applied to produce both estimates and standard errors. His methods were illustrated with application to quantile regression for flood data, in which relationships between extreme events could be clearly discerned. These relationships were obscured by more usual parametric approaches which rely on parametric forms to extrapolate quantiles. Dr Wang also discussed accelerated failure time models from the same perspective. Further details of the approaches discussed can be found in publications by Brown & Wang (2005, 2007).

Brown, B. M., Wang, You-Gan, (2005), Standard errors and covariance matrices for smoothed rank estimators, *Biometrika*, Vol. 92, No. 1, pp.149-158.

Brown, B. M., Wang, You-Gan, (2007), Induced smoothing for rank regression with censored survival times, *Statistics in Medicine*, Vol. 26, No. 4, pp 828-836.

### July Meeting

On Tuesday July 3rd, Dr Anthony Davison, Professor of Statistics at the Ecole Polytechnique Federale de Lausanne (EPFL), presented a talk entitled "Galaxies, ticks, vineyards and stock market crashes: Hard times for the Poisson Process." His various subject areas were linked together by utilisation of developments of the Poisson process. In a lecture that contained interesting theory, historical observations, and fascinating detail in several application areas, Professor Davison, developed from first principles the familiar Poisson process, and went

on to elucidate how exceedances over a threshold may be regarded as a two dimension Poisson point process with dimensions time and size of exceedance. A modification using a weighting function may be used to account for certain types of non-stationarity, as occurs in certain earthquake modelling, and which Professor Davison has now applied to modelling stock market time series.

A second application was the smoothing of gamma ray counts collected in astrophysical surveys of the Galaxy, where counts were modelled using a spatially variable Poisson mean, and a Bayesian analysis based on a smoothing Gibbs prior was illustrated. In this case, appropriate choice of prior was critical for producing the desired degree of smoothing – with a Gaussian prior being overly smooth. The solution presented involved the absolute value of the differences between neighbouring pixels instead.

A third application involved modelling the behaviour of ticks with a 3 state Markov model with differing proportional hazards in each state. Covariates including temperature, humidity, and illumination were found to predict time in each of three states: questing, walking, and resting. A final illustration dealt with the control of pest infestations in vineyards.

The insightful and interesting presentation was well attended by local members.

Rob Reeves.

### Support for Statistics at a local Science Careers Fair at a local High School

#### Science Career Fair

Three members (Peter Baker, Michele Haynes and Miranda Mortlock) all members of the Science Parent Support Group (SPSG) helped in conjunction with the School Science Department to run a Science Careers Fair at Kenmore High School on 24th July. There was a great response to a 'Maths and Statistics' career table at the recent Kenmore State High Science Careers Fair. One hundred and twenty enthusiastic Grade 10 and 12 students and their parents attended the event. Posters from the Australian Statistical Society (SSAI) and materials from OESR and ABS all helped make the maths/statistics booth look interesting.

Students received a 'Kenmore Science Career Fair Bags' full of materials for science, engineering and maths careers.

### Professional Development Assistance in March

Peter Baker, Michele Haynes and Miranda Mortlock, who are in the Science Parent Support Group (SPSG) had also provided a professional development session for science and mathematical teachers earlier in the school year. The session looked at the link between the science experiment instruction sheet, the collection of data and the use of exploratory statistics to further discuss the result. About twenty maths and science teachers attended and it was well received.

Miranda Mortlock.

## SOUTH AUSTRALIA BRANCH NEWS

### "The Australasian Clinical Toxicology Investigators Collaboration Randomized Trial of Different Loading Infusion Rates of N-Acetylcysteine" presented by Barbara Francis (CMAX)

Barbara Francis gave the first talk in our 2007 programme, and showed us how interesting statistical consulting can be. In this case, a motivation for the clinical trial was the introduction of an antidote to paracetamol overdose, that had been successful in Australia, to the USA. The design of the trial and the data, but not the analysis, were to be presented to the US Food and Drug Administration (FDA). The FDA does its own, undisclosed, analysis and then declares whether or not it considers the treatment safe for public use. The antidote is N-acetylcysteine, which is administered intravenously, and is known colloquially as Nac. To be effective Nac must be given soon after the overdose, so in this respect the quicker the infusion the better. But, Nac has untoward side-effects, in particular an allergic reaction, and these are reduced if it is infused more slowly.

A multi-centre randomized trial was set up to compare the incidence of adverse events when Nac is infused over a 60 –minute period with the incidence of adverse events when Nac is infused over a 15 –minute period. The latter

is the manufacturer's recommendation, but clinicians in Australia routinely use a range of infusion times from 15 to 60 minutes. The sample size was calculated to give 80% power of detecting a halving of the incidence of adverse reactions. A subsidiary objective was to assess whether the longer infusion time reduced the efficacy. Paracetamol overdose affects the liver, and maximum measured serum alanine aminotransferase is an established test of liver function that was used in the trial.

The analysis allowed for a patient's sex, and the time since the overdose, categorized as less than or greater than 8 hours, when this was known. The study did not demonstrate a reduction in Nac-related adverse reactions with the 60 minute infusion. The study did find that treatment with Nac within 8 hours was significantly more effective than later treatment, adding support to results from previous studies. The overall recommendation is that the 15 minute infusion time recommended by the manufacturers should be adhered to. The FDA is satisfied, and the treatment is now available in the USA.

There was a lively discussion that included technical questions and practical matters including ethical issues. An account of the trial has been published, (Kerr et al, 2005), and I think it would make an excellent case study that could be included in courses on medical statistics and the design of experiments.

F Kerr, A Dawson, IM Whyte, N Buckley, L Murray, A Graudins, B Chan, B Trudinger. The Australian clinical toxicology investigators collaboration randomized trial of different loading infusion rates of N-acetylcysteine. *Annals of Emergency Medicine*, 45(4), 2005, 402-8.

*Andrew Metcalf, University of Adelaide*

### Use of the t-distribution as a Robust Regression Tool

Dr Julian Taylor presented work relating to his PhD thesis at the SA branch June meeting. He began his talk by considering reasons why statisticians would want to use robust models, such as down weighting genuine outliers in the data. He also considered reasons why it may be of interest to model the scale parameter, including satisfying model assumptions and avoiding data

transformations. He then described the aim of his PhD which was to extend the robust t-regression model by allowing for heteroscedasticity through the use of a parametric model for the scale parameter.

After describing the familiar heteroscedastic Gaussian distribution, Julian went on to describe the heteroscedastic t-distribution and its similarities to the heteroscedastic Gaussian distribution, particularly in relation to parameter estimation. As for the Gaussian case, maximum likelihood estimates of scale parameters, including the degrees of freedom, are biased. Restricted maximum likelihood is known to alleviate the bias of scale parameter estimates and this is easy to use for the Gaussian distribution but there are problems extending this method for use with the t-distribution and approximate methods are needed.

One approach to this problem is to use a modified profile likelihood when the degrees of freedom are known and a stably adjusted profile likelihood when the degrees of freedom are unknown. An alternative approach was also proposed and although the two methods are completely different, simulations revealed that both methods produce similar results. These approaches appear to work well on data with one extreme outlier but may not be so useful when dealing with other forms of heteroscedasticity.

*Lisa Yelland*

### Mathematically Massaging a Million Markers

At the SA branch July meeting, Dr Ian Saunders from CSIRO talked about statistical genetics, specifically in relation to colorectal cancer. This is the second highest cause of cancer deaths in Australia and the third highest worldwide. The recent increase in incidence is probably due to diet, however there are now less deaths occurring as a result of this type of cancer due to the availability of early detection methods. Currently, approximately 5% of colorectal cancers are caused by genetic links which are understood, 75% cannot be attributed to genetic factors and the remaining 20% appear to be caused by a genetic link but it is unknown which gene is involved. Research is being

conducted at CSIRO with the aim to determine the genetic link.

As humans, most of our DNA is identical. There are however, parts of our DNA which differ. A single nucleotide polymorphism (SNP) is a position in the human genome where a single nucleotide varies between chromosomes while those around it don't. There are millions of SNPs that are known about and these are recorded in online databases. If an association is found between a SNP and colorectal cancer, the SNP must be close to the gene of interest. As there are many SNPs to consider, an efficient way to look for the gene of interest is to study siblings.

Technology in this area is improving rapidly and 900,000 SNP arrays are now available. Genetic studies result in large amounts of complex data and as a result, statisticians have a major role to play in this field. Statistical issues which need to be considered include the large number of false positive results, how to incorporate prior biological knowledge and whether statistical modelling or data mining should be used.

*Lisa Yelland*

## CANBERRA BRANCH NEWS

At the March AGM Dr Brent Henderson from CSIRO Mathematical and Information Sciences (CMIS) stepped down as branch president after a very successful two year term. After a president steps down it is tradition that they give a talk, so in the meeting which directly followed the AGM, Brent gave a very interesting talk titled *'Statistics in the water resources: Ensuring we know when the glass is half full'*. This talk focussed on some examples of the way statistical science is being used by CMIS to improve decision-making for our water resources – something that is clearly important given the water scarcity and the widespread drought.

Brent discussed the problem of choosing where we monitor in a spatial domain, and how that problem differs in the natural resources from other more traditional areas where spatial monitoring (or survey) designs are used. He talked about some current spatial monitoring design approaches, including the Generalised Random Tessellation Stratification



(GRTS) design which aims to select a spatially balanced sample and may be viewed to some extent as combining the good aspects of simple random sampling and systematic sampling. Brent then talked about the estimation of water quality trends and gave an example of a generalized additive model used to estimate non-linear salinity trends. This is flexible methodology that can account for covariates (e.g. seasonality, flow), outliers and the presence of serial correlation. This was followed up by an example of a spatio-temporal trend analysis where different monitoring sites were considered simultaneously. The last example presented was on spatial prediction of water quality on river networks. This illustrated how data collected at different monitoring sites may be combined to make predictions throughout a river network using geostatistical methods. A key aspect that makes this different from traditional spatial prediction is that the notion of 'distance' now depends on the network. There are also challenges in specifying a valid covariance function. The spatial predictions obtained from this methodology have been found to give a very useful visualisation of the water quality across an entire region. They may also help direct future monitoring effort.

Finally, Brent briefly discussed future directions for the statistics in the water resources, including the need to be able to combine physical (or deterministic) models and statistical models, and emerging opportunities created by data coming from automatic collection technologies such as sensor networks.

The Canberra branch would like to give special thanks to Brent for his great leadership and many contributions over the last two years.

*Janice Wooton*

The speaker at the May 29th meeting of Canberra branch was Dr. David Warton from University of New South Wales (UNSW). The title of the talk was "Which Wald Statistic? Implications of re-parameterisation of generalized linear models in environmental impact assessment". The Wald statistic is one of the three most commonly used statistics in hypothesis testing; the others are likelihood ratio and score statistics. The likelihood ratio (LR) test is superior to the other tests because it has better power and does not vary under different re-

parameterisation. However, the LR test is not available when we use Generalised Estimating Equations (GEE) approach. In this situation, we have to resort to Wald or score statistic for testing the hypothesis. Unfortunately, Wald statistics may not have high power in many applications. David illustrated this problem by using multivariate count data from a bush regeneration experiment in which the Wald and score statistics fail to pick significant difference of invertebrate abundance between the control and experimental sites, despite a difference clearly being evident.

David then presented a result for score statistics which explains why, in the context of k-sample tests, score tests have low power when smaller groups have lower variances. This is exactly the case with the bush regeneration data. Because the properties of Wald statistic vary under different parameterisations, the idea was to find re-parameterisation under which the statistic has better properties. He seeks this optimal re-parameterisation within a class of transformations which is equivalent to changing the link function in the case of generalized linear models (GLM). Since the LR statistic is thought to have better performance than the Wald statistic, he first seeks for re-parameterisation that enables the Wald statistic to better approximate the LR statistic. However this optimal power does not guarantee high power. He then seeks transformation that maximized power. Using this criterion, for balanced data he found that the Wald statistic' power is equal under any transformation (no optimal transformation), while for unbalanced data depending on the underlying mean parameters of the groups being tested, he showed that optimal transformation is achieved using either the canonical parameterization (the log link function in case of count data) or identity link function. But since we would rarely have knowledge on the underlying parameters, he suggested the use of variance-stabilizing transformation that will always be the safest bet and have intermediate power. David finished the talk by describing the potential applications of these results beyond k-sample tests and the challenge he is currently faced in extending the result to GLM with covariates. It seems fitting that David is working on Wald statistic,

after all as he proudly showed (with the help from Mathematical Genealogy Project), he is the academic great-great grandson of Abraham Wald, after whom the Wald statistic is named!

David graduated with a PhD in Statistical Ecology from Macquarie University in 2004. He is currently a lecturer at Department of Statistics, UNSW. His current research interest includes developing new methodologies for data analysis in ecological research, and increasing awareness in ecology and related disciplines of existing methodologies. He can be contacted at David.Warton@unsw.edu.au.

*Agus Salim*

## Canberra Branch June seminar

The speaker at June 26 meeting of Canberra local branch was Dr. Robert Clark from the Centre for Statistical and Survey methodology at University of Wollongong. On this occasion, Robert talked about his recent work on developing optimal strategies to sample rare subpopulations in a population survey. He began his talk by explaining this work was motivated partly by his recent experience working with New Zealand Ministry of Health in designing NZ Health Survey. One of the objectives of the survey was to be able to estimate Maori statistics with certain level of specified precision. Maori comprise about 12% of the adult population and approximately 60% of Maori live in Meshblocks (primary sampling units of approximately 50 dwellings) where their proportion is 20% or less, making them a relatively rare subpopulation. With limited survey budget that would only allows sampling of 12,500 households in the whole NZ, achieving the specified precision for Maori is not possible under simple random sampling. This suggests the use of designs in which the Maori is oversampled.

Robert then outlined several commonly used strategies to oversampling subpopulations. These strategies include snowball, dual frame, top-up/screening and disproportionate sampling. Due to several factors, in the NZ Health Survey, the combination of disproportionate sampling with screening using proxy reporting is used. When fixed number of households is chosen from each selected Meshblock, Robert worked out that the

optimal sampling strategy depends on the cost of screening and cost of interview per household. In one extreme when screening cost nothing, simple random sampling should be used to select the Meshblocks and on the other extreme when screening cost is substantial compared to interview cost, the probability of selection for each Meshblock should be proportional to the square root of the Maori concentration in the Meshblock. Contrary to the popular belief that more intensive sampling on the subpopulation will improve the design, Robert found that setting the probability of selection for Meshblock proportional to anything greater than square root of concentration will actually be counter-productive. Robert finished his talk by demonstrating further improvement can be achieved when the number of households selected from each Meshblock is varied, where more households are selected from Meshblocks with lower concentration of subpopulation. After the talk, there are a lot of discussion about the counter-intuitive findings in which member of the audience pointed out some possible mistakes of past surveys which employs more intensive sampling.

Robert Clark graduated from University of Wollongong in 2002 with a PhD in Statistics. Prior to joining University of Wollongong, he worked at the ABS methodology division where he was awarded Ken Foreman Award in 1996 for outstanding achievement and potential of a young methodologist. He can be contacted at rclark@uow.edu.au.

Agus Salim

## VICTORIAN BRANCH NEWS

Professor Kay Lipson has been appointed Dean of the Faculty of Higher Education, Swinburne Lilydale. Kay is a current Victorian Branch Councillor, and has been serving in that capacity since March 2002. She was Branch President from March 2003 to March 2005. Kay's promotion prompts the question: is she the only person from any Branch to serve concurrently as a Faculty Dean and a Branch Councillor? Congratulations, Kay!



### Valid inference after preliminary statistical model selection

Associate Professor Paul Kabaila was the speaker at the April meeting of the Victorian Branch. The meeting was held at the Szental Lecture Theatre, La Trobe University. This is first time that a Victorian Branch meeting was held at La Trobe University, to my knowledge.

Paul addressed a problem that we frequently encounter in applied statistics. It is common for statisticians to carry out a preliminary statistical (that is, data-based) model selection using, for example, preliminary hypothesis tests or the Akaike Information Criterion (AIC). This is usually followed by the statistical inference of interest, using the same data, based on the assumption that the selected model had been given to us *a priori*. Paul emphasised that this assumption is false and it leads to invalid inferences.

The statistical inferences of interest considered were hypothesis tests and confidence intervals, with particular emphasis on the latter. A number of authors have recognised the problem, for example, Hurvich and Tsai (1990, *American Statistician*), Regal and Hook (1991, *Statistics in Medicine*) and Breiman (1992, *Journal of the American Statistical Association*).

Numerical illustrations of the problem were provided for two scenarios.

The first of these illustrations concerned data collected to gauge the effectiveness of cloud seeding. The parameter of interest measures the effect of cloud seeding on rainfall. A confidence interval for this parameter, with nominal coverage 0.95, was constructed after preliminary variable selection in a linear regression model using AIC. Using the computational method of Kabaila (2005, *Australian and New Zealand Journal of Statistics*), the minimum coverage probability of this confidence interval was found to be less than 0.8. Therefore, this confidence interval is completely inadequate.

The second illustration was for a  $2^3$  factorial design with 2 replicates and a particular contrast as the parameter of interest. Paul analysed the same preliminary model selection method as that considered by Mead (1988) in his book *The design of experiments: Statistical principles for practical applications*. New York: Cambridge University Press. Namely, first test the null hypothesis that the third order interaction is zero. If this hypothesis is accepted then test whether or not each of the second order interactions is zero. Using the computational method of Giri and Kabaila (2007, submitted to the *Australian and New Zealand Journal of Statistics*), it was found that the minimum coverage probability of the confidence interval for the parameter of interest, with nominal coverage probability 0.95, is approximately 0.464. In other words,



Paul Kabaila  
Photo: Brian Phillips

this confidence interval is also completely inadequate.

The remainder of the talk focussed on this  $2^3$  factorial design example. There is a common belief that higher order interactions are likely to be negligible. The motivation for the preliminary hypothesis tests appears to be an attempt to utilize this prior information. The idea appears to be that if some higher order interactions are, indeed, negligible then these preliminary hypothesis tests are likely to detect this, hopefully leading to more efficient subsequent inference. As we have seen, this rarely works.

Paul's proposed method for utilizing this prior information is as follows. First, start by considering the effect of preliminary statistical model selection on the subsequently constructed confidence intervals. By extending the functional form of this effect, construct confidence intervals with the following properties. They have the desired minimum coverage probability. They are also (a) relatively short when the prior information is correct, (b) have expected length that cannot be too large and (c) revert to the standard confidence interval (obtained by fitting the full model) when the prior information happens to be badly incorrect. In this way these confidence intervals utilize (in a frequentist setting) the prior information.

Paul stated that whilst the computation of such confidence intervals was both theoretically and computationally challenging, he expected practical solutions to be available later this year.

The following PhD students and colleagues were acknowledged: Khageswor Giri, David Farchione, Sa-aat Niwitpong, Jarrod Tuck and Hannes Leeb.

*Mervyn Silvapulle*

## Nonparametric estimation of a regression curve when the observations are not measured precisely

The speaker at the May meeting was Dr Aurore Delaigle, from the Department of Mathematics, University of Bristol, UK. The talk was rather more technical than is usual for a Branch meeting, but Aurore had beautifully prepared slides and spoke very clearly, thus making the presentation accessible to all. The meeting was held at Swinburne University's Hawthorn campus.



*Dr Aurore Delaigle (left) with Kris Jamsen, the Branch Young Statisticians Representative (centre) and Mervyn Silvapulle, the Branch President  
Photo: Brian Phillips*

Aurore considered nonparametric estimation of a regression function in the case where the covariate is observed with random measurement errors. More precisely, the covariate  $X$  is measured with an additive error  $U$  so that, instead of observing a sample from the variable  $X$  one observes a sample from the variable  $W$ , where  $W=X+U$ , with  $X$  and  $U$  independent. This problem has applications in many different fields because, in practice, it happens very often that one cannot measure a variable very precisely.

In the case where the covariate is measured without any error, there are several ways to estimate a regression curve using nonparametric methods. For example, one can use the Nadaraya-Watson estimator. This estimator requires choosing a kernel function (usually a smooth and symmetric density) and a smoothing parameter called the bandwidth — the choice of the latter is crucial, as it will dictate the quality of the estimator. Fan and Truong (1993) in the *Annals of Statistics* proved that, in the case where the covariate is observed with error, one obtains a consistent estimator of the regression curve by using the Nadaraya-Watson estimator, after appropriate modification of the kernel. In fact, the kernel needs to be replaced by a pseudo-kernel, which depends on the kernel of the error-free case, the error density and the bandwidth.

Aurore showed how one can select the bandwidth by using a cross-validation procedure. In this problem, the cross-validation criterion cannot be

calculated because the observations on  $X$  are not available, and she, with some co-workers, has developed an estimator of this criterion by using a sort of SIMEX (simulation-extrapolation) procedure (see Staudenmayer and Ruppert, 2004, *Journal of the Royal Statistical Society B*, and references therein). Aurore showed on some simulated examples that the method works well. The Fan and Truong regression estimator assumes that the error density is known and she showed how to adapt the estimator in the case where the error density is unknown but the observations are replicated at least once. She demonstrated that the error density can be estimated easily from the sample of differences of replicated observations.

Aurore illustrated the completely data-driven method (where the error density is estimated from the data and the bandwidth is selected by her and her co-workers' cross-validation criterion) on two medical data sets. In the first example, the goal is to relate systolic blood pressure (this variable is typically measured with considerable error) to the risk of heart disease. In the second example, the goal is to compare two methods for measuring peak expiratory flow rate. In both cases, she illustrated the effect of ignoring the measurement error by comparing the results with the naive (untransformed) Nadaraya-Watson estimator. It was seen that ignoring the error produces an estimator which oversmooths the data.

The talk was based on joint work with Peter Hall and Alexander Meister.



## Estimating whale abundance by counting them: a hard case study in the Antarctic

On the 5th of June the Victorian Branch held a meeting in Hobart at the CSIRO's Marine Laboratories, possibly the first ever Branch meeting held in Tasmania. A total of 25 people attended the presentation and all reported that they were excited that the evening was occurring. Mark Bravington presented a lively and interesting talk on estimating whale abundance. It could even be said that everyone had a 'whale' of a time.

Mark first introduced us to the ideas behind estimating animal abundance from line transect surveys and some of the methodology used to analyse them. These methods are conceptually appealing but restrictive in terms of a number of issues that arise in surveys of various species. In particular, Antarctic minke whales seem to exhibit almost all the issues presented, and even seem to have a few more due to the 'interesting' data collection methods employed at various times through the 30 year collection period.

Mark went on to describe how he has tackled the analysis for the Antarctic minke whale data set. The analysis consists of using different data types to model different aspects of observing

whales: how far away the school was, who saw it, how many whales were in it, and where the school actually was. Outputs from some models form part of the input into other models, so uncertainty from the former needs to be accounted for in the latter. The nature of the relationship is complex and accounting for this uncertainty analytically is impossible. Mark uses approximate methods based on derivatives obtained using automatic differentiation methods. The data set itself has a strong spatial component to it. Since coastline features such as peninsulas can introduce 'discontinuities' in distribution which are ignored by most smoothers, Mark (and co-authors) have developed smoothers based on the physics of soap films which take into account the complex boundaries of the region.

Everyone who attended (with no exception) declared that they would be interested in more meetings concerning statistical methods. This is encouraging. The statistical scene in Hobart is evidently alive and well — just a little disjointed at the moment.

The evening concluded with some good wine, good food and a number of people who were obviously relieved to be able to talk about statistically related issues.

*Scott Foster*

## WESTERN AUSTRALIA BRANCH NEWS

The March seminar of the WA branch was given by Professor David Andrich, who had only just taken up the Chapple Chair as Professor, Graduate School of Education, at the University of Western Australia after having been Professor of Education at Murdoch University since 1986. His talk "Inferring parameter estimates in an experimentally independent response space of a logistic regression model from its experimentally dependent response subspace" reflected his thinking and experience in working in fields of education, psychology and the social sciences. David's chosen topic for discussion was a further development of the paper: Andrich, D. (1979). A model for contingency tables having an ordered response classification. *Biometrics*, 35(2), 403-415. The discussion began with an example from the contingency table context, e.g. Frequency of disturbed dreams among boys aged 5-15 referring to Nelder & Wedderburn (1972) JRSS Series A, 135,370-384. This was followed with a quote from R.A. Fisher "It will be observed that the numerical values.... lie....in the proper order for increasing reaction. This is not a consequence of the procedure by which they have been obtained, but a property of the data examined" Fisher (1958,p.294).

The requirement is equivalent to having empirical evidence that the thresholds which define the boundaries of the contiguous categories show increasing locations on the continuum, and not for example that they are indistinguishable. In a design in which *dichotomous* assessments at the successive thresholds are experimentally independent, this evidence can be readily established. David pointed out that in general, however, dichotomous assessments at the thresholds are neither observable nor independent. Instead, he says, because there is only one response in one of more than two ordered categories, *they are latent, must be inferred and are experimentally dependent.*

David showed using the Rasch model, which specialises the logistic regression model in the context of contingency tables, that, one could provide necessary and sufficient evidence that the thresholds



*Dwarf minke whale*  
Photo: Royal Australian Navy staff newsletter

are ordered empirically as required. He showed that the threshold estimates obtained from the Rasch model in which the latent dichotomous assessments at the thresholds are necessarily dependent have the same values as if the dichotomous assessments at the thresholds were experimentally independent.

This powerful result was illustrated by analysing the relationship between three response outcome spaces. In doing this he noted the necessity to make subtle distinctions between *values* and *structures* of response probabilities, between *compatible* and *determined* relationships, and between *manifest* and *latent* outcome spaces. His results were illustrated using a simulated example and an example using social mobility.

A select group adjourned to dinner at a nearby restaurant.

*Brenton R. Clarke*



*President Brenton Clarke delivers the honours scholarship award to Nicole Warrington.  
Photo: WA Branch News*

## WA Branch Honours Scholarship Award

At the May meeting Nicole Warrington received a cheque for \$500 being for her award as the 2007 Honours Scholarship Winner. The Honours Scholarship is offered by the WA Branch each year to the best honours student applicant from a Western Australian University.

In 2005 she completed a Bachelor of Science at Victoria University of Wellington, New Zealand, with majors in Statistics and Psychology.

After completing her undergraduate degree she worked at Statistics New Zealand as part of an internship programme.

She is currently completing a Bachelor of Science Honours course majoring in Applied Statistics with the Western Australian Institute of Medical Research at the University of Western Australia, focusing on statistical methodology for the analysis of genetic and epidemiological data. Her thesis topic investigates the genetic association of asthma in a family-based population (involving variance components analysis in a mixed models framework and the use of the EM algorithm to deal with missing data).

According to the judges “Nicole has a strong academic record, and gives the impression of a young person with definite goals and great zeal for a

statistical career. She wrote an excellent and convincing application, and received strong recommendation from referees.”

Following on from the May meeting, the June meeting of the WA Branch of the SSAI was a further celebration of young statisticians, with interesting presentations given by Rebecca Hogan and Jason Rabbitt describing projects they have undertaken for the Australian Institute of Health and Welfare (AIHW) and Data Analysis Australia (DAA) respectively.

With a combined interest in statistics, epidemiology and biomedical fields, Rebecca accepted a graduate position in the Ageing and Aged Care Unit of AIHW in Canberra at the completion of her undergraduate degree. Rebecca explained the mission of AIHW as providing “Better health and wellbeing for Australians through better health and welfare statistics and information”. The statistical work of the Ageing and Aged Care Unit includes producing their flagship publication “Older Australia at a Glance”; statistical reporting and analysis of aged care programs; analysis of the health of older Australians; providing ad-hoc support on statistical requests for other organizations; extraction, analysis and presentation of data (including data from ABS population surveys and

administrative data collections); and data collection and development.

Within the Ageing and Aged Care Unit, Rebecca’s main responsibilities were in the health and disability areas, in particular, research into dementia, one of the greatest single contributors of disease of aged people in Australia. The statistical issues faced in this area of research are many, from defining and classifying people as suffering dementia, measuring prevalence rates, analysing the characteristics and demographics of dementia sufferers, expenditure on people with dementia and research into carers and the use of services.

There were a number of challenging aspects to Rebecca’s analyses. A major challenge related to data limitations, needing to overcome issues with identification of the disease, non-disclosure of some administrative data that had been collected by other organizations and missing or non-collected data items from other sources. There is also little longitudinal data available and sample sizes within a single study are often limited. To overcome some of these issues, Rebecca conducted meta-analysis whereby she integrated data from a number of sources with different methodologies or study populations to obtain composite estimates of measures of interest.

Rebecca has now returned to Perth where she is studying a PhD at UWA whilst continuing to work for AIHW on a casual basis. As a thank you to Rebecca for presenting such an interesting talk, the local Branch offered her free student membership, a recent initiative to encourage more presentations by student statisticians at our local meetings.

Jason continued the seminar by presenting the findings of his contribution to the Cockburn Sound Comprehensive Baseline Study. Cockburn Sound is located south of Perth and is the location of a newly operational seawater desalination plant. In commissioning the desalination plant, the Water Corporation had an obligation to minimise the environmental impact and protect water quality. As part of a big team effort, Data Analysis Australia assisted Oceanica Consulting to complete the baseline study which will be used as a basis to measure changes over time.

Jason focused his talk on one objective of the study, which was to look for relationships between benthic infauna data and environmental data collected across Cockburn Sound. Benthic infauna are small creatures including polychaete worms, crustaceans (crabs and shrimp), molluscs, and echinoderms (starfish, sea urchins, sand dollars and their relatives). These creatures live in underwater sediment and are a good indicator of environmental health.



Cockburn Sound is a far from uniform environment and samples were taken from 77 sites for analysis. Each sample had 49 environmental variables recorded (grouped into 5 broad headings, called “variable groups”), counts for the presence of 188 species of benthic infauna and location, measured by eastings and northings. These variables were all measured on vastly different scales and were not directly comparable. Thus, to be usable, the multidimensionality had to be reduced.

To do this, Jason researched a technique called multiple factor analysis, an extension of principal components analysis. The first step was to make the variables within each variable group comparable, by using different transformations, centring and scaling. The second step was to make each variable group comparable by transforming each dataset by dividing it by its first singular value. The third step was to run a principal components analysis on the transformed variable groups.

Of the 77 principal components, 7 were found to be relatively important. Jason discussed the first 2 principal components in detail. The first component showed a reasonably continuous North-South gradient, leading to the observation that exposure to open water is likely to drive this component. The second component tended showed the distribution of the water column nutrients across the Sound. The benthic infauna were important variables for both these components.

Jason had previously given this talk at the Young Statistician’s Conference in Canberra, for which he won the award for best presentation given by a young statistician.

*Anna Munday*

The July seminar of the WA branch was given by statisticians from The Institute for Child Health Research, which is the research institute founded by 2003 Australian of the year, Fiona Stanley. The first part of the talk was given by Professor Nicholas de Klerk, who has been the head biostatistician at ICHR since 2000. Before his appointment at ICHR he lead the Occupational Respiratory Epidemiology Group in the Department of Public Health at the University of Western Australia for 10 years.

Nick’s talk focused on the possible link between mobile phone use and brain cancer. He first highlighted the growing use of mobile phones and how any deleterious effect of their use could be a major public health issue given their ubiquitous nature in society. He then reviewed various studies that have been done, some of which have found a significant increase in brain cancer from mobile phone use. Upon further investigation Prof de Klerk was able to assure the audience that further work needed to be done before we threw our mobiles in the bin. One example was that some studies tried to examine which side of the head people generally used their phone and whether there was a link to getting a cancer on that side of the brain. However this sort of data is very unreliable and people who get brain cancer are obvious predisposed to report that they used their mobile phone on that side of their head.

The 2nd part of the talk was given by Peter Jacoby who is a Senior Research Fellow at ICHR. He has worked in Child Health Research for over 5 years and before that worked in industrial statistics as well as lecturing at Edith Cowan University.

Peter’s talk focused on analysing longitudinal carriage data, such as that found in the pneumococcal carriage data from the Kalgoorlie Otitis Media (or inner ear infection) Research Project in Western Australia. He first outlined the conventional approaches such as random effects modelling where the assumption is made that the data are drawn from a single population.

He then discussed an alternative approach, namely group-based models whereby qualitatively distinct trajectories of carriage vs. time are identified and individuals are assigned to trajectory groups. This can offer valuable insights into patterns of carriage, and association of group membership with disease data can assist in understanding the pathways to infectious disease. He presented some results from the Kalgoorlie data set including showing the differences in aboriginal and non-aboriginal patterns of disease.

Some members then adjourned to dinner at a nearby restaurant, where no mobile phones were used, just in case.

*Marty Firth*