

Statistics at the 2020 Summit

Why I attended the 2020 summit

Dr Harch was nominated by CSIRO's Chief Executive Officer to attend the 2020 summit. Her international reputation as an environmental statistician, skill in leading multidisciplinary multi-organisational projects and her more recent experience with leading international collaborations with China and the USA were seen as relevant for making a significant contribution to ideas generated at the Summit.

My experience at the summit

I was part of the topic area "Australia's future security and prosperity in a rapidly changing region and world".

The majority of people who participated in the 2020 Summit attended as "Australians", but there were a few lobbyists who attended as well. I found the 2020 Summit as quite an inspirational experience because I interacted with people from all walks of Australian life. Discussion with participants—whether leaders in Australian society or contributors to the fabric of Australia—were fascinating.

There was a sense of camaraderie in the shared development of ideas and a real spirit of rolling up our sleeves together and getting on with the task at hand. There was agreement on the majority of key challenges to Australia's future security and prosperity, but there were differences of opinion in relation to the solutions to these challenges.

The process used to garner ideas had us start on the first day with individual reflection, then gathering as a small group to share these individual ideas and then synthesis of commonalities and differences



Dr Bronwyn Harch trained as an environmental statistician and currently has the role of Research and Business Leader for CSIRO's Environmental Monitoring and Modelling research theme. The group's research is focused on the application of mathematical and statistical sciences for planners and policy-makers to make sound environmental management decisions.

for discussion in larger groups. The main focus of the second day was to crystallise and prioritise the generated ideas. While there was some contention about the relative priorities of the ideas presented in the Initial 2020 Summit Report, a full account of the ideas discussed will be collated into a Final 2020 Summit Report in the coming month.

What I took from/learnt from the summit

The energy and passion of delegates made it obvious that many Australians care very much about Australia's

development as a country interacting in the global environment.

The process undertaken to garner ideas—where we were able to build on and adapt people's ideas—highlighted that a constructive dialogue enabling people to put forward ideas and having people actively listening ensures ideas can be generated through to a level of consensus.

Disagreement on ideas is also useful. It enables discussion to be focused on understanding others points of views—enabling a common understanding of issues.

Value of the summit

Already the Initial 2020 Summit report is being used by federal and state governments in their deliberations about government priorities. I believe in the process used to develop the ideas at the Summit; a participatory process enabling consensus and areas of disagreement to be openly discussed.

During one of the group sessions, Bronwyn shared with Kevin Rudd about the idea of Australia adopting a new approach using "smart power" to address food, water and energy security issues in collaboration with our neighbours. In this case "smart power" is about information and knowledge platforms that enable the prediction of future security issues and allow governments at all levels to consider scenario planning around this definition of security—which needs to be much broader than "defence". "Smart power" is in contrast to "hard power" (use of military force) and "soft power" (use of diplomacy).

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

Editorial

This issue appears to have a travel theme underlying the features in particular. At a local level, members are continuing to travel and come together for Branch meetings, and most branches have reports in this issue. Bronwyn Harch reports on her travel to Canberra for the 2020 summit, and Melissa Dobbie reports on her travel to Canada as the AusCan scholar. It's great to see female statisticians taking on high-profile roles both within in the Society and in the broader community.

I can't finish this editorial without mentioning the "t party for the t test", held at the University of Canberra in March. This very successful and very enjoyable event was organised to celebrate 100 years since the publication of Student's 1908 paper that introduced

the t distribution to the world. Many people contributed to the success of the "t party", including the Dean of the Faculty of Information Sciences and Engineering, who provided financial support; the Faculty administration team, who decorated the space; two local Irish pubs, who provided the Guinness-themed decorations (the party was held just after St Patrick's day so leftover decorations were easy to come by!); over 30 academics from all Faculties of the University of Canberra, all of whom used t tests in their research; and invited guests from the Australian National University. We hope that the report inspires you to come up with your own event to celebrate the anniversary of this mainstay of statistical theory and practice.

Member News

Seventeen of Australia's leading scientists were honoured on 19 March by election to the Australian Academy of Science.

Election to the Academy recognises a career that has significantly advanced, and continues to advance, the world's scientific knowledge. Scientific contributions of the new Fellows cover a wide range of specialities that include immune response to pathogens; physics of supernovae; photosynthesis; plasma physics;

population dynamics of vertebrates; solvable lattice models; and mammalian embryonic development. The new Fellows, elected in 2008 from Australian universities, CSIRO and medical research institutions, include Professor Matthew Paul Wand FAA, distinguished for his work on nonparametric function estimation. Congratulations Matt!

Source: <http://science.org.au/media/newfel2008.htm>



President's Corner

In this column I would like to reflect on the question: "Should the SSAI get involved in commenting on significant societal questions where statistical analysis plays a substantial role?"

This issue has been on the SSAI agenda for some years without a lot so far being done to address it. The SSAI Strategic Plan (currently being revised) lists as one of its strategies: "Convene specialist panels on significant community concerns that have a statistical aspect needing clarification and explanation." I admit to having given this issue low priority, partly because I have not been able to work out how the SSAI would implement this strategy. But, head in the sand or not, as the professional society for statistical work in Australia we may need to give this attention. I have been asked to respond to two requests of this type over the past couple of months. The first was for the SSAI to arrange an evaluation by Accredited Statisticians concerning the conclusions drawn in a recent scientific paper that is claimed to have had a crucial influence on the recent Garnaut Climate Change Review. The second was concerned with evaluating the available data and methodology used to arrive at the proper estimate of the gap in life expectancy between non-indigenous and indigenous Australians, a gap the current Government is committed to closing. It was suggested that if this were the UK then very likely the Royal Statistical Society would be asked to set up a working party to sort this out.

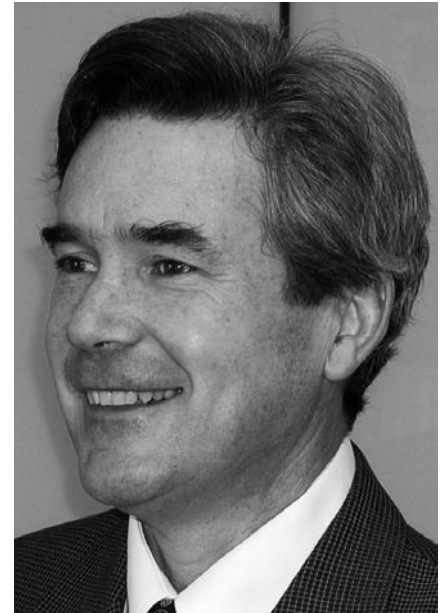
The primary issue is: Should the SSAI engage in these activities and is this engagement in the long-term interests of the SSAI? If the answer is "yes" there are several issues of implementation that need to be considered if we are to effectively respond to such requests: Who would do the work? Are only Accredited Statisticians the right people to be involved? How would we select and prioritise the topics that the SSAI was prepared to evaluate? How would these projects be funded? Funding might have to be provided or else the competing demands on our members' time will take precedence; or else, members may only engage because they have a particular point of view or interest in the issue being addressed, hardly the right approach to getting disinterested advice on important

issues for Australian society. How would we manage the reputational aspects of these studies? The potential impact on our Society's reputation is not to be underestimated—often the topics are controversial and there may be widely differing views about them. How would we finally agree that the conclusions reached and the views expressed can be put out under the SSAI banner? Any of our members who have given statistical advice in courts of law will know that quite often consensus on methods, analysis and their interpretation is not reached by experts of equal standing.

All of these questions, and others no doubt, need to be addressed before the SSAI can put any strategy for this into action. Right now we are hard pushed to get people to engage in running the SSAI on a voluntary basis I find it hard to imagine members engaging in a disinterested way (rather than because they have a passion or view about something) in these important issues without being remunerated in some way.

I would welcome member's views on the above issues.

Members might not be aware that an important role of the SSAI is to engage in various forms of lobbying. The key professional societies in the mathematical sciences have elected Nigel Bean, Head of Applied Mathematics at the University of Adelaide to represent them on the FASTS Board. In his inaugural submission Nigel raised several issues that FASTS will be encouraged to support. One of these was the fate of mathematics and statistics at the University of Southern Queensland, an issue which has galvanized mathematicians and statisticians around the world and one which has far wider implications. In November last year I wrote to the VC expressing concerns about the situation developing at USQ and informing him of our 2005 Review. Nigel will also alert FASTS about the fate of the new funding for mathematics and statistics teaching at Universities that was included in the May 2007 Federal budget. A survey conducted at the beginning of 2008 suggests that this funding is likely to be passed on to the mathematical sciences departments in only a minority of universities¹. This survey also suggests that we are close to the point where only half the



Universities in Australia are offering a 3-year sequence in Statistics. This issue highlights the need to lobby beyond Government and make sure the message is getting through at the University level also.

In my capacity as a member, ex officio, of the Australian Academy of Sciences National Committee on Mathematical Sciences I recently contributed to the Submission to the National Innovation System Review prepared by Prof Hyam Rubenstein who chairs that Committee. These are only some of the areas we have been active in lobbying.

William Dunsmuir

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1. http://www.amsi.org.au/pdfs/Questionnaire_summary.pdf



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If you are not sure please let us know by email to:
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Three Doors with Borek Puza (Edition 14)

Welcome to the 14th edition of *Three Doors*. Last time I presented The Records Puzzle and am now pleased to announce Conrad Burden as the current winner of the Three Doors Prize, a cheque for \$60 from SSAI. Several other persons also sent in the correct solution, which is given below, followed by a discussion and the next puzzle.

The Records Puzzle

Consider a sequence of n continuous iid random variables, indexed $1, \dots, n$, and define the i th one to be a record if it is the largest amongst those indexed $1, \dots, i$. Let R be the total number of records amongst the n random variables. Find the mean, m , and standard deviation, s , of R . Hence, for each $j=1, 2, \dots, 10$, find the smallest value of n such that m is at least j . Then, for each such value of n , calculate the corresponding exact values of m and s . Tabulate your results to 5 decimals and discuss briefly.

Solution

Amongst the first i values, each one is equally likely to be the largest, and so the probability of the i th one being a record is $p(i) = 1/i$. Consider the indicator $I(i)$ for the i th value being a record. Then $I(1), \dots, I(n)$ are independent

Bernoulli random variables, where the i th one has mean $1/i$ and variance $1/i - 1/i^2$. (Note that for $a < b$, whether the b th value is a record provides no information regarding whether the a th value is a record. Therefore $I(a)$ and $I(b)$ are independent. This fact can also be proved more formally.) Now, R is the sum of the n indicators. Consequently, $m = 1 + 1/2 + \dots + 1/n$ and $s^2 = m - (1 + 1/2^2 + \dots + 1/n^2)$. These formulae lead to the required table:

j	n	m	s
1	1	1.00000	0.00000
2	4	2.08333	0.81223
3	11	3.01988	1.20907
4	31	4.02725	1.55372
5	83	5.00207	1.83551
6	227	6.00437	2.08898
7	616	7.00127	2.31473
8	1674	8.00049	2.52114
9	4550	9.00021	2.71210
10	12367	10.00004	2.89053

Discussion

The harmonic series $1/1 + 1/2 + 1/3 + \dots$ sums to infinity. Thus m diverges without bound, albeit very slowly. For large n , we may use the approximation $m \sim \log(n) + c$, where $c = 0.57721 56649$

..... is Euler's constant. Thus $n \sim \exp(m - c)$, which gives results that are very close to those in the table. For example, if $m = 6$ then $n \sim 226.51$.

For further discussion on the topic of records, see Anděl (2001, Chapter 4 on pages 63-78). The author writes (on page 65): "We read in [the table] that in a random series (such as maximal high of snow in winter) an 11-year-old [boy] has seen in [his] life three records on average; a gentleman 31 years old, five records; and a man 83 years old, six records. Isn't this a key to the fact that in our youth winters were colder with more snow, summers were warmer, and, generally, everything was much better?"

The Ten Digits Puzzle

In how many ways can the ten digits $0, \dots, 9$ 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?

For a chance to win the next Three Doors Prize, send your solution to newsletter@statsoc.org.au.

References

Anděl, J. (2001). *Mathematics of Chance*. New York: Wiley.

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>



NOTICE

The Annual General Meetings of The Statistical Society Of Australia Inc and The Australian Statistical Publishing Association Inc. will be held on

Monday 30 June 2008 at 5.30pm at the Sofitel Hotel, Melbourne.

SSAI Annual General Meeting—Agenda

1. Apologies and Proxies
Proxies must be given in writing as per form inserted in the June 2008 issue of *SSAI Newsletter*. Proxy forms must be received by the SSAI Executive Officer for passing to the Secretary no later than 24 hours before the time of the meeting.
2. Confirmation of the Minutes—Minutes of the meetings as circulated
3. Matters arising
4. Reports
 - 4.1 President
 - 4.2 Treasurer
 - 4.3 Branches
 - 4.4 Sections
5. Accreditation
 - 5.1 Report from Accreditation Committee
6. Conferences
 - 6.1 ASC 2008
 - 6.2 ASC 2010
7. Election of Section Chairs
Nominations for Section Chairs should be received at the SSAI office no later than 23 June 2008. Nomination Forms have been inserted in each copy of the June issue of *SSAI Newsletter*. All nominations require a seconder and a statement from the nominee that she or he is prepared to stand.
8. Appointment of signatories
9. Other business
10. Time and place of next meeting.

ASPAI Annual General Meeting—Agenda

1. Apologies and Proxies
Proxies must be given in writing as per form inserted with June 2008 issue of *SSAI Newsletter*. Proxy forms must be received by the SSAI Executive Officer for passing to the Secretary no later than 24 hours before the time of the meeting.
2. Confirmation of the minutes—Minutes of the meetings as circulated
3. Matters arising
4. Presentation of the Annual Report by the Editor of the Australian and New Zealand Journal of Statistics
5. Treasurer's Report
6. Appointment of signatories
7. Other business
8. Time and place of next meeting.

2007 AusCan Scholar Report

Between 14 January and 15 February 2008, I visited Canada as the 2007 AusCan Scholar, the first recipient from Australia and the second recipient of the scholarship (following Dr Mu Zhu's visit to Australia in 2006).

The broad aims of the scholarship were to:

1. promote scientific interaction between the two statistical communities, and
2. provide opportunity to enhance my professional development and interact with leading researchers in Canada.

As such, I opted to focus my five-week visit on a few select places rather than try to get around the whole country and meet as many Canadian statisticians as I could. In particular I spent six days visiting Simon Fraser University (SFU) in Vancouver, a week visiting Dalhousie University (DalU) in Halifax, three days visiting McMaster University and the National Water Research Institute (NWRI) in Hamilton/Burlington, one day visiting the University of Western Ontario (UWO) in London,



Visiting the Department of Mathematics and Statistics at McMaster University.

two days visiting the University of Toronto (UofT) in Toronto, and five days visiting the University of British Columbia (UBC) in Vancouver. I intended to visit the University of Waterloo (UofW) for a day too but a winter snow storm in the area closed the university on that day! A winter snow storm also cut short my visit to the University of Toronto. The itinerary provided in Appendix 1 details the timings of these visits whilst selected photos from my trip are provided in Appendix 3.

The specific activities during my visit in each of these places varied and ranged from being pre-organised timetables of one-on-one conversations to more focused and deliberate discussions with faculty members (and also with doctoral and postdoctoral students at SFU). Topics of conversation ranged from discussing my working life in CSIRO to details of my PhD research (on modelling correlated zero-inflated count data) to my current research and applications in spatial design for aquatic monitoring. The latter area was summarised and the focus of two seminars that I delivered on seven occasions during my visit; the details of these with copies of the slides are provided in Appendix 2.

The conversations I engaged in were always a two-way road; I was just as eager to hear about others' research areas, working lives and statistical interactions, with the express purpose of enhancing and helping to direct my own statistical research. There were two common threads of statistical research that I identified from



Australian Government

Australian Institute of Health and Welfare

AIHW Statistical Consultants - Statement of Requirement

The Australian Institute of Health and Welfare plans to establish a panel of skilled statisticians for consultancy work. We are seeking statisticians with proven capability in applied statistics, who are able to assist with complex statistical problems and/or who have demonstrated ability to transfer knowledge to project staff.

Specifically, we are seeking individuals or a company with the ability to:

- Develop and implement statistical methodology and/or adapt existing methods to meet the AIHW needs.
- Be part of a collaborative multidisciplinary research team and ensure skills transfer.
- Write project reports in conjunction with other AIHW staff.
- Contribute to [preparing and writing] papers for publication in the scientific literature, with a focus on both statistical and applied journals and conferences.
- Interpret and present research findings to peers in the research community.
- Participate in the development of new research.

Position Description

Panel members will be involved in a range of services including:

- Providing a statistical consultancy and information service for AIHW staff;
- Developing statistical methodology and/or adapting existing methods to meet the AIHW research objectives;
- Implementing statistical methodology and working with AIHW staff to write project reports, ensuring the transfer of skills;
- Either leading, or working as an integrated part of, a collaborative multidisciplinary research team;

- Interpreting and presenting research findings to peers in the research community;
- Participating in the development of new research projects;
- Performing other duties as required.

Working Arrangements

The Consultant(s) will on occasions be required to either:

- work as integrated member of the AIHW team working at the Institute's Fern Hill Park premises; or
- provide advice and consultancy services 'on line' from their own accommodation.

Remuneration

For consultancies that require an integrated team member, payment will be based on the relevant salary rate for the expected duration of the project.

For 'on-line' consultancy services payment will be by an agreed hourly rate paid on receipt of a monthly invoice.

For further information: Please contact Dr Phil Anderson, phone 02 6244 1125, or email phil.anderson@aihw.gov.au

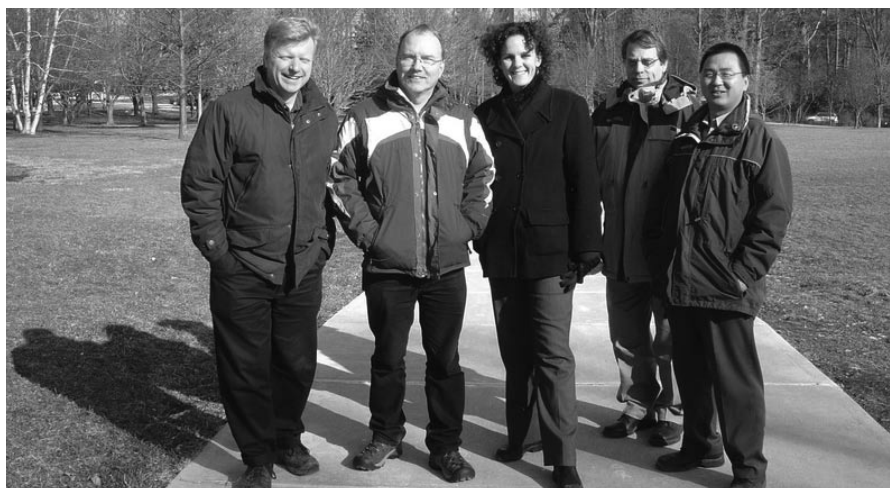
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my discussions across all locations I visited, namely in functional data analysis and in state space modelling (also known as hidden Markov Models or dynamic linear models). These were topics that I was keen to learn more about, especially in relation to applications of topics of relevance to my work in environmental monitoring.

I met with Jim Ramsay (the Canadian father of Functional Data Analysis methods) briefly in Vancouver during my last week in Canada and attended a seminar he gave at SFU which described some of his recently published research on parameter cascading in high dimensional data. Other Canadian statisticians whom work in this area and that I had brief conversations with include Jiguo Cao and Dave Campbell (both faculty members at SFU) and Fang Yao (faculty member at UofT).

Rachel Altman (faculty member at SFU) helped explain the fundamental underlying theory of Hidden Markov Models, and Joanna Mills Flemming and Mike Dowd (both faculty members of DalU) explained how they were using state space models to combine physical models with observed data in marine ecology applications. I also attended a seminar presented by Mike at the Bedford Institute of Oceanography in Halifax on data assimilation for ecosystem models, using state space models. Finally Yiping Dou, who has almost completed her PhD with Jim Zidek at UBC, ran through some R code she has written for implementing dynamic linear models to form spatial predictions (of ozone in her example) at unmonitored locations from data collected from a sparse number of monitoring sites.

Given my own research area and application focus is in designing monitoring programs for assessing aquatic ecosystem health, I arranged to meet with two specific Canadian statisticians who



A beautiful day in London, Ontario, with John Braun, Duncan Murdoch, David Bellhouse and Wenqing He.

also work in this area, namely Abdel El-Shaarawi (NWRI/McMaster) and Grace Chiu (UoW). This provided opportunity to discuss some of my burning statistical questions on topics in this area but also to establish stronger links with both of them for future potential collaborative research endeavours.

At SFU, where there is a strong graduate and postgraduate presence in the Department of Statistics and Actuarial Science, I interacted with many of the doctoral and postdoctoral students and heard briefly about their research on a variety of topics including recurrent event data with medical applications, capture-recapture methods for salmon populations, functional data analysis approaches to modelling returned salmon abundance given river flow, and prediction of forest fires. This further broadened my appreciation for research being undertaken in environmental applications in Canada.

There were numerous positive outcomes of my visit to Canada as the 2007 AusCan scholar. I regard the most beneficial of these as presenting me with an opportunity to:

- directly enhance my knowledge about cutting edge statistical research being undertaken in Canada;
- meet and interact with selected Canadian statisticians, some who work in similar environmental areas, thereby identifying potential future collaborative researchers; and
- discuss my research in some detail, which helped to clarify my own understandings and exposed others to areas of research and application that are practically challenging but require statistical rigour.

Overall, the trip was intellectually stimulating and motivating but I admit that it was quite exhausting¹, even with such a seemingly relatively relaxed itinerary compared to Dr Zhu's itinerary for his Australian visit. None-the-less, I believe I fulfilled the aims of the scholarship and hope that the majority of Canadian statisticians I visited and spoke with gained mutual benefit from my visit. I thank both of the societies with awarding me such a unique and worthwhile opportunity.

One improvement for next time is to advertise the scholarship and its aims more widely amongst the statistical communities. I found that there were very few Canadian statisticians who had heard about the program or knew why I was visiting. Consequently, I needed to continually explain what had brought me to Canada and the aims of my visit, to the point where I copied a paragraph down from the SSC website which I got my seminar introducers to read out before I spoke!

Melissa Dobbie



Chris Field treats me to my first whole lobster dinner!

1. possibly as a result, a "Vancouver" flu got the better of me on my final weekend in Canada but ended up just slowing me down in my last week in Canada.

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Conferences/Workshops/Courses

International Symposium on Forecasting

22-25 June 2008, Nice, France
<http://www.forecasters.org/isf/>

Australian Statistical Conference 2008

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

AMSI/SSAI ASC 2008 Satellite R workshop

27-29 June 2008, Melbourne, VIC
<http://www.maths.anu.edu.au/~johnm/R-ASC2008.html>

ASC2008 Satellite Short-Course: A New Approach to Meta-Analysis

4th July 2008, Melbourne, VIC
www.statsoc.org.au

Bayesian Methods in Health Economics

14-16 July 2008, Sydney, NSW
http://www.arcs.com.au/documents/Bayesian_Syd_14Jul08.pdf

7th World Congress in Probability and Statistics

July 14-19, 2008, Singapore
<http://www.ims.nus.edu.sg/Programs/wc2008/index.htm>

ISBA 2008 Satellite Workshop: Bayesian Environmetrics

17-18 July 2008, Brisbane, QLD
www.isba2008.sci.qut.edu.au

International Society for Bayesian Analysis Conference

21-25 July 2008, Hamilton Island, QLD
<http://www.isba2008.sci.qut.edu.au/>

Pre-Olympic Congress on Computer Science in Sport

5-7 August 2008, Nanjing, China
<http://www.olympiccongress.org>

Australasian Conference on Mathematics and Computers in Sport

31 August - 3 September 2008, Coolangatta, QLD
<http://www.anziam.org.au/MathSport/Conference.html>

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>

NatStats08 Conference

19-21 November 2008, Melbourne VIC
<http://www.nss.gov.au/natstats>

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

Australian Statistical Conference 2010

6-10 December 2010, Perth, WA

NatStats Conference08

The NatStats Conference08 will be held at the Crown Promenade, Melbourne from 19-21 November 2008.

Preprogram registration for the conference is NOW OPEN! Register and pay before 20th June to receive a special price on your conference registration—even cheaper than early bird!

The NatStats08 web site, <http://www.nss.gov.au/natstats>, is your one stop shop for all your NatStats08 needs. From the web site you will be able to register for the conference, download our sponsorship and exhibition document as well be informed of all the latest program and social events developments.

The conference program has been designed with policy and decision makers in mind. A range of speakers covering overseas organisations, senior staff from policy departments, as well as representatives from academia, the private sector and the community are being invited to help elevate thinking to



a national perspective. The conference will be divided into three main themes: Informing the Nation; Measuring the Progress of Society and Informing the Environment Debate. There will also be showcase sessions that will demonstrate Information Platforms and State planning initiatives.

Participating in NatStats08 will provide you with the opportunity to:

- **Learn** from experts and experience first hand the latest developments and the future directions of key national statistics
- **Connect** with the statistical community on the issues and

challenges in creating a culture of evidence-based decision making

- **Share** your experiences and raise awareness of the significant issues within your field
- **Network** with policy makers from across government, industry, academia and the community

If you would like to talk about the conference program please call Mark Lound on 02 6252 6325 or email him at inquiries@nss.gov.au.

To register your interest in the conference please contact Conference Solutions on natstats@con-sol.com

<http://www.isba2008.sci.qut.edu.au/>

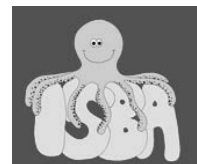
ISBA 2008 Satellite Workshop

Bayesian Environmetrics

17-18th July, 2008

Queensland University of Technology, Brisbane, Australia

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INTERNATIONAL SOCIETY FOR BAYESIAN ANALYSIS



Outline

This workshop is aimed at researchers and practitioners who are interested in Bayesian approaches to statistical modelling and analysis of environmental issues. The workshop will comprise four themes: (1) environmental modelling for air, land and water; (2) environmental risk and biosecurity; (3) climate change, and (4) new statistical and computing technologies.

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

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

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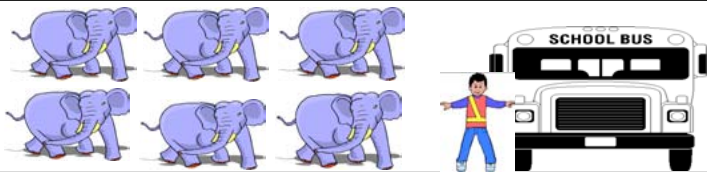
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Workshop in Commemoration of Chris Heyde

Professor Chris Heyde passed away on 6 March 2008. He had an exceptionally distinguished career in probability and statistics.

His research interests were broad, covering probability theory, applied probability and statistics, as well as the history of statistics. He published over 200 papers and authored and edited 12 books.

Chris served the Australian Academy of Science, the Australian Foundation for Science, The Australian Mathematical Society, The Statistical Society of Australia, The International Statistical Institute and the Bernoulli Society by taking on significant roles in these organisations. He also acted as Editor or Associate Editor for a number of journals, including the two Applied Probability journals of which he was Editor-in-Chief from 1990 to 2007.

Chris was a Fellow of the Institute of Mathematical Statistics (1973), a Fellow of the Australian Academy of Science (1977), an Honorary Life Member of the Statistical Society of Australia (1981), and a Fellow of the Academy of the Social Sciences in Australia (2003).

He became a Member of the Order of Australia (AM) for services to Mathematics (2003). He was awarded a DSc honoris causa by the University of Sydney (1998) and received the Pitman Medal (Statistical Society of Australia, 1988), as well as the Hannan and Lyle Medals (Australian Academy of Science, 1994 and 1995).

The Australian National University and the University of Canberra are organising a workshop to commemorate his contributions to Statistics, to Academia and the statistical community in Australia and overseas. The workshop will be held on 29 August 2008, at the Council Room, Building 1 of the University of Canberra. At this stage, speakers and participants include Ejaz Ahmed (Windsor University, Canada), Bob Anderssen (CSIRO), Daryl Daley (ANU), Joe Gani (ANU), David Heath (ANU), Shuangzhe Liu (UC), Ross Maller (ANU), Richard Morton (CSIRO), David Pederson (UC), Alice Richardson (UC), Peter Taylor (UC/AMT) and Alan Welsh (ANU).

All colleagues and friends are welcome to attend. Further information is available from Alan Welsh (alan.welsh@anu.edu.au) or Shuangzhe Liu (shuangzhe.liu@canberra.edu.au).

In Memoriam

**Christopher Charles Heyde,
20 April 1939 – 6 March 2008**

It is with great sadness that we report on the passing of Chris Heyde. Chris, as he was known to us, was a giant figure in Australian Probability and Statistics during a period of almost 40 years. His active research career, stretching right up to the last weeks of his life, spanned an era when a number of other major Australian figures strode both the Australian and the world stages. Some of these were his mentors, some were colleagues, some were his students, many were his friends, but only a few had the impact, overall, that Chris had. His influence went well beyond the confines of narrow academic research, as he lobbied hard in corridors of power for recognition of the applicability of Probability and Statistics in contributing to solutions of the large questions facing our times. He took a serious interest in the development of our subject, both in Australia, and internationally. His publications list contains invited articles which attest to his ongoing concern for the public perception of, and the future of, mathematical and statistical science, presented from his authoritatively perceptive standpoint.

While representing Australian interests in a substantial way overseas, via membership of major statistical groups such as the ISI and IMS, and the holding of a position at Columbia University joint with his appointment at the ANU, together with regular invited appearances at a large number of the most prominent conferences, Chris did not neglect his support of Probability and Statistics at home. He always had a strong commitment to the SSA. Apart from early involvement as a local branch member, he was Editor of the Australian Journal of Statistics from 1973-78, and President of the Canberra branch from 1977-78. In 1979 he was elected President of the Society, a position he held till 1981. He was a member of Central Council from 1973-86, and the Society's Federal President in 1985-86. Always active in committee work, he chaired the SSAI Statistics Policy Committee from 1979-1984, and was SSAI Representative on the National Committee for Mathematics from 1981-1996. He was elected an SSAI Honorary Life Member in 1981 and



awarded our ultimate honour, the Pitman Medal, in 1988.

Active also in many other arenas, Chris was elected Fellow of the Australian Academy of Science in 1977, and was a Member of Council of the Australian Mathematical Society in 1980-83, and its Vice-President in 1981. The University of Sydney conferred a DSc, *Honoris Causa*, upon him in 1998, and he became a Member of the Order of Australia (AM) in 2003, for his services to Mathematics, more particularly to Statistics and Applied Probability. In recognition of his contribution to the social sciences he was elected to Fellowship of the Academy of the Social Sciences in Australia in 2003. He was awarded the Hannan Medal of the Australian Academy of Science in 1994, and its Ranken Lyle Medal in 1995. Overseas, Chris's abilities were recognized early. He became a Fellow of the Institute of Mathematical Statistics in 1973. Later, he delivered the Fisher Lecture at an Invited Paper Meeting at the 47th Session of the ISI in Paris.

Chris was a Sydney-sider, schooled at Barker College, Hornsby, where he excelled at sports, particularly swimming. He was Dux of the School in 1956. A damaged Achilles tendon on the football field and a gifted mathematics teacher led him to redirect his energy to academic pursuits. He completed his Honours

in Mathematical Statistics in the first full year, 1960, of the existence of the Department of Mathematical Statistics at the University of Sydney, in which Oliver Lancaster was the foundation Professor, graduating with a University Medal in 1961. He continued his studies at Sydney, and received his MSc in 1962 for a thesis on the "Theory of characteristic functions and the classical moment problem". His note published in 1963 in which he showed that the lognormal distribution is not determined by its moments, is from this period. It became a classic, and achieved the accolade of being cited in William Feller's classic *Introduction to Probability Theory and Its Applications*, Vol.2.

In 1961, Chris began work on a PhD thesis in Pat Moran's Department of Statistics at the ANU. The PhD was awarded in 1965, and later that year he married Elizabeth (Beth) James, whom he had met at the ANU, while both were engaged on their PhD studies. The mutually supportive marriage was remarkably happy. They had two boys, Neil, born in 1967, and Eric, born in 1969. At the time of Chris's death, he and Beth were the proud grandparents of four grandchildren.

In September 1964, Chris joined Joe Gani, then also a member of Pat Moran's Department, in moving to the Department of Statistics at Michigan State University. Joe left there to take up the Chair of Probability and Statistics at the University of Sheffield, UK, at the end of 1965, and Chris followed him. He was soon promoted to Special Lecturer in charge of the Statistical Laboratory at the University of Manchester in 1967, when the Manchester-Sheffield School of Probability and Statistics was formed.

Chris returned to Australia in September 1968, where he took up a Readership in Ted Hannan's Department of Statistics at the ANU. He had by then produced some 30 papers, a dominant theme of which was the refinement of classical limit theory involving large and small deviations, rates of convergence and domains of attraction, while displaying a breadth of interest in the contemporary issues in probability. The appointment stimulated Chris's interests

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In Memoriam

from page 11

in new directions, notably the theory of branching processes and statistical inference for them, and population genetics models related to them. Several joint papers with Eugene Seneta appeared on these topics, and a fundamental one with Ted Hannan on time series analysis. In this work, a principal focus by Chris was the martingale concept. He was to become widely known for work on the theory and application of martingale methods, not least in estimation for stochastic processes. In 1973 he was awarded a DSc by the ANU.

In January 1975, Chris joined the Canberra-based Division of Mathematics and Statistics, of the CSIRO, again following in the footsteps of Joe Gani. On Joe's departure as Chief of Division, Chris took over as Acting Chief in 1981, until September 1983 when he was appointed Professor and Chairman of the Department of Statistics at the University of Melbourne. He was instrumental in creating the Statistical Computing Centre there, and, in 1985, a Key Centre for Statistical Science, of which he became the Foundation Director. This was a joint enterprise of LaTrobe, Monash and Melbourne Universities, and the Royal Melbourne Institute of Technology.

In May 1986 Chris returned to the ANU, and was Professor and Head of the Department of Statistics in the Institute of Advanced Studies from July 1986 to

December 1988. From 1989-1992 he was Foundation Dean of the ANU School of Mathematical Sciences (now the Mathematical Sciences Institute). Since 1993, while continuing at ANU, he was also a Professor in the Department of Statistics at Columbia University, New York, and Director of their Center for Applied Probability.

One of Joe Gani's major achievements was the setting up of the Applied Probability Trust, and the publication of its two world class journals. Chris had a close association with these from their inception, and became Editor-in-Chief of the *Journal of Applied Probability* and of the *Advances in Applied Probability* from 1990-2007, jointly with Soren Asmussen from May, 2005. Other editorial contributions included positions as Associate Editor of the *Journal of the Australian Math.*

Society, responsible for probability and statistics, from 1972-74, and of *Stochastic Processes and its Applications* from 1972-82 (he was its Editor from 1983-89). He was Editor of the Australian Journal of Statistics from 1973-78, an Associate Editor of the *Annals of Probability*, from 1974-81, and of *Mathematics of Operations Research*, from 1976-90. He was one of the Editors of the Springer series of books in Probability and its Applications from 1985. His high standards, efficiency and integrity as editor, author and coauthor were always greatly respected by his professional colleagues.

Chris's research demonstrated great depth and originality in his broadly chosen research areas, but beyond these he nurtured also a sustaining interest in the history of Probability and Statistics which fostered an awareness of the important foundational elements of our subject. He authored and edited twelve books, three of which are historical, and six of which are edited collections of papers for special issues of journals, Festschriften, or overviews of particular topics. Two others represent major original contributions to probability and statistics: *Martingale Limit Theory and its Applications* (1980) with Peter Hall, and the later *Quasi-likelihood and its Applications* (1997).

A more extensive appreciation of Chris's life and works than the present one, and of the honours accorded to him, written by Joe Gani and Eugene Seneta, appeared as an introduction to Gani and Seneta (2004). This was a special issue of the *Journal of Applied Probability*, which contained a collection of articles by his colleagues and friends. It includes a list of his publications up till 2004; that list will be updated in a collection of his articles, accompanied by commentaries by a number of colleagues, in an IMS volume to appear next year. A published interview of Chris appeared in Glasserman and Kou (2006). There will be an obituary by Gani and Seneta, to appear in of the *Journal of Applied Probability* 2008, extending the 2004 introduction mentioned above.

When first met, Chris could be a somewhat austere and even forbidding figure. But no first impression could be further from the truth. His outward reserve, and the rigour he applied to his administrative duties as much as to his mathematics, concealed a very

human heart within, and a strong ironic sense of humour, and the advice and encouragement he delivered impartially stemmed from a genuine concern for the well being of his students, his colleagues, the authors of the myriad of papers he handled in his working life, and all that he came in contact with.

Chris was diagnosed with leukaemia 11 years before his death, and underwent periods of treatment followed by lengthy periods of remission. He completed his normal activities at Columbia University in the Fall of 2007, but early in 2008 metastatic melanoma was diagnosed in Canberra. In an email message dated January 20, 2008, to one of the authors of the present article he wrote:

Whatever happens, I certainly feel that I have had a fortunate life. I will be happy to have more, ... but if not, I have had a good innings and can go in peace.

Chris Heyde was one of the greats of probability theory of our time and his contribution was immense. His influence will remain.

He will be painfully missed, by his colleagues, his wife and family, his many friends, and the statistical community worldwide.

Eugene Seneta and Ross Maller

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Daniel Dice Schubert

Many in the statistical community, particularly the younger members here in Perth, knew, or knew of, Daniel, and were shocked by his recent death which happened in a motorcycle accident last November. Daniel did his PhD at Murdoch University completing successfully in 2006, and, at the time of his passing, was employed on a Postdoctoral Fellowship at CSIRO Division of Mathematics and Information Sciences in Floreat. As the person who supervised his PhD I consulted with Harri Kiiveri,

In Memoriam

his supervisor at CSIRO, and we thought we would put together some words to inform our readers about this unique character.

From Brenton Clarke: Daniel came to Murdoch University after completing his BSc Hons 1st Class, which he completed externally to Murdoch. Initially he resided in Sydney while doing his ordinary degree and he spent time in Canberra at the Bureau of Statistics while completing his honours year (again externally). Daniel was very diligent and asked questions and it was a tribute to him that the Murdoch Mathematics and Statistics Secretary at the time had a special button on her fax machine so that staff could fax him back answers to his many and wide ranging queries. Daniel was inspired by the mathematics of robust statistics, though he was no slouch when it came to getting his hands dirty with computing and analysis of data. After completing his honours, he took up the offer of a Murdoch scholarship and decided to move to Perth.

Daniel soon made an impression on the lives of people in our department and, indeed, many around campus. He had fixed his mind on gaining a PhD. Daniel was quite different, which we all soon realized, but in a nice and caring way. He revered female mathematicians, had studied theology for the priesthood, but had gone away from that, he loved games of chance, and spent much of his spare time designing games to play on the computer (hence the middle name and the photograph). It became apparent that he loved cricket, soccer (Manchester United), and most of all classical music, being one of the first in our department to purchase an Ipod, on which he stored 500 classical pieces.

Having succeeded making the PhD project 'work' he gave an excellent talk at the Young Statisticians workshop at Thompkins Park in 2005. We submitted a paper to ANZJS. This was a turning point for him to write his thesis. As one can expect referees comments are often insightful, but must be answered carefully and with precision. Sitting with Daniel he soon learnt the craft of not only writing a good paper, but finishing it off in a way that would please the editorship and the reader. The paper appeared in the 2006 September issue of ANZJS, and



*Daniel Dice
Schubert holding
"dice". This photo
is courtesy of his
partner Josie
Hawkins.*

From Harri Kiiveri: Two years ago Daniel Applied for and was awarded a Post Doctoral Fellowship at the CSIRO Division of Mathematics and Information Sciences in Floreat. I became Daniel's supervisor and mentor.

When Daniel started work, the first thing I noticed was that the quiet and peaceful life in my office had changed significantly. Daniel became a regular visitor to my room for discussions, not only with Maths questions about projects we were working on, but on all manner of things ranging from current affairs, religion, politics and the meaning of life. Through these talks it became clear that we shared a lot of similar (sometimes radical) views about things. Daniel liked to talk and very little was off limits to talk about. Daniel had certainly been through hard times, harder than most, yet he didn't allow that to limit him. I don't exactly remember how Daniel's interest in mathematics began, however some time ago he decided that he wanted to study mathematics and with single minded purpose he did whatever it took to do that. This is what finally led him to Perth to study at Murdoch University where he was awarded a PhD in Statistics.

Daniel had wide ranging interests including Cricket (he used one of the algorithms he developed in his PhD thesis to prove that Bradman was an outlier), soccer, classical music—in particular Wagner's operas, mathematics, and more recently motor bikes.

Being a creative person Daniel had an unusual way of combining his interests. He would run computer simulations of test cricket matches (in fact test series) using the published statistics of all the players. He would simulate the outcomes

was an excellent fillip to writing his PhD. Daniel's PhD was titled: "A Multivariate Adaptive Trimmed Likelihood Algorithm"

And a digital thesis is available at Murdoch University Library <http://www.lib.murdoch.edu.au/adtbrowse/search/?k=Schubert>

of games that could never happen in real life. For example, he ran a series of test matches between Bradman's team of the 1940's and Ricky Ponting's team of 2006. (Bradman's team consistently won the series). He didn't stop at this however. He would make up test cricket teams from soccer players so for example Manchester United would play Arsenal in a test cricket series. He did this with classical composers also and simulated test cricket matches between Austrian composers and German composers amongst others. Its kind of interesting thinking about his score sheets with things like Beethoven caught Mozart bowled Wagner for 67. I don't know exactly how he'd figure out if Beethoven was a batsmen or bowler or what his stats were, but it had something to do with the impact the music had on Daniel

Looking back on my experiences with Daniel it seemed that there had been a guiding hand directing Daniel. When I think of the last few years so many things began to fall into place like clockwork

- He achieved his goal to study mathematics—culminating with his PhD
- He found a promising career path that really interested him and enabled him to continue studying mathematics
- His finances improved
- He started to look after himself better (improving on his Spartan student diet)
- He got his own transport
- He began to expand his interests and social circle beyond work
- He met his life's partner

Unfortunately this progression was tragically cut short by an accident which was no fault of his own. It has been difficult to come to terms with all this...

As time passes we are left with memories...memories of Daniel's enthusiastic work on real life problems which required statistics... with seeing his gradual "conversion" to Bayesian statistics...with the funny stories that seemed to accompany most things that he did...with the energy and enthusiasm he put into his life...with his "what you see is what you get" manner, and especially with memories of his unique ability to create connections with other people.

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Branch Reports

QUEENSLAND BRANCH NEWS

February Meeting

On 26th February Professor Murray Aitkin and Dr Irit Aitkin from the University of Melbourne spoke at Queensland University of Technology. The talk was titled 'Multilevel analysis of item response models in clustered and stratified survey designs for the US National Assessment of Educational Progress'.

The National Assessment of Educational Progress (NAEP) is a series of US national tests of performance in primary and high schools across a range of subjects. Results of the tests are published by the National Center for Education Statistics, in terms of differences in performance between ethnic groups, national regions, and other important reporting groups. The primary school mathematics tests are composed of items which are analysed using item response (IRT) models which regress the binary response on a latent ability variable, on which the reporting group differences are based. The survey design of many of the NAEP tests is multi-stage with both clustering and stratification. This complicates considerably the analysis of the test data. In this talk the multilevel model-based analysis of one scale from the 1986 mathematics test for children in Grade 3, age 9 was described. The full analysis required a four-level binary logistic item response model. Current analysis methods for the NAEP surveys and the improvements which result from the full model analysis were discussed.

April Meeting

The AGM was held before the talk. Dr Ross Darnell our outgoing President was thanked for his leadership in a very successful 2007 program (see below). Dr Miranda Mortlock takes over as President. The outgoing committee was thanked for all the hard work in the previous year. Many members are continuing in their role and in particular Dr Helen Johnson as secretary and Dr James McBroom as Treasurer. The full committee will be introduced in the next newsletter.

The program from 2007 is summarised here:

6-Feb Jay M. Ver Hoef, NOAA National Marine Mammal Laboratory, Alaska gave a very interesting presentation on Space-

Time Zero-Inflated Count Models of Harbor Seals.

3-Apr Following the AGM: Professor Annette Dobson, School of Population Health, University of Queensland spoke on Missing Data in Longitudinal Studies.

8-May Dr Toshi Ohnishi of the Institute of Statistical Mathematics, Tokyo, spoke on Estimating a common slope (of multiple strata) in the Tweedie generalized linear model using a conjugate prior.

5-Jun Dr Dr Yougan 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.

3-Jul UQ Professors Anthony Davison and Louise Ryan presented talks. Professor Davison spoke on Galaxies, ticks, neurons, and stock market crashes: Hard times for the Poisson process. Professor Ryan spoke on Optimal Design for Epidemiological Studies.

7-Aug QUT James Enoch, Academic Program Manager, SAS Institute, Australia and New Zealand spoke on Bridging the gap between Academia and Business

20-Sep QUT Professor Doug Altman presented a talk in Sydney which was viewed by Queensland members a via video linkup. Professor Altman's talk was titled Selective non-reporting of findings of randomised trials and impact on systematic reviews.

16-Oct UQ Dr Timothy Robinson of the University of Wyoming presented a talk titled "Bayesian Analysis of Split-Plot Experiments with Non-Normal Responses for Evaluating Non-Standard Performance Criteria".

Nov-07 QUT Two day Workshop on the R System on 26-27 November 2007 at the Queensland University of Technology. Ten participants took part in the workshop which was delivered by John Maindonald, ANU.

Dec-07 QUT Professor Helen MacGillivray gave a vigorating talk titled "Developing probabilistic statistical thinking". The meeting was held on Tuesday the 11th December at QUT's Gardens Point Campus at 5pm.

James McGree from the University of Queensland spoke on 'Probability-Based Optimal Design' on 15th April at the University of Queensland. In recent years,

design for generalized linear models (GLMs) has become a topical and integral part of experimental design. This has predominately been a consequence of both their broad application and to the ever growing computational power of modern day computers. The problem is one of choosing a design such that parameters can be estimated with high accuracy. GLMs are generally nonlinear models (nonlinear with respect to parameters). For such situations, it is necessary to have preliminary estimates of parameters to form designs. This is indeed the main difference between design for linear and nonlinear models; the former not requiring information about the unknown model parameters. These design basics are initially revised as an introduction into some recent developments of design criteria for GLMs.

A new criterion termed P-optimality for GLMs which maximizes the probability of observing an outcome or set of outcomes is proposed. The development of this criterion was motivated by experiments where designs for the efficient estimation of parameters produce low or modest probabilities of observing successful outcomes. In an applied setting, despite being able to efficiently estimate parameters, ethical issues may be raised when conducting an experiment where only small probabilities of successful outcomes are expected. P-optimality combined with parameter estimation provides a technique for maximizing successful outcomes and minimizing uncertainty about parameter estimates. For the criteria developed, a general equivalence theorem was shown to apply which provides theoretical support to the methodology and ideas presented. Applications to design problems found in the literature will be explored to show the benefits of implementing this new methodology.

Earlier this year, James submitted his Ph.D thesis after 3 years of research at the University of Queensland (UQ). During this time, he was fortunate enough to have the opportunity to study at the University of Southampton and the University of Otago. James also gained experience in the application of current statistical methodology within the pharmaceutical industry as a student intern at Novartis Pharma, Switzerland. James currently has a position at UQ as an associate lecturer.

Miranda Mortlock

CANBERRA BRANCH NEWS

Beyond the hype: data mining in practice

The talk for the March meeting of the Canberra Branch of the SSAI was delivered, following its Annual General Meeting, by our branch secretary, Ray Lindsay. Ray's talk was about his work as a senior data miner in the Australian Taxation Office, and had an interesting title - "Beyond the hype: data mining in practice".

He opened the talk by referring to a July 2006 article from the Australian Financial Review with headline "ATO data mining unearths treasure". The article reported that the ATO reaped a \$118 million dividend from its first attempt at using data mining to score taxpayers who are late filing returns. Ray retold this story from a technical perspective, highlighting the technical and statistical obstacles of the analysis, which "made the journey very interesting".

The problem he tackled was to predict revenue that would arise if a large number of overdue income tax returns (or business activity statements) were lodged by taxpayers and to use the predicted revenue as scores for prioritising action. Many apparently overdue returns are in fact not required to be lodged and the client has simply failed to notify the Tax Office. Separating the wheat from the chaff would lead to a better outcome from revenue collection activities.

Training data were used to fit the model from lodgments that have been made and the model was then used to derive score data from those overdue. There was no shortage of data. Data items included previous lodgment behaviour, known income and credits, demographics, whether a tax agent was used, industry codes (for business), and so on. There were some 400 attributes and each model used about 10 to 20 attributes. Many data items were missing, and not at random. Other interesting challenges included plenty of zeroes and long tailed distributions. Ray's team used a two stage model, firstly to model the sign and then the magnitude of the predicted values. All financial variables were log transformed with those that can be both positive and negative becoming two transformed variables.

Given the focus was to derive priority scores, normal metrics for model fitting were less relevant than measuring a correct rank order. Ray's team used the Receiver

Operating Characteristic curve which compares the rate of false positive vs (1 - rate of false negatives) for the binary models. For interval variables, they used the generalised c- statistic, which is the interval equivalent of the Receiver Operating Characteristic curve for binary variables. These tools were used for choosing between models based on training data at time of model building, and evaluating over time based on actual lodgments, subsequently.

SAS/Enterprise Miner 5.1 was used for the two stage models. Models available included regression, neural network, Classification And Regression Trees [CART] and others. Regression and "neural nets" do not cope with missing data. While CART coped better with missing values, it only predicted a small number of distinct values, and was not useful for discriminating between a large number of units. However combining the component models in two stages increased the number of unique predictions beyond that expected. The team experimented with using ensemble models and these improved the percentage of unique values further.

Ray noted that it helps to break up a problem to smaller parts, build relatively simple models and combine them in the right way. He concluded by quoting George E. Box: "All models are wrong, but some models are useful."

Frank Yu

Developing treatment outcome models from clinical trials data

At the Canberra Branch meeting on 29 April, Michael Adena, Statistical Consultant with Covance gave a talk, "Developing treatment outcome models from clinical trials data". Michael spoke both about the general issue of statistical support for Pharmaceutical Benefits Advisory Committee submissions and about the specific issue of evaluating a particular drug for treating HIV.

The PBS, established in 1948, aims to give the Australian community access to safe, efficacious and cost-effective medicines. Guidelines for getting a drug adopted on the PBS are seen as amongst the most rigorous in the world. Submissions require a detailed submission, following new guidelines introduced in 2007. Reports typically include meta-analyses of previous studies, extracting salient information. Re-analysis of clinical trial data and analysis of

epidemiological data can also be required. Michael explained how the statistical work he did provided support for the economic models used to evaluate the cost-benefit of new drugs in terms of both life-years and quality-adjusted life-years. In an aside he remarked that in pharmaceutical evaluation, saving 1 life-year was likely to be regarded as cost-effective up to about \$40 000, whereas in road safety improvements the upper limit was closer to \$500,000.

In his specific example he discussed 2 studies of a new protease inhibitor which was expected to lower the HIV viral load compared with control treatments. The patients in this study were all 'highly treatment experienced' patients for whom other drugs had failed. These studies show a significantly higher proportion of patients with a continuing response at 48 weeks with the new drug compared with the control. However most of this difference seemed to be apparent at by week 8, with the time to treatment failure curves being roughly parallel after then.

In discussing what this means for patients, and how much the community should pay for this drug, Michael said the standard economic approach was to calculate the difference in life-years gained, which gave a cost per life-year. However, as there were only 51 deaths (out of 1488 patients) during the study, a modeling approach is necessary. He analysed the trial data to estimate parameters for a Markov model with 12 'alive' states and a death state. By modeling the transition probabilities between these states in each 8 week interval, using logistic regression, Michael was able to show that treatment differences in transitions were in the first 8 week period, with little or no treatment differences after then. The study data confirmed that the death rate was strongly dependent on the current CD4+ count.

Michael then used an example from oncology to motivate the use of Poisson regression as an alternative to Cox regression for the analysis of survival. Whereas Cox regression does not give an explicit baseline hazard, Poisson regression does. Poisson regressions produce relative hazard estimates close to those from Cox regression, are simple to fit, and support a rich modeling framework.

In conclusion, Michael described some of the fun aspects of his work, especially the intellectual challenge, variety of work, modeling, working with current medical

issues and being involved in a world leading area. His work requires integrating large amounts of information from different sources, usually in a short time frame.

Ray Lindsay

NEW SOUTH WALES BRANCH NEWS

The past six months have been a busy period for the NSW Branch. On the 29th of November we had the 8th Annual J. B. Douglas Awards and Dinner at the Macquarie Graduate School of Management Conference Centre. These awards are competitive and pit students enrolled in research masters or PhD statistics degrees from universities across the state against one another. On the night we had six excellent student speakers and the Peter Wright Prize was jointly awarded to Stephanie de Silva (University of Sydney) and Dorothy Wong (Macquarie University). I would like to thank Caro Badcock (previous NSW President), William Dunsmuir (UNSW and current Society President) and Jo Leadbetter (Eli Lilly Aust PL) for being part of the judging panel. Prior to the dinner William Dunsmuir, our guest speaker, discussed "Quasi-Monte Carlo in Statistical Model Estimation" which aims to deal with problems that hinder the calculation of high-dimensional intractable integrals and instead. He gave a general discussion of the QMC methods and how they can be used in statistical modelling, especially generalised linear models and time series models with latent correlation. We are now about five months away from the 9th annual J. B. Douglas Awards, so I would like all supervisors of postgraduate students to seriously considering nominating them to take part in the event. Information about the date and location of the Awards and dinner will be advertised as the time draws nearer.

On the 19th of March the Branch held its AGM at the University of Sydney. Amongst many things on the agenda, a proposal was unanimously accepted by those in attendance to modify the rules which involved restructuring the makeup of the Branch council. Gone now are the days where the NSW Branch will have the outgoing President continue their stint on council for another two years as Past President. Instead, in the first year of a

President's two year term, the previous President will be the Vice President, while in the second year a new Vice President will be appointed who will fill the role of President at the end of the current President's term. Phew. The change in the rules is now available on the Branch's website. After the AGM, Caro Badcock stepped down as Branch President to take up the newly formed Vice President role and I was handed the reins with Boris Choy (UTS) as the Branch Secretary. I therefore had the pleasure of presenting the annual Lancaster Lecture where I attempted to persuade those listening how one can use various categorical analytic tools to study yeast cells. I considered the use correspondence analysis, non-symmetrical correspondence analysis (there is a difference) and measures of association such as the Marcotorchino index and Grey-Williams index to help understand the factors that influence the ageing of a yeast cell. I did make a disclaimer highlighting that I'm not a molecular biologist, but my colleagues (Dr Vince Higgins, and our PhD student, Lloyd Mirto) are. The talk discussed the findings of a study undertaken to determine factors (including various oxidising agents) that inhibit a yeast cells ability to respire.

In April we had the pleasure of Professor David Hensher, Director of the Institute of Transport and Logistics Studies, University of Sydney, give a talk titled "How do respondents process stated choice experiments? – Attribute consideration under varying information load". David spoke about the popularity of state choice experiments and how design strategies have been increasingly developed to capture the ever increasing complexity that exists in studying choice behaviour. An individual's response, or choice, of a particular question is often determined by factors that are not reflected in a survey. Therefore it becomes important to understand, not just how an individual chooses an item or responds to a question but it is just as important to understand why they make such choices. David demonstrated this using several very interesting examples, including what factors determine ones use of public or private transport (cost, toll, traffic, etc), to better understand why such a choice is made. To reveal the extent to which is occurs, David employed ordered heterogenous logit models to provide a quantitative analysis of his data.

The coming few months also proves to be a very active period for the Branch. Our monthly meetings will continue and, as always, you will be kept informed of their details.

Last July, the Branch hosted the workshop given by Kerrie Mengerson, "Workshop on Bayesian Statistical Methodology", which saw 59 people attend. We are again going to host another Bayesian flavoured workshop from the 14-16 of July in collaboration with ARCS Australia and the APBG. This workshop is aimed at health economists and statisticians with the third day focusing more on advanced topics for the statistician. Professor John Stevens, from Sheffield University UK, will be the facilitator and more details can be found at the Branch's website. Also, the week after the ASC we are going to hold a joint session with APBG and Pfizer again. Simon Thompson, Director of the MRC Biostatistics Unit in the UK and one of the plenary speakers at ASC, has agreed be out guest speaker.

You may recall that last July the Branch held a workshop "Integrating statistical ideas into mathematics" which provided an opportunity for mathematics teachers, curriculum developers, university statisticians and other representatives from the secondary schools from all around NSW to discuss the proposed changes to the NSW senior mathematics curricula. To follow on from the success of this workshop we are in the process of organising a second education workshop to be held at end of July, or early August (very soon). Helen MacGillivray, a Carrick Award winner, has agreed to be a guest speaker.

Eric Beh

SOUTH AUSTRALIA BRANCH NEWS

The Expected Value of Information, Trial Design and Decision Making in Health Technology Assessment

The first meeting of the year for the SA branch was held in February at the University of Adelaide. The speaker was Simon Eckermann who is currently an Associate Professor in Health Economics at Flinders University and is also a member of the Economic sub-committee of the Pharmaceutical Benefits Advisory Committee (PBAC).

Economic analysis is used in health technology assessment to inform decision makers of the expected cost of a new

treatment relative to the cost of an existing treatment. Ideally the new treatment will be more effective and less costly than the existing treatment, however often it is more effective but also more costly. A decision must then be made about whether to implement the new treatment or not. By using patient level data, the bivariate distribution of the cost and effectiveness can be estimated through the use of bootstrapping.

Simon presented models for choosing between three alternatives when considering introducing a new treatment: delaying acceptance of the new treatment while a randomised controlled trial is conducted, accepting the new treatment and conducting a randomised controlled trial concurrently, or accepting the new treatment without conducting a randomised controlled trial. The methodology was illustrated in the context of early and late interventions for pregnant women whose babies are in the breech position, where the outcome of interest is whether the woman gives birth by caesarean or not. He then discussed a fourth option when there are multiple jurisdictions involved, where one jurisdiction may use a side payment to influence trial design in another jurisdiction. In this scenario of multiple jurisdictions, it may be optimal for some jurisdictions to adopt the treatment with no randomised controlled trial, while a trial is conducted in other jurisdictions prior to their acceptance of the new treatment.

Lisa Yelland

VICTORIA BRANCH NEWS

October 2007 meeting

Speaker: Michael Beahan

Director of Census Output for the ABS

Topic: Dissemination of data from the 2006 Census

On Tuesday 16th October 2007, the Victorian Branch of the Statistical Society met at Swinburne University. Over 20 people were present to hear our October guest speaker, the Director of Census Output for the ABS, Michael Beahan, who discussed the dissemination of data from the 2006 Census and provided us with some brief insights into the planning for the 2011 Census.



Michael told us how the ABS has put considerable effort into increasing the accessibility of its data and statistical information since the 2001 census, especially in relation to the web. To use Michael's words, they want to "let people find the data before they die!". Their goal has been to remove the barriers between people and the data. They have also recognised that people have different data needs - some people require data that is customised for particular geographic areas or on specific topic, while others' need are much simpler. Consequently, the ABS has produced a range of products to meet these needs.

To date, the ABS has four web based products available (Quick Stats, Map Stats, Census Tables and Community Profiles), with two additional products due for release early in 2008 (CData Online and Table Builder). Michael provided us with a demonstration of some of these products (for details I refer you to the ABS website www.abs.gov.au).



In his demonstration Michael highlighted the different ways that people can start looking for data – either geographically or by topic. One of the exciting geographic search features is that users can type in a specific address (e.g. their home address), and the search facility will find all locations (e.g. census collection district, local government area, state) containing the property address for which census products are available.

Another new feature of Census 2006 is the metadata that is available to support the tables. By the simple click of an "i" button

(information button), users can obtain images of the census question, definitions of variables, classification schemes and notes on the quality of the data associated with the variable.

Prior to this Census, most tables of data prepared by the ABS were based on "place of enumeration" (i.e. the location where the census form was completed). In response to user requests this has been changed so that most tables are now based on "place of usual residence". However Michael warned users to be cautious when comparing results from the 2006 Census with earlier years, and to check that they are making appropriate comparisons. He also pointed out the inclusion of mesh blocks for the 2006 Census data which allows the user to make almost perfect fitting of the data to the geographical areas they require such as suburb boundaries.

In the last part of the talk, Michael explained that the consultation phase for the 2011 Census was starting in November 2007 and those interested in making a submission will have until March 2008 to do so. A number of the attendees continued their discussions with Michael at a nearby restaurant.

In conclusion, Michael's talk was well received, as highlighted by significant audience comments and questions throughout the session. On behalf of the Statistical Society I would like to thank Michael for his lively and informative interactive presentation and I encourage everyone to visit the ABS website to find out a few interesting facts about their neighbourhood, because it really is as easy as Michael says!!

Helen Bartley

Fisher and Scores

The Belz Lecture, followed by the Belz Dinner, is the most significant event of the year on the Victorian Branch calendar. The lecture honours Professor Maurice Belz, the Foundation Professor of Statistics at the University of Melbourne. The first Belz Lecture was held in 1969, and in recent years it has assumed the additional status of a University of Melbourne Public Lecture.

The Belz Lecture for 2007 was delivered on November 13 by Professor Alan Welsh. Alan is a well-known member of the statistical profession. He is a Fellow of the Institute of Mathematical Statistics, a Fellow of the American Statistical

Association and a Fellow of Australian Academy of Sciences.



Professor Alan Welsh

The title of Alan's presentation was "Fisher and Scores". The talk described work, motivated by G. K. Watson and carried out jointly with John Robinson, to understand an analysis of R.A. Fisher and compare it to a contradictory analysis of the same data by M.S. Bartlett. The data are a table of results obtained by G. L. Taylor by testing 12 blood samples against 12 sera and recording the response as one of 5 ordinal values. Fisher's approach to analysing these data was very similar to that used by him for linear discriminant analysis. He used the analysis of variance to show that there is a significant relationship between the response and the explanatory variables (sera and blood samples) and the analysis of covariance to make approximate inference about the scores (the vector estimated from the data which assigns numerical values to each ordinal category). He showed that the estimated scores are not significantly different from the equally spaced scores (0, 1/4, 1/2, 3/4, 1) and gave an implicit expression for the acceptance region of the test which is a joint confidence region for the scores. It is interesting that from a modern point of view, we can see that Fisher was making inference about eigenvalues and eigenvectors.

Bartlett was critical of Fisher's approach, arguing that it used univariate methods to try to summarise a multivariate relationship. He also felt that the analysis of variance tests were unjustified and that likelihood ratio tests (justified by asymptotic results) should be used instead. Bartlett carried out three tests and showed that there is a significant correlation between the

response and the explanatory variables, that the correlation matrix between the response and the explanatory variables is not significantly different from having rank one, and that the estimated scores are significantly different from the equally spaced scores (0, 1/4, 1/2, 3/4, 1). Bartlett computed marginal confidence intervals for the components of the score vector and used these to argue that the assigned values of 1/2 and 3/4 are inadequate. This last test reaches the opposite conclusion to that of Fisher. Therefore, it would be of interest to compare the two analyses carefully and see if we can find an explanation.

The tests of the first hypothesis (of no relationship or of nonzero correlation) turn out to be based on equivalent statistics. Fisher's F sampling distribution is arguably conservative compared to Bartlett's chi-squared but these are both asymptotically the same. It is therefore not surprising that Fisher and Bartlett reached the same conclusion. H. O. Lancaster later showed that the assumed chi-squared sampling distributions of these tests are incorrect but Fisher and Bartlett were in agreement. Fisher did not test Bartlett's second hypothesis (the correlation matrix has rank one) but Bartlett's test was not significant so he also proceeded to test the adequacy of the equally spaced scores. Detailed asymptotic expansions show that both test statistics have asymptotic chi-squared distributions (although Fisher's test uses far more degrees of freedom than Bartlett's) but that they are testing different hypotheses. Essentially, Fisher's test combines a test for the adequacy of the assigned scores with another for the hypothesis that the correlation matrix has rank one whereas Bartlett treated these hypotheses separately, using separate test statistics.

Mervyn J. Silvapulle

Victorian Branch Annual General Meeting

The Annual General Meeting (AGM) of the SSAI Victorian Branch was held on Tuesday 18 March 2008 at the Hawthorn campus of Swinburne University of Technology. The Branch President presented the Annual Report and the Treasurer's Report. In 2007, the Branch held seven meetings at different locations, including La Trobe University, Monash University, Swinburne University of Technology and The University of Melbourne. The 2008 Branch Council will

consist of Mervyn Silvapulle, who will continue a two-year term as President, and the following members, elected at the AGM: Ian Gordon (Vice President), Owen Jones (Treasurer), Lucy Busija (Secretary), Fiona Beer (Young Statisticians Representative), Muhammad Akram, Kym Butler, Chris Lloyd, Debra Partington and Brian Phillips. The President extends his thanks to retiring Branch Councillors Ann Maharaj, Kris Jamsen, Kay Lipson and Geoff Laslett. Geoff, though no longer on the Branch Council, will continue as Branch Editor of the SSAI Newsletter. At the end of the meeting, Mervyn Silvapulle presented a eulogy for Chris Heyde.

Lucy Busija

Statistical modelling of assessment and education data from a progress monitoring perspective

Following the Annual General Meeting, Dr Siek Toon Khoo addressed the meeting, attended by more than 30 people. The speaker is the Director of the Psychometrics Institute at the Australian Council for Educational Research in Victoria. She presented an absorbing talk highlighting a number of difficulties associated with using classical ideas, especially Classical Test Theory, for modelling the measurement of achievement growth in education. Her talk was based on the results of the Australian Council for Educational Research Longitudinal Literacy and Numeracy Study (LLANS). LLANS was initiated in 1999 with the aim of studying achievement growth in literacy and numeracy for Australian children, with a particular emphasis on the longitudinal approach in assessing learning skills in the early years of school.



Dr Siek Toon Khoo

Siek Toon outlined the process of the development of meaningful assessment of latent variables, which are unmeasurable through physical measurements. She explained that in order to show growth during the first three years of school, measurement scales for literacy and numeracy needed to be constructed first. These scales were used to track growth in literacy and numeracy achievement over time. The scales provided estimates of students' ability, allowing students to be positioned along the ability continuum at the time of assessment.

She discussed, using Rasch modelling of assessment data in constructing measurement scales, how a number of models were examined to assess the ability of the students. These models identified where students were underperforming and needed additional work to help them improve. From this Siek Toon went on to describe how the LLANS had collected a series of assessment data over time for each individual student in the study. This led to the question: 'How can you investigate the individual differences in developmental trajectories as the students grow in literacy and numeracy skills?' The basic idea is to use longitudinal growth curve modelling to model the developmental data.

Siek Toon enthusiastically explained why the curves are best fitted by a two-stage model. During the first stage of data collection, the assessments were administered by teachers using one-on-one interviews. The interview assessments were administered twice during the first and second years of school and at the beginning of the third year of school. The second stage of data collection started in the fourth year of school. The students completed a written assessment every year from the fourth year to the seventh year of school. The longitudinal data obtained across time allowed tracking of student performance growth. The growth modelling investigated individual differences in the developmental trajectories in the two stages of growth.

Debra Partington

Tea party held for t -test

28 March 2008: It was an unusual event. Singing happy birthday to an inanimate object or dead person is generally deemed, at the very least, unnecessary, or perhaps even uncouth, but on this particular occasion it was requisite for the party's enthusiastic followers.

The Faculty of Information Sciences and Engineering played host to a party celebrating the 100th birthday of the t -test, the most widely used statistical procedure for comparing two groups of observations.

Head of Mathematics and Statistics Peter Vassiliou provided party attendees with a brief background on the test and the life of its founder William Gossett, underlining the test's continuing relevance in all fields of research today.

The test was developed in 1908 by William Sealy Gossett, who worked as a statistician at a Guinness brewery in Ireland. He used the pen name "student" to ensure that Guinness' industrial processes were kept covert. Today, the "Student's t -distribution" is routinely used to perform tests of hypothesis in all types of research.

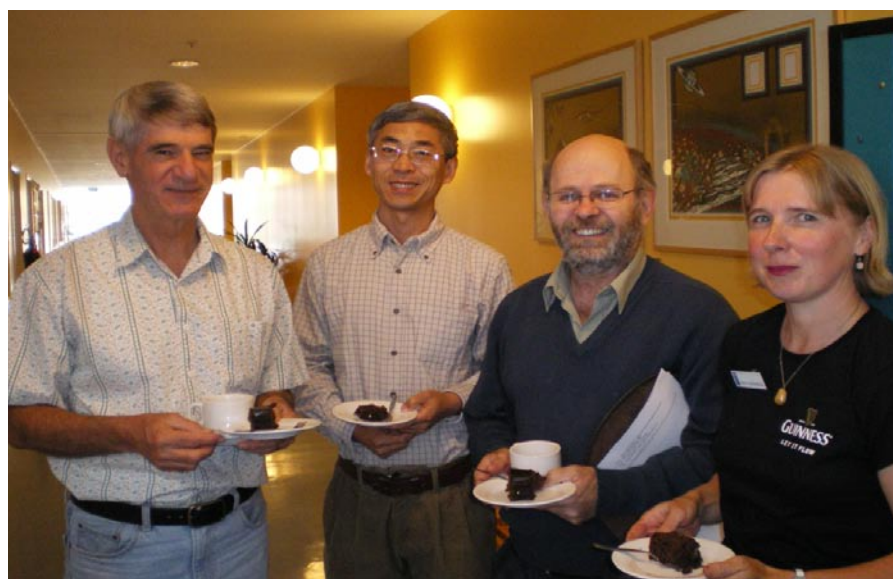
Statistics Lecturer Alice Richardson was enthusiastic about the event. "The 100th anniversary of the t -test is definitely something worth celebrating," she said.

"Having the t -test means that I can look for significant differences in the data that researchers supply and I'm confident in the conclusions I draw. If it wasn't for the t -test, we'd all be working ourselves to the bone collecting large amounts of data, or else relying on less powerful tests."

Zoe Spinocchia



Information Sciences & Engineering Research Associate Fariba Shadabi uses the t -test to analyse data for her research.



Statistical consultant Dr David Pederson, senior lecturer in Maths and Statistics Dr Shuangzhe Liu, Professor Alan Welsh of ANU, and lecturer in Statistics Dr Alice Richardson celebrate at the t -test party.