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# Editorial September 2008



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## PRINTING

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**DEADLINE FOR NEXT ISSUE:  
10 NOVEMBER 2008**

The Editors hope that everyone who  
took part in ASC 2008 in Melbourne  
had an enjoyable and productive time.

This issue of the newsletter contains  
a variety of reports on events at  
and surrounding ASC 2008, and we  
hope they inspire good memories or  
determination to be a part of it all in  
Perth in 2010!

The Editors would also like to  
congratulate Service Award winners  
Neville Bartlett and John Henstridge;  
and Pitman medallist John Robinson.

More extended tributes to these  
statisticians will appear in a later  
issue.

There's also a number of branch  
reports in this issue, reminding us all  
that even if you can't make it to the big  
conferences, there's always something  
going on in the Stats Society at a local  
level.

*Alice Richardson*

Editor

## Conferences

**New Zealand Statistical Association Conference**  
1 – 2 September 2008, Hamilton, New Zealand  
The call for papers will be linked from <http://nzsa.rsnz.org/NZSA2008/index.htm>

**Australasian Conference on Mathematics and  
Computers in Sport**  
31 August - 3 September 2008, Coolangatta, QLD  
[http://www.anziam.org.au/MathSport/  
Conference.html](http://www.anziam.org.au/MathSport/Conference.html)

**International Conference on Applied Probability  
and Statistics (with emphasis in Business and  
Industrial Statistics)**  
1 - 3 December 2008, Hanoi, Vietnam  
<http://www.action-m.com/CAPS2008/>

**Australasian GenStat Conference: Biometrics in  
Primary Industries and the Environment**  
2 - 5 December 2008, Marylands Country House,  
Yarra Valley, VIC [www.dpi.vic.gov.au/genstat2008](http://www.dpi.vic.gov.au/genstat2008)

**NatStats conference**  
19 – 21 November 2008, Melbourne, VIC  
<http://www.nss.gov.au/natstats/natstatshome.nsf>

**“Introduction to R” and “A new approach to  
Meta Analysis”**  
Two One-day Workshops  
27-28 November 2008, La Trobe University,  
Bundoora Campus, Melbourne  
<http://www.statsoc.org.au/WhatsNew/>

**The Mathematics and Statistics in Industry  
Study Group**  
27-31 January 2009, Wollongong, NSW  
[http://www.uow.edu.au/informatics/maths/  
research/misg/index.html](http://www.uow.edu.au/informatics/maths/research/misg/index.html)

**Australian Statistical  
Conference 2010**  
6 – 10 December 2010, Perth, WA  
<http://www.promaco.com.au/2010/asc/index.htm>

# Two One-day Workshops

## INTRODUCTION TO R THURSDAY 27TH NOVEMBER 2008

**The R system is a free software environment for scientific and statistical computing and graphics that runs on all common computing platforms. It offers an unrivalled range of statistical and other scientific computing abilities. R is becoming extremely popular amongst those who wish to analyse data and is used by researchers at the forefront of the development of new statistical methodologies.**

This workshop is aimed at those who are unfamiliar with R or those who want to refresh their basic knowledge in order to re-start using R again. The workshop will be conducted by Luke Prendergast and range from getting started with R through to examples of statistical analysis using R. A set of notes will be provided.

## A UNIFIED AND MORE EFFICIENT APPROACH TO META ANALYSIS FRIDAY 28TH NOVEMBER 2008

**This course is intended for statistical consultants and researchers in the fields of medicine, social and psychological sciences. It may also be of interest to university students and academics who want a simple but practical measure of evidence for alternative hypotheses.**

This short course is an introduction to the basic ideas of meta-analysis, and includes traditional methods for combining results from different studies, whether they are in the form of one- or two-sample data, for both discrete and continuous measurements. Tests for heterogeneity assist in the choice of fixed or random effects models.

In addition, this course includes new, more efficient methods based on variance stabilisation of all basic test statistics. This unified approach leads to more accurate confidence intervals for effect sizes in both individual and combined studies.

Participants will learn how to transform test statistics so that the evidence in them for alternative hypotheses can be calibrated. This procedure yields shorter confidence intervals

for effect sizes. In addition, a simple relationship between expected evidence and test level and power enables one to more accurately estimate the power function of a test, and hence more accurately choose the sample size required to obtain power against an alternative of scientific significance.

Some acquaintance with the statistical methods and the software package R is desirable, as R demonstration macros and R functions will be provided to carry out computations and to display results. Participants will be able to bring their own laptop or use statistical laboratory computers in order to do the exercises. Those unfamiliar with R or who have not used R recently can take advantage of the R workshop on Thursday 27th November 2008.

The course is based on the book: Meta Analysis: A Guide to Calibrating and Combining Statistical Evidence (Wiley Series in Probability and Statistics) by Elena Kulinskaya, Stephan Morgenthaler, and Robert G. Staudte (Paperback - April 25, 2008)

For more details about these workshops and a registration form go to <http://www.statsoc.org.au/WhatsNew/>

## Notice to all SSAI Members:

**The SSAI Executive Officer will be on annual leave from 26 September until 14 October 2008.**

**The SSAI Office in Canberra will be closed during this time.**

**For urgent enquiries, please contact Doug Shaw at [Doug.Shaw@csiro.au](mailto:Doug.Shaw@csiro.au)**

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# Young Statisticians Network

## YOUNG STATISTICIAN REPRESENTATIVES

**The Young Statistician Network has positions for a National YS representative (currently co-chaired by Fiona Beer & Kevin Wang 2008/2009). The current state representatives are: Frank Liu (ACT), Stephen Bush (NSW), Helen Thompson (QLD), Penny Bennett (SA), Karl Jackson (VIC), and Alex Stuckey (WA). There are currently open positions in New Zealand, Tasmania, and the Northern Territory – if you are in these areas and are interested in being the representative for 2008/09 please contact Fiona or Kevin.**

Since the ASC the state representatives are now going to have a teleconference catch-up the first Thursday of each month. The first catch-up was in August, where we discussed re-branding the Young Statisticians into a Network. We will be meeting again next month to further develop the branding of the YS network – what we stand for, how often we should meet in a professional and social manner, and how to attract more active members of the YS network. If you have any ideas please don't hesitate to contact your state representative, or start a discussion thread on the facebook page "Young Statisticians of Australia". We will keep you all updated in each newsletter.



**Logo for the YS Network: If you have an artistic flair and would like to design a YS Network logo we'd love your input.**

The YS representatives also decided each State/Territory holding a careers information night with a social theme. Canberra has already had a very successful careers night in May, with the other states to have their careers nights before the end of the year.

## ASC 2008 CONFERENCE UPDATE

Welcome all Young Statisticians! Now, as some of you know we recently met during the Australian Statistical Conference in Melbourne (30th June – 3rd July). On the first day the Young Statisticians ran sessions all day which included networking and career information. Then a social dinner of a fantastic pub meal at Mrs. Parma's. Firstly we'd like to thank the YS conference committee –without whom the day would have not been as productive. Theresa Nunan, Stephen Bush, Richard Hutchinson, Rian Caccianiga, Jason Rabbitt, Damien Kennedy, Fiona Beer, Kevin Wang, and Derchie Hung.



We started the morning with some ice-breakers and networking sessions, and in total we had 65 people attend! We'd like to thank everyone for attending (Young Statisticians and not so new to their careers). The career sessions included talks from a sports statistician (Karl Jackson), a psychometrician (Dr Siek Toon Khoo), a biostatistician (Dr Philippa Clarke), a market research statistician (Dr Helen Bartley), government statisticians (David Lovell, Theresa Nunan, & Damien Kennedy), and a consultant statistician (Dr John Henstridge).

There are more photos currently on display on the facebook group (Young Statisticians of Australia) – please tag yourself in them.

If you would like to be involved in organising the 2009 YS conference in Sydney or if you would like more information on these presentations please email either Fiona (beerf@amgen.com) or Kevin (wang\_ko-kang@lilly.com).

# Three Doors with Borek Puza (Edition 15)

**Welcome to the 15th edition of *Three Doors*. Regarding The Ten Digits Puzzle in the last edition, several persons wrote in with the correct solution, some with extensive discussion and analysis of related problems. Following a random draw, I am pleased to announce Conrad Burden as the next winner of the Three Doors Prize, a cheque for \$60 as donated by SSAI. The puzzle and its solution plus discussion are given below.**

## THE TEN DIGITS PUZZLE

In how many ways can the ten digits 0,...,9 be written in a row so that each digit other than the left-most is within one of some digit to the left of it?

## SOLUTION

Observe that the sequence of digits must end with 0 or 9. (For example, if it were to end with 8, then 9 would appear earlier and not be within one of some digit to the left.) Therefore, as we write the digits *from right to left*, we always have a choice between writing the *highest* unused digit or the *lowest*, until we hit the left, where these two choices coincide. Thus there are two choices at each of 9 opportunities, and hence the total number of ways in which the ten digits can be written is  $2^9 = 512$ .

## DISCUSSION

This puzzle was taken from Winkler (2004, page 21), who in turn sourced it from a 1960s Putnam Exam. The puzzle is interesting because it can most easily be solved *backwards*, as above. The following is a *forwards* solution, thanks to Brian Davies and Andrew van Burgel. If the first digit is 0, then the others must follow in ascending order. If the first digit is 1, then there are 9 places the 0 can go, after which the other digits must follow in ascending order. If the first digit is 2, then there are  $C(9,2) = 9!/(2!7!) = 36$  places the 1 and 0 can go (these must be in descending order), after which the other digits must follow in ascending order. This logic leads to the required number of ways:  $1 + 9 + C(9,2) + C(9,3) + \dots + C(9,9) = 2^9 = 512$ .

Yet other methods of solution are possible, for example by induction, as submitted by Terry Neeman. Another method, as submitted by Conrad Burden, is to consider an equivalent process whereby ten balls are placed into a row of ten boxes, one per box, so that each ball is added to the box at either the left-hand end or the right-hand end of the contiguous set of boxes already containing balls. Clearly, there is a one-to-one correspondence between ways to fill the ten boxes and ways to write the ten digits, and so we ask: In how many ways can the ten balls be placed into the ten boxes? But this is equivalent to the time-reversed problem: In how many ways can the ten balls be *removed* from the boxes if only the left-most or right-most ball can be removed at each stage? For the first 9 steps there are two choices as to which ball to remove, and for the last ball there is only one choice. This logic (which is essentially the same as the logic in the first method shown above) once again leads to the answer:  $2^9 = 512$ .

### References

Winkler, P. (2004). *Mathematical Puzzles: A Connoisseur's Collection*. Natick, MA: A K Peters, Ltd.

## OZCOTS 2008

On 3rd and 4th July, OZCOTS 2008 was held in Melbourne as an overlapping satellite to the Australian Statistical Conference (ASC) whose 2008 theme was Celebrating Diversity. OZCOTS 2008 was the 6th Australian Conference on Teaching Statistics, and combined the interests of the Statistics Education Section of the Statistical Society of Australia Inc (SSAI) with activities of Helen MacGillivray's Australian Learning and Teaching Council (ALTC) Senior Fellowship. The ALTC (initially named the Carrick Institute of Learning and Teaching in Higher Education) was established late 2004 as an Australian Government initiative. The Senior Fellowship Scheme supports leading higher education teachers to undertake full time program of highly strategic activities over one year. Only one to three senior fellowships are awarded per year over all disciplines and Helen was one of the inaugural fellows. Such recognition of the importance of teaching statistics in higher education is of significant value to the statistical and statistical education communities, and the holding of OZCOTS 2008 in association with the ASC as part of the senior fellowship program aimed to highlight this.

The OZCOTS 2008 program consisted of six invited papers, eighteen contributed papers, and two forums. The program, abstracts and preliminary proceedings are available at <http://silmaril.math.sci.qut.edu.au/ozcots2008/>. A link is also available to photos taken at OZCOTS by that well-known keen photographer of statistics education events, Brian Phillips. The six invited speakers at OZCOTS are members of the Senior Fellowship's international collaborative team, and their participation in OZCOTS 2008 was fully funded by the Fellowship. OZCOTS was also supported by the Australian Statistical Conference and the Victorian Branch of the SSAI.

OZCOTS was held at the same venue as ASC and delegates could register just for OZCOTS or could "add" registration for the second day to their ASC registration. The arrangement of the first day of OZCOTS being available to ASC delegates at no extra charge was highly successful with standing room only available on the first day with many ASC delegates attending part or all of the OZCOTS program. A number of ASC delegates who had not pre-registered for the second day of OZCOTS, were so interested by the first day that they stayed on for the second.



*At the conference dinner.*

The invited papers were

- *Applied Statistics as a growth engine for statistics programs* by Chris Wild
- *Technological Literacy and Statistics Education: a call for thought and research* by Rob Gould
- *On becoming a statistician* by Peter Petocz
- *Statistical cartoons: the role of graphics in understanding statistics* by Adrian Bowman
- *Experience first, logic later* by Larry Weldon
- *What lies beneath: inventing new wheels out of old* by Michael Martin.

All the invited and contributed papers gave rise to lively discussion, as did the two forums with panels of the invited speakers leading the

*Michael Martin, invited speaker.*



*Adrian Bowman, invited speaker.*



*LEFT: Larry Weldon, invited speaker and RIGHT: Peter Martin performing at the conference dinner.*

discussion. A report on the two forums will be posted on the OZCOTS website.

A statistical education presence during the ASC was also provided by Helen MacGillivray's invited paper on "Building foundations for statistician education" on the day before OZCOTS. This paper was well attended and led to considerable post-paper discussion and interest.

Delegates enjoyed a convivial and lively conference dinner overlooking the river and Melbourne's lights, with entertainment provided by local balladeer extraordinary, Peter Martin.

Calls for an encore were satisfied by a repeat performance at the close of the conference after the forum on "Where to from here?" As a measure of the success of OZCOTS 2008 and the enjoyment expressed by delegates, we are already investigating holding an OZCOTS in association with the next ASC in Perth, 6th-10th December, 2010.

*During one of the sessions.*



## Dr. Frank Hansford Miller

26 November 1916- 21 February 2008

**The Western Australian Branch of the SSAI noted the passing of one of its long time stalwarts. Frank was until recent years an active though retired member of the WA Branch. In fact, Frank joined the branch after retiring from his position in London. Some here queried where he actually worked when he was in London, though one can assume that some time between being Head of Maths at Haverstock Comprehensive School and signing himself as Mr., and later being Dr Frank Hansford-Miller at the Inner London Education Authority where he had commented on a number of papers in particular the read articles in Applied Statistics (Journal of the Royal Statistics Society Series C), he was happy to assume his title. From his own notes written before he passed away Frank wrote that that he entered University College London, to read mathematics in 1946. His studies were interrupted in 1947-1949 by a hospitalisation due to tuberculosis of the spine where three vertebrae were eaten away. He was not beaten; he fought back and graduated BSc, later entering King's College in the University of London, at first full time and then part-time doing research for his MSc and PhD.**

On retirement Frank came with his wife Phyllis to Perth, the attraction apart from the climate, being that while they themselves had no children, his wife Phyllis had a sister who had emigrated from England and came out to Western Australia Perth some time before and who had established a family.

Frank came out to Perth in the early nineteen-

eighties and soon became known to the local statistics fraternity through becoming acquainted with Terry Speed, the Professor of Statistics at the University of Western Australia. Terry recognized Frank's name from the many commentaries he had made on published proceedings of the Royal Statistical Society. Consequently, Frank became a tutor at UWA,

Murdoch University, and Curtin University.

Frank had had a varied life, and this just added to the spice of the meetings of the local branch of the statistics society, where he would inevitably ask a question of the speaker, link it to some interesting facet of his own life experience, and query the speaker's thoughts. Not every speaker was enamored with his style but it certainly gained Frank some respect- indeed he was asked by the local Branch executive for an interview to try and encapsulate some

of his thoughts on statistics-and life in general. This interview is available at

<http://www.statsoc.org.au/resource/pdfs/ssaiNewsletter/newsletter101.pdf> .

Frank revered his adopted country and it was fitting that at his burial at Pinaroo cemetery in Perth, there was in the vicinity gum trees, a sheep, a kangaroo. As the casket was being lowered a crow flew over and did a job on it, something for good luck as one of his relatives observed. The temperature was 41 degrees in the shade. It was an appropriate Australian sendoff.

Frank has left a small portion of his estate to The WA Branch of the Statistical Society of Australia Inc.





# Science Meets Parliament (SMP)

// SMP

**This is an annual two-day event organised by the Federation of Australian Scientific and Technological Societies (FASTS) to facilitate interaction between scientists and federal parliamentarians. The topics for this year were Australia's science and innovation capacity and the ability of science to help understand and manage social and environmental challenges. Each member society sends two representatives to SMP.**

## A YOUNG STATISTICIAN'S PERSPECTIVE:

The most important benefit from attending SMP (Science Meets Parliament) was the contacts that I made. I now have quite a stack of business cards and a clearer picture in my mind of the types of work other scientists are doing out there in Australia. I think meeting the other scientists who attended was probably more important than actually meeting the MP's. I realised that there are a lot of scientists who are collecting data and undertaking statistical analyses. A number of scientists mentioned statistical aspects of their projects. It soon became clear that the problems they were trying to solve looked both challenging and interesting and I think in some instances having a statistician on hand would really help them with their work.

I have come to the conclusion that there are certainly opportunities out there for statistical consultants to fill. I get the impression that sometimes scientists may not realise they can really gain something from talking to a statistician. I think the SSAI really benefited from sending representatives to this because we were advertising the statistical profession to other scientists and politicians. Statistical awareness is something we really need to pass on to others outside our profession.

Of course I should mention that it was good to actually meet some senators too. The senators I talked to appeared to be genuinely interested in science and mathematics issues such as education and the shortage of trained mathematicians and statisticians. Hopefully they will do something about these issues.

It was good having both a very experienced statistician and a younger statistician sent to SMP and I suggest we do this in the future

as well. I especially benefited from attending because as a young statistician, getting established and making contacts is essential (and I certainly made a lot of contacts!).

## AN EXPERIENCED PERSPECTIVE:

I agree that having statisticians attend SMP is very valuable. This year, I joined with others to meet with Julia Gilliard's adviser to push for the implementation of relevant recommendations from the Review on Statistics at Australian Universities and the National Strategic Review of Mathematical Sciences Research in Australia. We reinforced the national importance of a critical mass of mathematical scientists across research, education, industry and government entities to ensure that we maintain and build our technical and problem-solving capability.

We applauded the 50% increase in financial support for mathematics and statistics students at universities, but were concerned that this funding did not necessarily reach those teaching courses in these disciplinary areas.

We also indicated that we intend to have a more co-ordinated and cohesive input into government strategy on matters that would affect mathematical sciences. This is consistent with the strong cooperative spirit that we are developing among those working across all levels of education (be it schools or universities), research entities, government institutions and private enterprise.

All SSAI members could help by continually stressing to their friends, colleagues and the general population that underlying quantitative skills are valuable in almost any occupation and are particularly necessary for solving some of the big issues facing the world today. Maybe then we will have an impact on student engagement and enrolment choices in our area. The jobs are already there!

JANICE WOOTON AND  
KAYE BASFORD

## ANZJS Joint Venture Proposal

KAYE BASFORD  
(for the Management Committee)

**In 2001, the Statistical Society of Australia Inc. (SSAI) and the New Zealand Statistical Association (NZSA) signed a Memorandum of Agreement to jointly produce a journal known as the Australian and New Zealand Journal of Statistics (ANZJS).**

The Australian Statistical Publishing Association Inc (ASPAI) is the incorporated association with the sole purpose of publishing ANZJS, i.e. our publishing arm. It has separate accounts to SSAI, but is wholly owned by SSAI, and its officers are the officers of SSAI. Nevertheless, the contract with the current publisher of ANZJS, Wiley-Blackwell, is with SSAI and NZSA, not with ASPAI.

For the past few years, we have been tidying up the financial relationship between SSAI and ASPAI in preparation for formalising our relationship with NZSA to jointly publish ANZJS. Our desire is to remove ASPAI and enter into a new contractual arrangement for the ongoing publication of ANZJS.

A management Committee for ANZJS was established. This committee consists of Kerrie Mengersen, Roger Littlejohn, Murray Jorgensen, Neville Bartlett and Kaye Basford.

We have obtained legal advice on the best way to proceed, and the recommendation is to form a Joint Venture. Here, the parties (SSAI and NZSA) contract to carry on a specific project (publication of ANZJS) and the contract will comprehensively set out the rights and obligations of the parties.

NZSA and SSAI would remain owners of copyright and other intellectual property rights, would enjoy the profits of the publication and would be the direct contractors with Wiley-

Blackwell and others.

A joint venture allows the flexibility of SSAI and NZSA to carry on their other business and only join together in relation to the publication of the Journal. It can be tailored to suit the parties' needs and does not need to be unnecessarily complicated.

The management of the Joint Venture would be based on the current Management Committee, and would consist of the Managing Editor of the ANZJS and two representatives from each of SSAI and NZSA.

At the recent Annual General Meeting, it was agreed in principle that we enter into contractual negotiations to establish a suitable joint venture agreement. This would properly reflect the desired arrangements between the parties and avoid any confusion over NZSA's role. Considerable progress has been made in this regard, but some details are yet to be defined, e.g. the ratio in which the two societies will contribute seed funding (now and at some possible future date) and how financial assets would be split if the arrangement came to an end.

Approval in principle is also being sought from NZSA at their next Annual General Meeting (1 September 2008). If that is obtained, then the joint venture agreement would be prepared and presented to both Executive Committees for approval in the next 6-12 months.

On acceptance and execution of the joint venture agreement, we would inform Wiley -Blackwell and other interested parties of the new situation and remove all references to ASPAI and commence steps to wind-up/dissolve.

## Looking for a job?

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

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

Do you have a job to advertise on the website?

Email a position description to [dwuf@wehi.edu.au](mailto:dwuf@wehi.edu.au) Listing is free!

This service is proudly brought to you by:

SSAI 

# NatStats08 Conference

## Early Bird Registration is now open.

### Register before the 26th September and save!

**The inaugural NatStats08 Conference will be held at the Crown Promenade Hotel in Melbourne on the 19-21 November 2008. The Conference will focus on the measurement issues surrounding key government policy areas.**

For over one hundred years, statistics have been an important source of information that has contributed to the management of Australia's economy, society and environment. But the world is changing - new statistical requirements are emerging, new sources of data are becoming available through administrative systems, and existing statistical series need to adapt to meet the challenges that are ahead.

NatStats08 is a key event for the National Statistical Service which is being led by the Australian Bureau of Statistics as part of its mission to increase the use and understanding of statistical information. The ABS recognises that it is just one of many providers of statistics to the Australian community; through the National Statistical Service it aims to provide a unified source of statistical information that can be used to inform debate, policy making and evaluation. There is a strong and emerging need for good

information to support policy development and performance evaluation across governments in Australia. Good information is required to answer questions that are important to Australians, their families and their communities.

The NatStats08 will cover the following themes: Informing the Nation, Measuring the Progress of Society and Environmental Information for Informed Decisions. The conference will then conclude with a panel discussion on "Statistics in the 21st Century", which includes SSAI member Murray Cameron.

NatStats08 is the first national conference to bring together an array of high profile researchers and policy makers from all levels of business, academia, government and the community to discuss strategies for improving future statistics for the nation.

Speakers include: Mr Enrico Giovannini - Chief Statistician of the OECD; Dr Ken Henry AC - Secretary to the Treasury; Mr Greg Bourne - CEO of the World Wildlife Fund, Australia; Tim Costello - CEO World Vision Australia; Professor Fiona Stanley - Director, Telethon Institute for Child Health Research.

## On an Expression of Generalized Information Criterion

**At the July meeting of the SA branch, Zeng-Hua Lu, Associate Lecturer from the School of Mathematics and Statistics at the University of South Australia gave a very informative talk on improving the consistency property of the criterion based approach for model selection.**

In the criterion based approach for model selection, one chooses a model which maximizes the log-likelihood function among a finite number of candidate models. Consensus is that the Bayesian Information Criteria (BIC) and its Generalized Information Criterion (GIC) enjoys the consistency property of correctly identifying the true model with probability one. In his talk, Zeng proposed a particular expression of the GIC by raising  $\log N$  in the penalty term of the BIC to the power  $r$ .

One of the popular applications of model selection criterion is variable selection in linear regression models. While the Akaike Information Criterion

(AIC) often results in selecting too many covariates (overfitting), BIC often just retains those very influential ones (underfitting). Using cross validation techniques for estimating  $r$ , the proposed criterion can make considerable improvement to the BIC. In practice, it has been found that  $r \in [0, 3]$  satisfies most needs, which suggests one could search for  $r$  over much smaller range than the theoretic one  $[0, \infty)$ .

The proposed form of the GIC, in which a parameter controls the severity of penalty serves two purposes. One is to indicate to what extent one model is preferred over another model. The other is to allow for an adoption of adaptive technique such as the cross validation for model search. The drawback of Zeng's proposed method is the intensity of computation required.

In closing, Zeng pondered on further work such as applications to time series.

## SA BRANCH //

PAUL SUTCLIFFE

# Statistics and Psychology

**The May meeting of the SA Branch was treated to an entertaining talk given by Daniel Navarro from the School of Psychology, University of Adelaide. Many important statistical tools such as factor analysis, multi-dimensional scaling and additive clustering have come from Psychology.**

Even from the early days when “experimental psychology” emerged as a discipline in the late 19th century, it has had an odd relationship with statistics. For instance, Fechner’s [1860] classic “The Elements of Psychophysics” is a much about the design of experiments and analysis of choice data as psychology. For its time, the work is remarkably sophisticated – the analysis is characterised by the use of a probit link function and logarithmic transformations of the main predictor.

While the progress of psychology has been somewhat uneven (it took another 100 years to include an intercept term in Fechner’s model)

there have been a number of highly productive interactions with statistics. The factor analysis model, for instance, was developed by Thurstone in the 1940s as a method for inferring the latent structure of human cognitive abilities and has been imported into statistics rather than the other way around.

Daniel discussed the development of statistical modelling in psychology by following two distinct threads: learning from choices and inferring latent structure. In the choice context, psychologists have tended to import ideas from statistics and related disciplines. In the latent structure context, psychology has been more of an equal partner and techniques such as factor analysis and multidimensional scaling have been imported to statistics.

This talk was well attended by staff and students from the School of Psychology, an initiative from the SA Branch to broaden the audience of our meetings.

## CANBERRA BRANCH //

GLENYS BISHOP

# Canberra Branch Careers Night

**On May 8, the Canberra Branch held a very successful Careers Night on the Australian National University campus. Nine speakers from a variety of government agencies, academia and private enterprise spoke briefly about the nature of their work and important role statistics plays. The meeting was chaired by Brent Henderson (CSIRO).**

Our Young Statisticians representative on the branch council, Frank Liu, publicised the event among students at ANU and also the University of Canberra. Over 40 students attended the meeting and were very positive in their feedback. Many of the students were surprised by just how widely statistics was used in the real world and the many different types of statistical analyses being applied. Frank also enlisted the support of

Kate Gemmell from the ANU Careers Centre to provide some more general guidance about career choice and the support the Centre offers. The Careers Night helped her to learn more about potential jobs in Statistics.

At the end of the evening everyone enjoyed the chance for informal discussion with drinks and snacks provided by the Branch and the Australian Bureau of Statistics.



*Speakers at the Careers Night held by Canberra Branch included from left: Noel Hansen (ABS), Michael Fogliani (ATO), Emma Lawrence (BRS), William Reece (Covance), Teresa Neeman (ANU), Brent Henderson (CSIRO), Pritibha Singh (Eli Lilly), Alice Crisp (AIHW) and Frank Liu, the coordinator.*

# Canberra Branch News

CANBERRA  
// BRANCH

**At the Canberra Branch meeting on 29 July, Dr. Jerry Reiter, Assistant Professor of Statistical Science, Duke University, North Carolina, gave a fascinating talk on “Protecting Confidentiality in Public Use Data via Multiple Imputation”.**

As the name suggests, public use data is unit record data released by organizations for use by the general community for modeling purposes. Likely users of such data are specialist analysts from Universities or other organizations who normally would not have access to the unit level records. However, most data collected by statistical organizations is protected in some form or other, and so unit record information cannot be released, or at least it must be modified in such a way so as to minimize the chance of any unit being uniquely identified or matched by a ‘snooping’ user with records from another data file. Jerry began the presentation by describing some of the standard techniques used to protect publically released unit record data. These methods include:

1. recoding of data variables into categories to make records more alike;
2. suppression of data, particularly observations judged to be sensitive;
3. swapping data items, and
4. adding random noise to values.

Each of these approaches has its potentially serious shortcomings. For example, methods 1, 3 and 4 often seriously affect relationships between variables, which can make the data useless for secondary analysis, and method 2 can introduce informative non-response, which can make it extremely difficult to analyse. In addition, if the original data had been collected in a complexly designed survey, the user of the released data may not have the skills or knowledge to analyse the data in a way that correctly accounts for the design, let alone dealing with any distortions introduced by the data protection method itself.

Jerry described the procedure of multiple imputation, originally proposed by Rubin, 1993, in the *Journal of Official Statistics*, as an attractive technique that not only overcomes the problems mentioned above, but potentially makes the job of the end-user much easier. The technique relies on the statistician, who has

access to the unit level records, constructing a ‘realistic’ model of the data (admittedly this may be difficult to achieve). The model would then be used to construct synthetic datasets multiple times. The advantages of doing this is: no unit record needs to be released, the released data will look very similar to the original data, and statistical procedures that are valid for the original data are also valid for the synthetic data. The technique can also be applied to just the ‘sensitive’ observations in the dataset, and it can be used to impute missing values at the same time (so the user doesn’t have to worry about how to deal with these). The purpose of releasing multiple copies of the data is so that standard errors and confidence intervals can be easily constructed. The mathematics of how these are constructed was described by Jerry in his presentation. For the reader interested in the details references are available on his home page at <http://www.stat.duke.edu/~jerry/>.

Jerry illustrated the procedure by applying it to the March 2000 US Current Population Survey. In this case a simple regression tree model was used as the synthetic data tool for the variables in the survey. A comparison was made of coefficient estimates for several different regressions models using both the original unit record data and the synthetic data files. In most cases the coverage rates of the confidence intervals produced from either data source were very close to each other.

Currently in the US, multiple imputation is being used by a number of official statistical organisation to protect public use data files. The presentation was concluded with a summary of where further research was needed for multiple imputation. It was highlighted that one of the main issues to overcome was the building of trust of the end-user in synthetic data.

PHILIP KOKIC, ANU

## First Half 2008

MARTY FIRTH

**The year began with a bang with our March meeting being presented by Professor Adrian Baddeley and attracting close to 50 attendees. The title of his talk was “STAT WARS – Why Statistics is Controversial”. He began by talking about the antipathy towards statistics generated by such witticisms as “Lies, damned lies and statistics”. He then went on to talk about statistics & miscarriages of justice, typified by the case of Sally Clark and Professor Meadow. Briefly, Sally Clark had two children die of cot death and based (at least in part) upon an erroneous statistical argument by Professor Meadow (not a statistician) Ms Clark was convicted for double homicide. The speaker asserted that there is little regard for real statistical expertise and yet the damage done by those who claim such expertise hurts both the field of statistics as well as people such as Ms Clark.**

The audience was then treated to a brief history of statistical thought, including very early origins such as from The Mahabharata (1000 BC) and then onto Bablyon, Rome and Europe in the Middle Ages. Adrian highlighted the Calas case of 1761 where the court used ‘mathematical’ (rather than probabilistic/statistical) methods for assessing witness credibility. In this case, evidence clearly showed these methods to produce an erroneous verdict which discredited the use of maths and/or stats in the evaluating of evidence. There was also the Dreyfus trial in 1899, where again someone claiming statistical expertise that they did not have, led to a wrong conclusion. This leads to the modern day where evidence such as DNA is sometimes seen as conclusive with no discussion of probability.

The law of large numbers was then discussed. In the current context, we see that when discussing the outcomes of a large sample of people, the individual people can often be ignored as it is the average behaviour that is of interest to the epidemiologist, psychologist etc. But people claim that they are not just a “statistic” or that “statistics don’t tell the whole story”. Somehow, statisticians come out in a bad light, dehumanizing people by considering them just as numbers!

Some light was then offered to the audience by showing that as experiments have become more complex in more recent times, more and more fields of human endeavour have realized that they need to take into account variability, which

generally is not well understood. In genetics, public health, criminology, etc statisticians are needed to make important advances (eg RA Fisher and Oliver Lancaster). The problem however, is that these people are not recognized as statisticians and the contribution of statistics goes unnoticed.

In the course of the talk Prof Baddeley presented 8 theses, which are presented here:

1. Teaching statistics using trivial examples promotes fallacies
2. Fallacies and abuses of Statistics are entrenched in Western culture
3. Resistance to statistical thinking draws on powerful emotional motives
4. Variability remains a revolutionary idea. Its transformation of science is not yet complete.
5. Analysing data is like breathing air: because it is vital, we want it to happen effortlessly & unconsciously.

In the Information Age, data will become pivotal to

6. scientific research (increasing the imperative for every science/profession to lay claim to data analysis).
7. decision-making (increasing the costs/penalties for erroneous data analysis).
8. many controversies and conflicts that centre around the collection/access/analysis of data.

# MASA

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**At the May meeting the WA Branch awarded our annual Honours Scholarship which is available to the best honours student applicant from a Western Australian University. This year, the award of \$500 was split between two applicants, Tom Lawrence and Prudence Thompson, both of UWA. Tom was considered strong academically and though he had only just commenced honours was seen as likely to do very well. His parents (who are not statisticians) were in attendance and showed they were listening when his mother asked a very pertinent question of one of the speakers. Prudence was seen as already showing a very strong contribution to the applied area of statistics with her thesis working on mapping still births in WA as well as other activities she has been involved with over the last year or so. Unfortunately Prudence was a split year student she could not actually attend the night as her dissertation was due in very close to the date of our meeting!**

As is our custom we have 2 young statisticians give the talks on the evening, including the previous year's winner(s) of the honours scholarship (Prudence and Tom beware). This year we had our previous winner, Nicole Warrington of The WA Institute of Medical Research and Rian Caccianiga of Data Analysis Australia. Unfortunately the summary of Nicole's talk was not received in time for publication but she discussed her honours project which involved 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). Rian's talk is discussed in more detail below.

Woylies (*Bettongia penicillata*) are small marsupials which have been removed from the endangered list due to the success of the Western Shield Baiting Program in decreasing the abundance of woylie predators and translocations of woylies from other regions. Despite this removal from the endangered list, recent investigations indicate a decline in population that requires urgent action. Rian Caccianiga of Data Analysis Australia presented the work she's been involved with in modelling and understanding the timing and nature of the woylie decline in Western Australia's south-west region on behalf of the Department of Environment and Conservation.

The data available for analysis was the result of numerous live cage-trapping sessions conducted over a long period of time at a number of different sites in the Upper Warren region in south-west Western Australia. This data had been collected for many different programs and projects (none of which had this particular analysis in mind at

the time of their design!) and as such was not ideally suited to standard statistical analysis. Some of the data issues that had to be overcome were the limited amount of data available at each site, inconsistent trapping methodologies and intensities, inconsistent recording of detailed trapping results and lack of independence in the data.

The approach taken to investigate the extent and timing of the woylie population decline was to fit a series of quasi-binomial generalised linear models with a logit link function to model the trap success rates, where a success was defined as capturing a woylie and a failure was defined as an empty trap. The quasi-binomial model was used rather than the binomial to take into account the overdispersion due to the lack of independence in the data.

Exploratory analysis of the data suggested that there was a quadratic nature in the trap success rates with an initial increase followed by a decrease, so models were fit incorporating time and time<sup>2</sup> terms. The other significant variables in the model were trapping sites as factors, trapping rates of brushtailed possums and quenda and a time by site interaction term. Variables that were found to be not significant were the condition index (a measure of woylie health), the proportion of adult female woylies who were breeding and the chuditch trap rate. The key result was that there was evidence of a strong decline in the woylie population since 2002.

Additional investigation was also carried out to investigate the woylie population demographics and biometrics by fitting a series of linear models and generalised linear models as appropriate. Some of the results were that the proportion of male woylies (approximately 60%) is increasing at some sites and decreasing at other sites; that average woylie weight is increasing at some sites and decreasing at other sites; that female woylies are heavier on average than male woylies; that males have larger hind foot lengths than females; and that there didn't appear to be a decline in the condition of woylies – an important result for understanding the cause of the population decline.

Rian's genuine interest and enthusiasm in presenting her work showed Rian's love of the environment and how this area of personal interest has been successfully integrated in her statistical career. Rian later presented this work at the Australian Statistical Conference where she won the award for best presentation by a young statistician.

Nicole and Rian were then treated to dinner accompanied by a large group to round off a pleasant evening.



**The June talk was given by our president Marty Firth and reprised much of his talk given at a London Symposium concerning the non-specific effects of vaccines in developing countries. Non-specific effects of vaccines refer to either beneficial or deleterious effects of the vaccine that are not related to the particular disease(s) for which the vaccine is designed. The talk covered the situation where the effects that a standard vaccination schedule has on mortality in countries with high mortality was investigated.**

It has been hypothesized that the DTP Vaccine (Diphtheria, Tetanus & Pertussis) is bad for girls for a brief age period under certain conditions that relate to the timing of other vaccines (BCG and Measles). It is worth noting upfront, that this potential deleterious effect of DTP would not usually be seen in a country like Australia due to the better overall health system.

The speaker then talked about his experience with analyzing data from Papua New Guinea, this included a discussion of how the data collection was performed in the remote areas of PNG. This included the important point that vaccine records were kept by clinics as well as by the mothers of the children (which will be discussed later). As the study was an observational one, propensity scores were used to try to adjust for any bias in which people got vaccinated, but the deleterious effect of DTP was not found in this analysis of this data.

The work of Peter Aaby et al was then discussed, who are the main proponents of the theory that DTP Vaccine can have a deleterious effect for girls. They have two main criticisms of the studies that fail to find such an effect:

- 1) One reason DTP vaccine may not be given to a child is that they present with a fever. This could be seen as a general sign of sickness and so there is a fundamental difference in the population of those who do and do not receive DTP vaccine which biases the data to show a protective effect for vaccination.
- 2) In many countries vaccination records are only kept by the mothers of the vaccinated children. When a child dies, it is typical for this vaccination record to be disposed of, so that when researchers come to a village where a child has died they may miss the

fact that the child was vaccinated as there is no longer a written record of it.

As the speaker had previously mentioned however, he had used Propensity Scores (and other methods) to try to combat problem 1 and problem 2 simply did not exist in the PNG data since the vaccination clinics were used to decide which children were vaccinated.

Finally there was a discussion of Aaby et al's approach to combating point 2. They use the so-called "landmark" approach, where vaccination status can only be changed if the researchers meet with an alive child to verify the change in vaccination status. This necessarily biases the calculation of a MR towards 1, as many children will spend some time in a vaccinated state but will be treated as unvaccinated for some of that time. However they claim that this is better than the biasing of the MR towards 0 which they claim will happen otherwise. The speaker presented some simulations that show that while the above claims seem to be true, the landmark approach increases the variance of the estimator so much as to cause serious concern (eg 13% of time declaring a true MR of 0.33 as > 1).

## Thinking Statistically

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**Sarjinder Singh**

Reviews:

Collins Carbo, *Technometrics*,  
2007, 49(4), 496.

Marcin Kozak, *Statistics in  
Transition*, 2006, 7(6), 1407-9.

Forewords by

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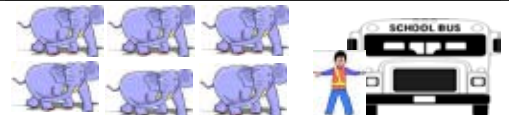
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# Australian Statistical Conference 2008 Prize-winners

## EARLY-CAREER STATISTICIANS

ASC2008 received over 150 abstracts from people wishing to present a talk or poster and 41 of these abstracts were submitted by early-career statisticians. This excellent level of response was substantially greater than that received at previous conferences and provided quite a challenge for the judges of two sets of prizes.

The EJG Pitman Prize of \$500 cash for a talk by an early career statistician at an Australian Statistical Conference was keenly contested. The judging panel was impressed by the quality of the presentations, the breadth of areas covered from theory to practical application, the challenging nature of the problems tackled, the enthusiasm shown for the topic and the skilful handling of questions. Experienced statisticians know that a 20-25 minute talk is difficult to manage in terms of communicating the essence of a problem and the results achieved. All of the presentations achieved very reasonable results in this regard.

The winner of the EJG Pitman Prize was Rian Caccianaga of Data Analysis Australia for her talk entitled "Analysis of Upper Warren Woylie Data". While there can only be one winner, the judges would like to acknowledge four other presentations that achieved a very high standard. These were:

- Yao-ban Chan, University of Melbourne, on "Scale adjustments for high dimensional, low sample size classifiers"
- Thomas Fung, University of Sydney, on "A characterisation of scale mixtures of the Uniform distribution"
- Leesa Sidhu, UNSW at the Australian Defence Academy, on "Little Penguins: to band or not to band?"
- Jason Ferris, Australian Research Centre in Sex, Health and Society, on "Multi-state modelling in R: A stochastic approach to modelling pregnancy outcomes".

Cash prizes of \$500, \$300 and \$200 were provided by Data Analysis Australia for posters submitted by early-career statisticians. The judges were greatly impressed by the results achieved and awarded:

- First prize: Jennifer Wilcock, University of Auckland, on "A method for designing two-stage case-control studies"

- Second prize: Anna MacDonald, University of Canterbury, on "Quantile estimation using extreme value mixture model with application to neonatal physiological measurements (A. MacDonald, C.J. Scarrott, D.S. Lee, M. Reale, G. Russell, M. Zahari, X. Zhao)"
- Equal third prize: Kris Jamsen, University of Melbourne, on "Specification of generalised linear mixed models for family data in genetic association studies using Markov chain Monte Carlo methods (Kris M. Jamsen, Sophie G. Zaloumis, Katrina J. Scurrah, Lyle C. Gurrin)"
- Equal third prize: Kevin Wang, Eli Lilly Australia, on "Transition from Academia to the 'Real World': A young statistician's perspective".

Congratulations to all of these contributors.

## REGISTRATION PRIZE

The first 100 ASC2008 registrants to pay their registration fees were placed in a draw for a \$150 voucher at Crumpler (a popular brand of laptop, camera and general bags).

The winner was Sharon Nielsen from the NSW Department of Primary Industry at Orange, NSW.

## EXHIBITION PRIZE

Delegates who visited all of the exhibitor stands and collected a stamp on a passport in the back of the conference handbook were eligible for a weekend package for two people supplied by the Melbourne Sofitel. The winner of this prize was Hugh Jones of the Department of Environment and Climate Change NSW, in Sydney.

# Bayesian Statistics in Health Economics Workshop – July 14 - 16

**On July 14 to 16 we cosponsored with ARCS and the APBG a workshop on 'Bayesian Methods in Health Economics'. This workshop was very specialized and was aimed at health economists and statisticians undertaking health technology assessments that are required by the reimbursement authorities. John Stevens, Deputy Director of Centre for Health Economics and Bayesian Statistics, University of Sheffield was the main presenter at this workshop.**

On Day 1 John introduced the differences between the Bayesian and frequentist frameworks by comparing the definitions for probability, parameters and inference and the use of prior information. He then stepped through the Bayesian method:

- Create a model to link data to the parameters
- Formulate prior information about unknown parameters
- Combine the data using Bayes theorem
- Use resulting posterior distribution to make inferences

We spent quite a bit of time going through the various distributions commonly used in the Bayesian framework (t, normal, beta, Dirichlet, gamma and lognormal) before discussing prior information, the types of prior information, how to formulate it, elicitation of the information using the bisection method and biases encountered as a result of the elicitation. Day 1 finished with Bayesian updating, MCMC and WinBUGS.

Day two focused on the health economic theory: incremental cost-effectiveness plane, willingness to pay, incremental net benefit, cost-effectiveness acceptability curves, modeling cost data, transformations and joint models of effectiveness and cost data in the Bayesian framework. The role of assurance during the design of cost-effectiveness trials in the Bayesian framework was discussed. That is, the unconditional probability that the trial will end with the desired outcome. The consequences of the prior information were discussed. For example, if the prior information for the unknown parameters is weak then even infinite sample sizes may not be sufficient to achieve a desirable assurance of a successful outcome. While at the other extreme, if the prior information is sufficiently strong then the required sample size may be zero. John stressed that the prior distribution provides an upper bound on the achievable assurance of a successful outcome. Day two concluded

with a discussion on parameter uncertainty and sensitivity analysis (where there is a lack of consistency in terminology across various areas) and Markov models. John stressed that univariate sensitivity analysis is of limited use and should NOT be used. Instead probabilistic sensitivity analysis (PSA) should be used to reflect the combined implication of uncertainty in parameters (Guide to the Methods of Technology Appraisal, NICE, 2004).

During Day 2 we undertook an impromptu discussion of how what had been covered so far was applicable to the Australian setting. During this discussion we were able to allay the concerns from the health economists that WinBUGS would replace their current economic modeling software, whatever that might be. It was stressed that WinBUGS is a tool to synthesise the available information in a Bayesian framework and to generate the inputs to the economic models. Any economic submissions to the reimbursement authorities should clearly explain the methods used to obtain the information in the economic models and hence will include an explanation of the approach taken and the software used. However the economic modeling in the submissions to reimbursement authorities will still be as they are used to, which I think was a relief all round.

Day three brought the previous two days together. First, John started the day discussing meta analysis in a Bayesian framework, the various principles and procedures of well conducted meta analyses, the outcome measures of absolute risk differences, odds ratio, relative risk and the relationship between relative risk and odds ratio. He then discussed the differences between fixed and random effects models, again in the Bayesian framework and showed the differences with an example. John used the same example throughout the rest of the day but added complexities with additional variables, collection times and so on to show us how to undertake meta regression, investigate autocorrelation and undertake indirect and mixed treatment comparisons. A considerable amount of time was spent on mixed treatment comparisons using fixed and random effects models as these form a large part of health economic submissions. The day and the course finished with a discussion of model checking and evidence consistency, the deviance information criterion and cross-validation.

# NSW Branch News

**No Branch activities were held during June because of the conference but July and August has been very busy.**

After a very successful joint meeting with the APBG and Pfizer in 2007 where Doug Altman spoke we decided to repeat the event. This time Simon Thompson, Director, MRC Biostatistics Unit from the University of Cambridge and one of the keynote speakers from the conference presented a talk titled 'From randomised trials to national policy decisions via cost-effectiveness analysis'. Over 40 attendees heard Simon speak on his challenges of converting results from randomised trials that showed ultrasound screening for abdominal aortic aneurysms (AAA) is effective in reducing mortality into decision models that show long-term cost-effectiveness. He discussed some of the statistical issues involved in building a reliable model, including parameter estimation and uncertainty, structural uncertainty, and model validation. Using an example he showed how the estimated 30 year cost-effectiveness was obtained from 5 years worth of data. As additional data became available after the 30 year estimates were obtained he was able to show the large difference between the predicted and actual cost-effectiveness for predictions only one or two years later (i.e. years 6 and 7). He stressed how much research needs to be done on improving the methods available to predict cost-effectiveness and how care needs to be taken when using these predictions particularly as governments are using the results of these analyses to determine policies. For example, this research has informed the recent decision to initiate a national AAA screening programme in the UK.

In July we also undertook another first. On July 14 to 16 we cosponsored with ARCS and the APBG a workshop on 'Bayesian Methods in Health Economics'. This workshop was very specialized and was aimed at health economists and statisticians undertaking health technology assessments that are required by the reimbursement authorities. The three associations contracted the Centre for Health Economics and Bayesian Statistics at Sheffield University to develop a three day course to meet the Australian requirements. There was substantial financial risk as the development cost would be non-refundable regardless of whether

the course went ahead or not. Given that the course has been specifically developed for us it is SSAI, ARCS and APBG who own the copyright (with Sheffield) and can deliver the course again. As it happened around 28 attended the course and the expectation is that we will almost break even – all in all a successful outcome. A report on the workshop is on page 16.

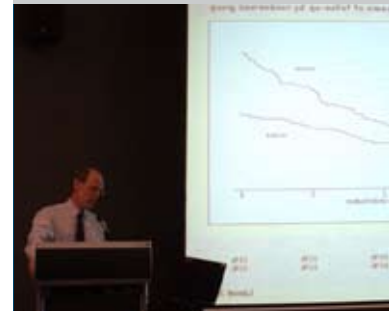
In 2007 the NSW Branch held a very successful workshop to bring secondary school mathematics teachers, curriculum developers and statisticians (university and any others interested) together to discuss the statistical components of the Stage 6 mathematics syllabus due for release in 2010. To continue the good work on the building the relationship between mathematics teachers and statisticians we held this second workshop. The theme of the afternoon was to discuss the types of professional development the mathematics teachers need to provide them with the skills to deliver the statistical topics and to investigate ways of providing these skills. As with last year's workshop a full report will be available on the Branch website once I write it. An overview of the afternoon will also be provided in the next newsletter.

August will also see an evening lecture on the 26th. Richard Gerlach, Senior Lecturer, Discipline of Econometrics & Business Statistics, Faculty of Economics & Business, University of Sydney will present a talk titled 'Bayesian Dynamic Nonlinear Quantile Forecasting, Exploiting the skewed Laplace Distribution'.

September will see two evening lectures. Dr Mikis Stasinopoulos, a Reader in Statistics, STORM, London Metropolitan University, London will speak on Applications of Generalised Additive Models for Location, Scale and Shape and Dr. Tim Heazlewood, School of Exercise Science (NSW), ACU National. In October Malcolm Hudson, Macquarie University will talk on statistical estimates of the benefits and hazards of Hormonal Therapy post-menopause and how to reconcile observational and trial data".

Don't forget that we will be hosting the 9th Jim Douglas Post Graduate Awards Day on November 26 and that this will be followed by our annual dinner so put it in your diaries. Our invited speaker will be Prof John Robinson, University of Sydney.

NSW  
// BRANCH



*Simon Thompson addressing the NSW Branch Meeting.*

CARO-ANNE BADCOCK  
Vice President, NSW Branch

## EFFECTIVENESS OF A POPULATION BASED MASS MEDIA CAMPAIGN: “BACK PAIN, DON’T TAKE IT LYING DOWN”: WHAT DO THE STATISTICS TELL US?

The April meeting of the Victorian Branch, held at Swinburne University’s Hawthorn campus, was attended by over 20 people. The speaker, Professor Rachelle Buchbinder, is the Director of the Monash Department of Clinical Epidemiology at Cabrini Hospital and Professor in the Department of Clinical Epidemiology and Preventive Medicine, Monash University. The subject of her talk was the evaluation of a media campaign designed to alter general attitudes and beliefs about back pain. The campaign, the first of its kind in the world, ran in Victoria between 1997 and 1999 and received wide recognition, earning Professor Buchbinder several prestigious research awards.

Disability due to back pain is one of the leading causes of health system expenditure in Australia. Traditional treatments, such as bed rest and physical inactivity, are, at best, only moderately effective and can have adverse consequences. Imaging tests are also rarely necessary because most cases of back pain have no identifiable cause. Current best practice management of acute back pain involves staying active and continuing normal activities and work (within limits of pain). This is especially effective as a preventive measure or soon after the onset of symptoms, resulting in reduced workplace absence. However, awareness of this modern therapy was, until 1997, limited in both the medical profession and the general public.

Evidence had been accumulating about the effectiveness of public health media campaigns to promote good health practices, including

antismoking and Slip! Slop! Slap! campaigns. Rachelle described a Victorian Work Cover Authority Media Campaign, run under the slogan “Back pain, don’t take it lying down”, that was specifically designed to alter the general population’s attitudes and beliefs about back pain. The principal medium was a series of television advertisements featuring well known sporting and TV personalities, who promoted the modern approach to back pain in an amusing and instructive way. Rachelle showed clips of the TV advertisements.

The effectiveness of the campaign was assessed using a three-part evaluation. Did the campaign 1) improve population beliefs about low back pain; 2) improve general practitioner (GP) beliefs, attitudes and stated management of low back pain; and 3) reduce the number, duration and costs of back pain claims? The population and GP studies were conducted using quasi-experimental design. Assessments were planned to be conducted before the campaign, and at 2 and 2.5 years into the campaign. At the end of 1999 there was a change of government in Victoria and the advertisements ceased. This enabled post-campaign studies to be performed to determine the long term effects of the campaign on population and doctors’ beliefs: for the population this review assessment took place 3 years after the campaign began, and for GPs, 4.5 years after. In both studies, NSW was used as a control. For assessment objective (1), random samples of employed people between the ages of 16 to 65 years took part in telephone interviews, with both interviewers and participants blinded to the study aims. The general practitioner study (assessment objective (2)) involved postal surveys to random samples of GPs in Victoria and NSW. In both states, the GPs were blind to the study aims. The main outcome measure for the population study was a questionnaire, consisting of nine statements about back pain beliefs.

Rachelle then presented a series of graphs and tables that summarised the results of the study. In Victoria, as opposed to NSW, the control state, there was a clear shift towards more positive attitudes to back pain following the campaign. The change occurred across all sections of community. The positive attitudes were maintained 3 years later, although some decay was evident. Among the GPs, there was also a shift towards more positive back pain beliefs, which resulted in better practices in the management of back pain. This



Professor Rachelle Buchbinder  
Photo: Brian Phillips

positive change in GP attitudes was sustained 4½ years later. In addition, there was apparent reduction in back pain related disability and workers' compensation costs. The message was clear: as a result of the campaign, real change has occurred in beliefs about back pain within the broad community.

The media campaign has generated considerable international interest. Similar campaigns have been conducted in Norway, Scotland, and Canada, and Danish authorities have invited Professor Buchbinder to share her experience with them later this year.

## A RANDOM EFFECTS MODEL FOR ATHLETICS RECORDS

It is always refreshing to listen to a new and enthusiastic young statistician at a Victorian Branch meeting. Dr Alec Stephenson's recent appointment to Swinburne University of Technology reflects that institution's push to recruit active research staff. Alec completed a PhD in extreme value theory in 2003 under the supervision of Professor Jonathan Tawn at Lancaster University (UK), and then took up a post-doctoral fellowship at Macquarie University, Sydney, in 2004, and an assistant professorship at the National University of Singapore from 2005 to 2007. He has continued to work actively on both the theory and applications of extreme value methods since completing his thesis. His presentation to the May meeting, held at Swinburne University, described a modern statistical analysis of athletics records.

Alec analysed several sets of athletics records simultaneously. An ideal set is represented by the men's annual record times for running 800 metres. This is a complete data set, in that the best time in all such races was recorded every calendar year, from 1908, the first year that data are available, to 2003. In some distance races the annual record time was recorded only if the current world record (that is, the best-ever time to date) was broken. This is true, for example, in the men's 1000 metre race prior to about 1950. For the years without data, Alec treated the annual record time as right-censored at the prevailing world record. In addition, some early times were recorded only to the nearest tenth of a second, rather than one-hundredth, and Alec treated these as interval-censored. Overall, the

data sets covered the years 1908 to 2003 and distances from 60 metres to marathon, for both males and females.

Alec described two models for analysing the data. The basic model assumed that the annual record times came from independent generalised extreme value (GEV) distributions with constant coefficients of variation and shape parameters. For a race of a given distance, the mean of the GEV distribution decreased from 1908 to 2003 according to a displaced exponential curve. To extend the model to all distances, the linear parameters (intercept and slope) of this exponential curve were allowed to vary with distance, whereas the non-linear parameter was held constant. Comparisons of the fitted curves with the raw data quickly revealed a problem. Although the model fitted reasonably well overall, there were distinct periods in which the model was clearly inadequate: the war years, for example, have poorer annual records in races over all distances, presumably because of the smaller range of competitors available then. To overcome this, Alec modified the basic model by allowing the GEV mean to deviate positively from the displaced exponential curve for each year and distance. These deviations were simple functions of temporally correlated random year effects. Plots of the estimated random effects did indeed confirm that the war years had poorer annual record times.

Alec's talk may have set a record of its own, not for time or distance, but for the number of questions and interruptions that it provoked. These followed two main themes. Firstly, does the random effects model capture the effect of performance-enhancing drugs? Secondly, could the model be generalised to include a 'super-athlete' effect, in which one particular runner dominates an event, or range of events, for a sequence of years? Alec's talk was very timely, serving to whet the appetite of the audience of about 20 people for the forthcoming Olympic Games in Beijing.



*Dr Alec Stephenson  
Photo: Brian Phillips*

## Queensland Branch News

**The past few months have been a very busy time for the SSAI Qld branch. With Ross Darnell stepping aside as president, the fresh enthusiasm of Miranda Mortlock had led to a flurry of activity. The council also welcomed two members - Leesa Wockner, and Peter Baker. All members were assigned roles for the year with an emphasis on recruitment, encouraging social interaction at a diversity of events.**

### MAY

Two members (Miranda Mortlock and Peter Baker) provided a Maths and Statistics Booth at a local Science Careers Night coordinated by Ms Emily Simons (Head of Science) at Kenmore State High School. Mathematics and Science Departments presented their subject selections and this was linked to the career evening events to assist students in making decisions about their future. Speakers from a range of tertiary and industry partnerships presented short careers talks and representatives from universities, business and government hosted career booths. Members in the Science Parent Support Group make a useful link between professional activities in SSAI and local

secondary schools assisting in awareness of career options and study pathways. 120 high school students and their parents attended the evening.

### JUNE

The month of June saw the Qld branch offer funding for qualified students or early career statisticians to attend and present at the Australian Statistical Conference held at the end of June. Two PhD students from UQ were awarded the funding, Will Probert and Leesa Wockner. Will presented a talk, whilst Leesa presented a poster. These two students also gave short talks at the SSAI Qld Branch June meeting. Will Probert, a current PhD student under the supervision of Hugh Possingham, presented his talk entitled, 'Controlling an Emergent Disease'. Will's work specifically pertains to the environmental management of Facial Tumor diseases that impact the populations of the Tasmanian devil. More generally, this work provides a simple protocol for examining the trade-off between learning and management where there are multiple hypotheses of how the system may function.



*The 2008 Queensland Branch Council Rob Reeves, James McBroom, Leesa Wockner, Miranda Mortlock, Sue Barrett and Helen Johnson. (members not present are Michelle Haynes, Ross Darnell and Peter Baker)*

Leesa Wockner, a UQ PhD student supervised by Geoff McLachlan, presented a short talk on 'the detection of differentially expressed genes via normal mixture models'. Her work pertains to the detection of differentially expressed genes in microarray experiments. The presentation gave these students an opportunity to present to their peers and gain feedback before their trip down to Melbourne. The Qld branch also used this opportunity to reach out to younger statisticians in Qld, by providing free pizza and drinks. The event was quite successful and it is hoped more younger statisticians will involve themselves in the society's events.

The attendance at ASC2008 by Queensland members was quite significant with several members presenting and attending. The Young Statisticians stream saw the proxy for the YS rep, Leesa Wockner, networking with other young and early career statisticians around Australia. The involvement of young statisticians in the Queensland Branch has become a top priority of the Branch. Queensland is endeavoring to hold more social events aimed at these younger members.

## JULY

The amount of activity did not slow down in July. Several SSAI members attended the Public Lecture on Monday night Public Lecture at 6pm on Monday 14 July at UQ by Prof Peter Guttorp, University of Washington, entitled "Gasp - I can't breathe! How statistics can be used to study environmental pollution control". Furthermore, we were lucky enough to have Prof Fiona Steel, one of the keynote speakers from ASC2008 present at our July meeting. A very successful event saw over 60 people attending followed by a dinner at a local Thai restaurant.

Fiona Steele is Professor in Social Statistics in the Centre for Multilevel Modelling at the University of Bristol. She has previously worked at the London School of Economics and the Institute of Education, University of London. Fiona's interests are in methodological research motivated by social science problems, particularly in demography. Her areas of expertise include multilevel modelling, event history analysis, and structural equation modelling. She has recently been awarded the RSS Guy Medal in Bronze 2008 for "her

methodological and practical contributions to multilevel modelling, to demography and to social statistics more generally".

Fiona spoke on one of her numerous research topics: 'Discrete-Time Methods of Multilevel Event History Analysis.'

Prior to the Fiona Steele talk featured in July meeting we were fortunate to hear from Prof Vijay Nair, who is Donald A. Darling Professor and Head of the Department of Statistics at the University of Michigan, Ann Arbor, USA. He was visiting UQ and kindly talked to the branch on 'Statistical Inverse Problems in Network Tomography'.

He also holds a joint appointment as Professor in the Department of Industrial & Operations Engineering. He has worked extensively in the areas of Engineering Statistics, Reliability, Design of Experiments, and Modeling of Computer and Communications Networks. His recent interests include Credit Risk Modeling, Neuroinformatics, and Behavioural Intervention Studies. Before joining the University of Michigan, he was a Research Scientist at Bell Laboratories for fifteen years. He has a PhD in Statistics from the University of California, Berkeley and a Bachelor in Economics from the University of Malaya, Malaysia.

# Maximum impact statistics – Extreme value modelling in practice

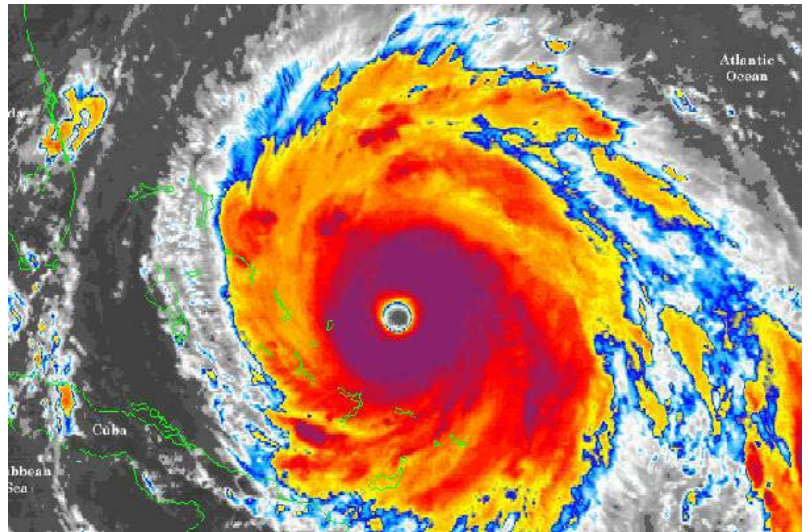
SCOTT SISSON, SCHOOL OF  
MATHEMATICS AND STATISTICS,  
UNSW

**Over a few days in December 1999 Hurricane Mich left a trail of destruction along the coast of Venezuela with many thousands of lives lost, many more disrupted and extensive damage to built-up areas. This created a conundrum for local meteorologists. The associated rainfall event produced an extremum of daily rain well outside the range of prediction. The**

**Gumbel model commonly used for this purpose would have predicted a return period for an event of this magnitude in the millions of years, so was no help in alerting authorities to risks of a disaster of this magnitude.**

Can we use this event to come up with a more practical model that can place it within a plausible return probability range? Scott Sisson's talk to Canberra Branch in May took us through the theory of extremal event modelling, introducing models for threshold exceedances (how long before an extreme event recurs) based on the generalised exponential and generalised Pareto distributions themselves motivated by the extremal types theorem (a counterpart of the Central Limit Theorem for repeated observations from a fixed distribution where maxima are observed rather than means).

Applying MLE to the parameters of these generalised distributions was neither practically nor mathematically sensible. An alternative Bayesian approach leads to credible application by building in uncertainty in model and parameter assumptions, and reframing the data around more realistic priors (accepting seasonality and clustering of high rainfall events over several days). This brought the exceedance estimate down from the multiple thousands of years to only 308. Later on the ground evidence



of a major event most likely exceeding the Vargas event approximately 500 years ago gave added credence to this number.

Shifting from natural disasters outside control but amenable to prediction, to a microscopic process control example, Scott demonstrated in the second half of his talk a quite different application of Bayesian inference to control quality of clean steel. Strength is assumed related to maximum diameter of lesions (3D), but measurable in 2D samples. The repeated sampling technique Approximate Bayesian Computation, combined with results from stereology, is used for modelling the three Dimensional counterpart, resulting in more realistic, less conservative strength estimation.

The talk turned attention to the place of statistical inference within situations subject to uncertainty or incomplete information, and where in the Vargas case, while not preventing the major losses of such events could give planners and the public a sober assessment of their vulnerability. It is difficult not to argue that Bayes may indeed be best in the face of model uncertainty, incomplete data and strong priors. These two cases well illustrate sensible and responsible statistical practice undeterred by respectively wide uncertainty and computational intractability when the material stakes are high.