SSAI

STATISTICAL SOCIETY OF AUSTRALIA INCORPORATED
NEWSLETTER

December 2011
Number 137

Adventures in Bayesian Statistics
The 2011 Belz Lecture

IN THIS ISSUE

The Maurice H. Belz Lecture has been given annually since 1969 and was established by the Statistical Society to honour the work of Professor Belz in establishing and advancing the science of statistics in Australia. Maurice Belz was the Foundation Professor of Statistics at the University of Melbourne (1955 to 1963). The lecture is jointly supported by the Statistical Society of Australia, Victoria Branch, and the Department of Mathematics and Statistics at the University of Melbourne.

The 2011 Belz Lecture **"Adventures in Bayesian Statistics"** was given by Professor Kerrie Mengersen, from the Queensland University of Technology and President of the SSAI, on Tuesday 25 October 2011.

Kerrie began her lecture with a suggestive slide, charting the rise, decline, and then rise again of Bayesian statistics. The early development of Bayesian ideas by Laplace in the 1800's was later abandoned by the likes of Fisher and Neyman, leading to its nadir. Two key developments then led to the Bayesian resurgence: in the 1950's Jeffreys largely resolved the issue of objective vs. subjective priors, and in the 1980's Geman & Geman and the 1990's Gelfand & Smith showed how with numerical computation, Bayesian analysis could be made practical. The importance of both of these aspects of Bayesian statistics—the expression of prior information and computational efficiency—were subsequently drawn out in a sequence of examples.
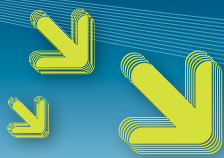
Spiraling whitefly are a tropical pest that require surveillance to inform early warning, market access, and response efforts. Presenting joint work with Mark Stanaway and Rob Reeves, Kerrie described a Bayesian approach to this problem that explicitly incorporated expert opinion on the spread of spiraling whitefly. A hierarchical model was used, featuring a presence/

Professor Kerrie Mengersen

absence model conditioned on a spatio-temporal model for the spread of the pest. In the event, the extent of whitefly spread indicated by the prior was reduced when conditioned on the data. In addition to allowing the use of a complex model with many latent parameters, the Bayesian approach also provided useful estimates of those parameters, such as host suitability and inspector efficiency.

Kerrie's second example was used to motivate some of the computational contributions to Bayesian analysis made by the Bayesian Research Application Group (BRAG) at QUT. In joint work with Chris Strickland, Ian Turner and Robert Denham, Kerrie has been working on

Editorial

Alice Richardson.

For many statistics researchers, the end of the year means the announcement of competitive grants form the Australian Government – Australian Research Council Discovery Grants, National Health and Medical Research Council grants, and so on. We are delighted to congratulate one such winner in this issue of the newsletter, and also extend our best wishes to all other statisticians involved in successful grants at this time. Your inclusion in the research teams indicates a broad acceptance of the range of important skills that statisticians can bring to research in a wide variety of disciplines. Good luck in your research and please feel free to report on your progress to the newsletter from time to time!

As we continue to think about the coming year, we note that in 2012 the Society will be 50 years old. Let's not miss this opportunity to celebrate past statistical successes and look forward to bright futures. The Editors encourage Branches and Sections to organize special events, take plenty of photos, and send in reports so that everyone gets a sense of the breadth of activity involved in the society's golden anniversary year.

Finally, bringing our thinking back to the approaching end of 2011, the Editors would like to take this opportunity to wish all Society members a happy Christmas, and a pleasant New Year. We would also like to thank all those who have contributed to the newsletter, whether by writing reports, taking photos or entering competitions. Thank you also to the organisations who have supported the activities of the Statistical Society and its members – your input into successful Society activities is much appreciated. In particular, we would like to thank the ABS for hosting the SSAI office in ABS House in Canberra.

Alice Richardson
Alice Richardson
Editor

Michael Adena
Michael Adena
Editor

EVENTS

Biometrics Society Australasian Region meeting: Biometrics by the Kiama Blowhole

4–8 December 2011

"The Sebel Harbourside" in Kiama, NSW

Statistics for Strategies in Development

11th Islamic Countries Conference on Statistical Sciences (ICCS-11)

18–21 December 2011, Amman, Jordan

Salford Analytics and Data Mining Conference 2012

Insight For Data Enthusiasts

24–25 May 2012, San Diego, USA

Australian Statistical Conference 2012

9–12 July 2012, Adelaide, SA

Celebrating the SSAI's 50th anniversary!

8th World Congress in Probability and Statistics (jointly organised by the Bernoulli Society and IMS)

9–14 July 1012, Istanbul, Turkey.

RC33 Eighth International Conference on Social Science Methodology

9–13 July 2012, University of Sydney.

XXVIth International Biometric Conference

Organized by the Biometric Society of Japan

26–31 August 2012, Kobe, Japan.

From the President

Dear Members

This column marks the first six months of my term as President of the Society. It's been a busy time, with several initiatives under way and many more planned – details are contained in the rest of the column. I hope you are all able to take some time away from statistical work over the holiday season, and return refreshed for celebrating 50 years of the Society in 2012.

I wish to report on progress made on the five points that I listed in my column in the last newsletter. This is in addition to the usual business of the Society. The points marked with asterisks below correspond to activities in which you as Society members are very welcome to participate. If you are interested, please advise our Executive Officer, Marie-Louise Rankin, by phone or email (eo@statsoc.org.au).

1. Promote our Profession.

We have been working on the following activities to achieve this goal:

• SSAI has signed up as a working member of the special year of emphasis on the Mathematics of Planet Earth in 2013 (http://www.mpe2013.org/).   This will involve a large number of activities around the country in the following two years. We are also investigating ways to engage in the 2013 International Year of Statistics with IBC (http://isi-web.org/news/2013-international-year-of-statistics-iystat).

• In collaboration with members of the Young Statisticians Section, plans are under way to develop news stories for the SSAI website, along the lines of the RSS website. We are hoping to commence this early next year. If you have any good stats-related stories, we would love to hear them!

• A meeting of major employers of Society members will be held in early 2012 to discuss issues of promotion of the profession, collaboration with SSAI, employment opportunities, creating and meeting demand, and training of statisticians.

2. Review and revise the SSAI Strategic Plan and Financial Plan.

The current Strategic Plan is on the website. Branches have been advised about the Review and will be an integral part of the process in the coming year.

• A team has been formed to conduct the Review and will commence in December. There is a place for one more Society member.

• Your comments on the Plan are very welcome.

3. Support and promote the Society's groups.

To date, I have participated in tele-meetings of the Sections and Branches, and have attended Perth, Melbourne and Adelaide Branch meetings. The discussion with, and feedback from, Branch Council and Society members has been very useful in learning more about the activities, drivers and concerns of our core groups. Key issues have been fed back to the Central Executive for discussion and action.

• Are you an accredited member of the Society? If not, please consider doing this if you are eligible. Information is on the SSAI website.

• Please visit the list of Accredited Members on the website. The list is searchable for a range of interests such as 'consulting', 'education' and so on. We are aiming to make this more visible on the site, in order to promote our members. Comments about this list or other ideas about visibility and promotion of our groups are welcome.

4. Expand and consolidate linkages between SSAI and other professional societies within Australia and internationally.

• SSAI has become a member of the working group for the year of emphasis on the Mathematics of Planet Earth in 2013. This will lead to a range of activities over the next two years. Suggestions for activities, alerts to planned activities and offers of help are very welcome! >>

SSAI EXECUTIVE COMMITTEE

Central Council:
President: Kerrie Mengersen
Secretary: Dr Doug Shaw
secretary@statsoc.org.au

BRANCH PRESIDENTS AND BRANCH SECRETARIES

Canberra
President: Bill Gross
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Secretary: Arthur Hung
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Queensland
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Secretary: Sandy Clarke
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Western Australia
President: Berwyn Turlach
Secretary: Ryan Admiraal
R.Admiraal@murdoch.edu.au

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Section for International Engagement
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Young Statisticians' Network
Susanna Cramb
susannacramb@cancerqld.org.au

Further contact details for Society Secretaries and Section Chairs can be obtained by contacting the Society on (02) 6251 3647
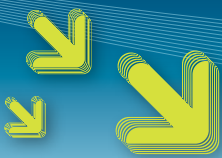
SSAI is in discussion with the Australian Mathematical Sciences Institute about establishing a more formal collaborative association. We are considering how this might also be achieved with other like-minded organizations within Australia and internationally.

5. Review and revise what we deliver as a Society to our members and how members engage with the Society.

- A Register of Expertise has been established that lists members who responded to the call (by email and in the last newsletter column) about ways in which they could be involved in the Society. Thank you to those who have responded. The Register has already proved useful in obtaining assistance with some Society activities and I believe that it will become an important mechanism for engagement among members. Please ask if you would like information on this Register sent out again, or please advise if you now feel able to add your name to the Register.

- We are planning to introduce webinars soon so that all members can have access to key presentations, so watch this space! Please let us know of suggestions or offers regarding presentations you would like to be broadcast in this way.

Kerrie Mengersen

Adventures in
Bayesian Statistics cont.

Owen Jones

Professor Kerrie Mengersen after her lecture.

Sama Low Choy in particular—have been exploring this problem using a software tool they developed, aptly named Elicitator.

Kerrie's last example was used to make the point that informative priors are not always the best tool. Mixture models were used to classify patients undergoing deep brain stimulation to treat Parkinson's disease. A Bayesian approach was used to select the number of components in the mix, and in recent work with Judith Rousseau, Kerrie has shown that using an overly informative prior for the number of components can lead (asymptotically) to too many components being chosen.

The lecture finished with a brief survey of fields where Bayesian analysis has enabled scientists to do things previously impossible, ranging from astronomy to religion, presumably making it the tool of choice for answering the really big questions.

Owen Jones

the estimation of vegetation, and thus biomas and soil carbon, using remotely sensed data. Linear Gaussian state space models were used, but proved too slow when applied to the very high-dimensional data being considered. By decorrelating the data the dimensionality problem was circumvented and remarkable speed-ups achieved. For the spatial component of the model Krylov subspace techniques were used to take advantage of the sparse dependence between grid cells.

The BRAG group at QUT, in a project led by Chris Strickland, has been distilling much of its expertise into a Python software package called PyMCMC. Reportedly close to release, the package aims to provide modular tools for developing Bayesian models. All the usual types of Bayesian models are included, as well as estimation techniques such as Gibbs sampling,

Metropolis-Hastings, Orientational Bias MC, and Slice Samplers. The package has been designed to be extensible and, in particular, fast.

The next of Kerrie's examples illustrated how Bayesian networks can be used to incorporate expert knowledge from a wide variety of fields into a model. Using a systems-dynamics type approach, Kerrie linked a number of different physical submodels into a single model for the probability of an algae bloom in Morton bay. Again the Bayesian approach enabled estimation of numerous latent variables, in particular allowing the identification of the most important variables driving the system, and the exploration of "what if" scenarios for management purposes. Clearly for models such as this, the ability to elicit useful information from experts is critical, and the BRAG group—and

Announcements

ELECTION OF EXECUTIVE MEMBERS

Members are advised that the Executive positions of Vice-President (President Elect), Secretary and Treasurer will become vacant at the Society's Central Council Annual General Meeting in 2012.

The SSAI Rules provide for a Nominating Committee,consisting of the current Executive and the Branch Presidents, to solicit nominations and submit a list of nominees to Central Council. Should an election be required, Central Council will then arrange a ballot of all financial members of the Society.

Members of SSAI are invited to submit nominations for the three positions to be vacated. Nominations must be in writing and signed by the nominator(s), and must be accompanied by a written and signed statement from the nominee accepting the nomination.

Nominations should be submitted to the SSAI President (Kerrie Mengersen) or to a Branch President before 31st January, 2012.

SOCIETY AWARDS

The Society awards a gold medal, the Pitman Medal, at most once annually, in recognition of outstanding achievement

in, and contribution to, the discipline of Statistics. Honorary Life Membership honours outstanding contribution to the profession and the Society, while a Society Service Award may be awarded to a Society member in recognition of sustained and significant service to the Society.

An Awards Committee, chaired by the President of the Society, makes recommendations to the Society's Central Council as to appropriate Award recipients. Pitman Medals and Honorary Life Memberships are usually announced at the Society's Conference.

Members of the Society are encouraged to propose suitable recipients of the Pitman Medal, Honorary Life Membership or a Society Service Award. Suggestions, with brief supporting information, should be emailed to the President, Kerrie Mengersen, as Chair of the Awards Committee.

Doug Shaw – Secretary

The 21st Australian Statistical Conference and 8th Australian Conference on Teaching Statistics

CALL FOR ABSTRACTS

ASC 2012 – Australian Statistical Conference
Celebrating 50 years
9th – 12th July 2012, Adelaide Convention Centre

www.sapmea.asn.au/asc2012

Statistical Society of Australia Inc.

Australian Statistical Conference
9 – 12 JULY 2012
Adelaide Convention Centre

celebrating 50 years

To register your interest please visit our website:
www.sapmea.asn.au/asc2012

Statistical Society of Australia Inc.

BACKGROUND

In July 2012, Adelaide will host two major statistical events. The 21st Australian Statistical Conference (ASC 2012) will be held July 9-12 and the 8th Australian Conference on Teaching Statistics (OZCOTS 2012) will be held July 12-13, both at the Adelaide Convention Centre.

ASC 2012 is concerned with all aspects of statistical theory, methodology and applications and will include an outstanding program of invited talks featuring keynote addresses by:

• Professor Anthony Davison, Ecole Polytechnique Federale de Lausanne

• Professor Christl Donnelly, Imperial College London

• Professor Peter Donnelly, Oxford University

• Professor Sophia Rabe-Hesketh, University of California, Berkeley

• Professor John Storey, Princeton University

• Professor Roderick Little, U.S. Bureau of Census

The OZCOTS 2012 theme is Statistics education for greater statistics covering all aspects statistical education. OZCOTS 2012 will include a program of contributed papers and forum discussions as well as keynote addresses by:

• Professor Kaye Basford, University of Queensland

• Professor Jessica Utts, University of California, Irvine

Abstracts for contributed presentations at ASC 2012 and OZCOTS 2012 are now invited. We look forward to receiving your abstracts and to seeing you in Adelaide in 2012.

Paul Sutcliffe
Conference Chair ASC 2012

Helen MacGillivray
Brian Phillips
Conference Chairs OZCOTS 2012

ASC 2012

Contributions relevant to all areas of statistical theory, methodology and applications are welcome. Proposals now are invited for:

• Oral presentations, 15 minutes plus 5 minutes for questions;

• Posters, maximum size vertical 100cm (39 inches) x horizontal 120cm (47 inches).

Abstracts for ASC 2012 must be submitted online at http://www.sapmea.asn.au/conventions/asc2012/abstracts.html

by 16 March 2012. All abstracts will be reviewed by the Program Committee and authors notified of the outcome no later than 20 April 2012. Authors of accepted abstracts for both oral presentations and posters must register for the conference by 30 April 2012 in order for their presentation to be scheduled in the final program. Accepted abstracts will be published in the conference handbook.
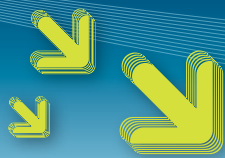
21st Australian Statistical Conference cont.

Australian Statistical Conference
9 – 12 JULY 2012
Adelaide Convention Centre

Please note that detailed instructions for the format and submission of abstracts are available at http://www.sapmea.asn. au/conventions/asc2012/abstracts.html.

OZCOTS 2012

Contributed papers relevant to any area of statistical education are welcome. Accepted papers will be published in the online Conference Proceedings with an oral presentation of length 15 minutes plus 5 minutes for discussion to be given at the conference. All abstracts will be reviewed by the OZCOTS editors and authors notified of the outcome within a week of receipt of abstracts. Authors can also elect to have their paper refereed. Papers accepted as meeting refereed standards will be designated as such in the Proceedings.

Abstracts for OZCOTS 2012 must be submitted online at http://www.sapmea.asn. au/conventions/asc2012/abstracts.html

Abstracts from authors wishing to have their papers refereed must be received by 31 January 2012, and papers to be refereed must be submitted by 29 February 2012. Authors will receive referee reports by 30 April, 2012. Abstracts from authors not wishing to have their papers refereed must be received by 29 February 2012. Final versions of all papers must be received by 31 May 2012. Authors of accepted papers must register for the conference by 31 May 2012 in order for their presentation to be scheduled in the final program and their

SUMMARY OF KEY DATES

	ASC 2012	OZCOTS 2012
Submission of Abstracts	16 March 2012	31 January 2012 29 February 2012
Submission of Refereed Papers (OZCOTS only)		29 February 2012
Submission of Final Papers (OZCOTS only)		31 May 2012
Notification of Acceptance of abstracts	20 April 2012	within one week of receipt
Presenter Registration	30 April 2012	31 May 2012

paper to appear in the proceedings.

Please note that detailed instructions for the format and submission of abstracts are available at http://www.sapmea.asn. au/conventions/asc2012/ozcots_abstracts. html.

NOTE TO AUTHORS

As a commitment to attend and support the conference, presenters of accepted submissions are required to register for the full-time program or the day of their presentation. All costs of attending the conference, including the registration fee, are the responsibility of the presenter.

CONFERENCE ORGANISERS

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Unit 12, 202 Glen Osmond Road
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South Australia 5063
Tel: +61 8 8274 6044
Fax: +61 8 8274 6000
Email: asc2012@sapmea.asn.au
Web: www.sapmea.asn.au/conventions/ asc2012

Paul Sutcliffe ■

XXVIth International Biometric Conference

Organised by the Biometric Society of Japan, Japanese Region of the International Biometric Society

26th in 神戸 IBC

August 26-31, 2012
Kobe International Conference Center Kobe, Japan

Invitation

We are pleased to welcome you to Kobe for the XXVIth IBC in Kobe, Japan. As always, It will bring together participants from all over the world working in academic institutions, government agencies, and industry to exchange ideas on the latest advances in biometry, biostatistics and bioinformatics. It will also be an occasion to meet old and new friends, and the chance to visit historical cities such as Kobe, Kyoto, and Nara.
(Toshiro Tango, Chair Local Organizing Committee)

About Kobe

Kobe, located almost in the center of Japan, is known as a city having a unique style with the exotic atmosphere in Japan, which has been affected by the foreign cultures and flourished as the international port since old days. Kobe boasts the Rokko Mountains richly endowed with nature and has flourished as the hot spring street such as Arima since old days. Kobe is also known as the gourmet street (Kobe beef, Nada Japanese sake, wine and sweets), as well as the fashion street with the sophisticated image.

About Conference Venue

IBC 2012 will be held at the Kobe International Conference Center within the Kobe Convention Center Complex, located on Port Island, an artificial island in Kobe. It features a combination of extensive conference facilities, modern and affordable accommodations, and a rapid and efficient transportation system.

Access to KOBE

Conference Organization

Organizing President
Kaye E. Basford, University of Queensland, Australia

International Programme Committee Chair
Christine McLaren, University of California, USA

Local Organizing Committee Chair
Toshiro Tango, Center for Medical Statistics, Japan

Scientific Programme

・Opening ceremony and IBS Presidential address
・Full programme of invited oral sessions
・Contributed oral and poster sessions
・Sessions highlighting the society's publication, Biometrics and JABES
・Pre-conference short courses

Social Programms

Sunday 26	Welcome gathering at KICC
Monday 27	Civic reception in Kobe City Center
Tuesday 28	Optional evening social activities
Wednesday 29	Range of social excursions (one-day)
Thursday 30	Conference dinner

Closest International Airport	
Kansai International Airport (KIX)	
Bay Shuttle Felly + Port Liner	40min
Limousine Bus + Port Liner	80min
Shuttle Taxi	80min

Access Via Other Japanese Airports	
Tokyo (Narita International Airport) (NRT)	
NEX & Shinkansen	60min & 2hr 48min

For constantly updated information, please see the website
http://www.secretariat.ne.jp/ibc2012/

Kobe Kyoto Tokyo NRT KIX Osaka
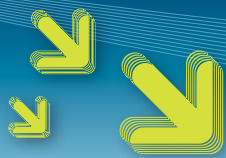
Ryan Admiraal

Statistics is Sexy — the 2011 WA Young Statisticians' Workshop

The 7th WA Young Statisticians' Workshop was held at the Tompkins on Swan room of the Tompkins Park Function Centre, Alfred Cove on Tuesday 27th September 2011. There were 47 registered participants, 12 invited guests and speakers, and 5 committee members in attendance; many of whom stayed for the sundowner.

Our invited speakers came from a wide range of backgrounds, and spoke on a wide range of topics. These topics including medical statistics, climate change, the census, statisticians in court, and how statistics can be used to assess the competency of medical professionals. All were very interesting, and we appreciate the time and effort our speakers put in. Particular mention should be made of our keynote speakers, Mike Scott (ABS) and Ian James (Murdoch University), and of our Branch President Berwin Turlach (UWA) for delivering the closing address.

We had three young statisticians present talks and a further four present posters. Many of the young statisticians' presentations were from the field of medical statistics, although there were presentations on financial statistics. Congratulations to Alethea Rea (DAA) for winning the Best Young Statistician Speaker prize and to Sam Burnham (CSIRO) for winning the Best Young Statistician Poster prize. Also, thanks to Adrian Baddeley, Berwin Turlach and Brenton Clarke for agreeing the judge the presentations.

Our Q and A panel was a success, with our eight experts sharing their advice and experiences with the participants. Some of the topics discussed got many of the participants and panellists involved in lengthy discussion, such as the issue of non-statisticians misusing or misrepresenting data, and whether or not it is worthwhile for a statistician to have a second degree in a different field e.g. geology. We are very appreciative of the time our panellists gave up to be part of this session, the first time we believe it has been tried out at a WA Young Statisticians' workshop.

Left to right, Hana Sakai, Alethea Rea, Prudence Thompson and Emma Smith

Left to right, Thomas Austen, Mark Sinclair, Ben Burgess

Many of our speakers kindly allowed an original or edited version their slides to be posted online. They will soon be available for viewing via our website: http://www.statsoc.org.au/wa-young-stats.htm.

Overall, we feel that the workshop was a success, and we are grateful to DAA, the ABS, CSIRO and SAS, who sponsored the workshop, as well as the Central and WA Branch councils of the SSAI for their financial support. Thanks to the staff at DAA who assisted us with filling bags and mailouts, the Tompkins Park Function Centre for hosting the workshop, and Melville Bowls Club for hosting the sundowner. We are very grateful to the many members of the SSAI WA Branch, Central Council, Young Statisticians' Network and National Young Statisticians' Conference organisers who were always willing to lend advice during the past six months. Finally I wish to acknowledge my fellow organising committee members — Prudence Thompson, Karyn Reeves, Yuichi Yano and Bec O'Leary — for all their time and efforts. Without everyone's help or advice I'm sure the workshop would not have nearly been as successful as it was.

Ryan Admiraal

Young Statisticians' Network

Susanna Cramb

ON-LINE MENTORING OPPORTUNITIES

PhD students from developing nations and experienced statisticians from Australia and other developed nations are invited to participate in an online mentoring opportunity, sponsored by the International Statistical Institute and the Bernoulli Society.

Barriers faced by students in developing nations include lack of resources and infrastructure. By volunteering as a mentor you will be matched to a PhD student, and provide advice and support via email, possibly sourcing papers, books and software.

For further information or to volunteer, please visit: http://statmentoring.nr.no/statmentoring/index.php/Statistical_mentoring_for_Ph.D._students_in_the_developing_world

ASC 2012

There will be a dinner specifically for Young Statisticians' on the Tuesday evening of this conference (10th July). This will be a relaxed opportunity to network with other future leaders of the statistical community. Thanks to the generosity of Data Analysis Australia, this should be affordable for everyone. We hope to see you there!

WANTING TO BE MORE INVOLVED?

If you would like to get more involved with the Young Statisticians' Network, please email either myself or your local State representative (Thomas Lawrence (WA), Han Gan (Vic), Garry Khemka (ACT) or Leo Chow (NSW)) — see the SSAI website for contact details.
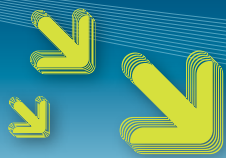
Susanna Cramb

Call for Papers

Call for papers: 2012 Panel Survey Methods Workshop

Dear Colleague,

We are inviting submissions for papers to be presented at the 3rd Panel Survey Methods Workshop, 4–5 July 2012 at the University of Melbourne, Australia. Papers should address important methodological topics that are unique to the design and implementation of panel surveys.

The aim of the workshop is to foster discussion and initiate methodological research specific to the collection of panel survey data. The format of the meeting will be informal, designed to encourage interaction and collaboration. Presentations will be limited to a 10 minute summary of key findings or ideas, in order to allow generous time for discussion. All participants will have had a chance to study materials in advance, as presenters will be asked to circulate a handout before the workshop. The handout should provide background information upon which the presentation will be built. One person from each panel study represented at the workshop will be invited to also provide a 2-page summary of the recent and planned key methodological developments and these will be circulated prior to the workshop. The meeting will end with a brainstorming session, to identify a research agenda of the key issues.

The focus is primarily on surveys that involve collecting data from subjects on multiple occasions (panel surveys). Note that the workshop is concerned with the data collection methods used by such surveys, not with the substantive findings. Topics of interest include, but are not limited to, the following:

- Measurement error, including panel conditioning, seam effects, recall error, and dependent interviewing;

- Mixed mode data collection, including effects on cost, measurement error, attrition, and logistics;

- Attrition and non-response, including effects of survey design features, assessment of bias, methods to minimise effects, and adjustment methods (weighting and imputation);

- Role of interviewers in longitudinal surveys;

- Paradata, including collection and use in longitudinal surveys;

- Sampling issues, including refreshment sampling and following rules;

- Innovations in longitudinal surveys, including biomarkers, online panels, matrix sampling, remote access, linking data sources, consent issues, and experimental designs; and

- Use of administrative data in longitudinal surveys.

Papers may provide a review of research and practice in a particular methodological area, present the findings of new methodological research or outline planned research for which the presenter would like feedback. Submissions will be screened by the organising committee, who will select papers that address relevant topics and collectively provide a balanced program.

Submissions should consist of an abstract of no more than 500 words, describing clearly the topic that will be addressed, the material that will be drawn upon and the key messages of the paper. The deadline for submission of abstracts is 31 October 2011. Authors will be informed whether or not their submission has been accepted by 30 November 2011. Authors of accepted papers will be required to register for the workshop, to submit a handout by 3 June 2012, for circulation prior to the workshop, and to present their paper orally.

Please submit abstracts to n.watson@unimelb.edu.au.

Registration for the workshop is free of charge. The organizers have secured funding to provide subsidies of $2000 (AUD) to 20 participants to assist with travel costs. While we would like to encourage active participation, presentation of a paper is not a requirement for participation in the workshop. Please note that places will be limited to about 50 people.

For more details about the workshop, please see http://www.melbourneinstitute.com/miaesr/events/workshops/workshop_panel_2012.html

Regards,

Nicole Watson, Mark Wooden, Annette Jäckle, Mick Couper, and Peter Lynn

10th annual
AMSI
SUMMER
SCHOOL
in the
Mathematical
Sciences

9 Jan to 3 Feb 2012

University of New South Wales

Some travel and accommodation subsidies are available. See the website for details. With the consent of their home university, students may take courses for credit towards their degree.

For more info visit:
www.maths.unsw.edu.au/amsi2012
or email: **amsi2012@unsw.edu.au**

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Functional Analysis
Dr Denis Potapov (UNSW)

Geometry and Groups
Dr Stephan Tillmann
(University of Queensland
and University of Sydney)

**Combinatorial
Enumeration and
Optimization**
Assoc Prof Ian Wanless
(Monash University)
and Dr Thomas Britz (UNSW)
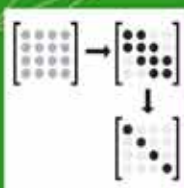
**Four Key Numerical
Algorithms**
Dr William McLean (UNSW),
Assoc Prof Robert Womersley
(UNSW) and Dr Thanh Tran
(UNSW)
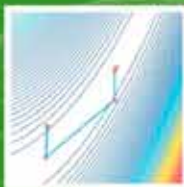
Optimization
Assoc Prof Regina Burachik
(University of South Australia)
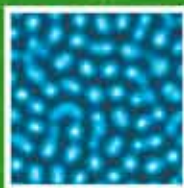
**Modelling in
Mathematical Biology**
Prof Graeme Pettet
(Queensland University of
Technology)

**Mathematical
Foundations of
Probability and
Statistics**
Assoc Prof Ben Goldys (UNSW)

Climate Statistics
Assoc Prof John Boland
(University of South
Australia)

NHMRC success

Successful NHMRC grants commencing in 2012 were announced in October. SSAI member Professor John Carlin (pictured) and a team he leads have been granted $2.5M funding over five years for a Centre of Research Excellence named "The Victorian Centre for Applied Biostatistics". The newsletter caught up with John to find out more.

IG: First, congratulations: you must be very pleased with this outcome. How many person-days were required to prepare the application?

Thanks Ian, it was certainly very gratifying that the NHMRC saw fit to make this award, to a discipline that tends to be a bit of an invisible handmaiden to the researchers who frame the "real research" on the big issues of public health. As for the person-days, it's a good question but I'm afraid the data collection was very disorganised so I can only make a very imprecise estimate... leaving aside the months if not years of pondering the general ideas, writing the grant occupied me and my colleagues for the best part of a month and probably amounted to 1-2 weeks of person-time. I presume you are referring to recent research suggesting that the person-days required to prepare and assess grant applications might be better spent doing more research, with funds distributed by lottery. Having just won an award I couldn't possibly agree with that suggestion of course.

IG: Tell us about the structure of the Centre and the groups involved.

The proposed Centre is a collaborative venture between biostatisticians at the Murdoch Children's Research Institute (me and A/Prof Michael Coory), the Department of Epidemiology & Preventive Medicine at Monash University (Prof Andrew Forbes and A/Prof Rory Wolfe), and the Centre for Molecular Environmental, Genetic & Analytical Epidemiology (MEGA) at The University of Melbourne (A/Prof Lyle Gurrin and Dr Julie Simpson). We aim to create an academic centre for biostatistics research and

John Carlin

training across our three locations. It is now widely recognised that the discipline of biostatistics is of critical importance to a broad range of health and medical research, as research in these areas focuses increasingly on studies of large cohorts of individuals followed over lengthy periods of time, data linkage with disease and healthcare registries, and the conduct of complex trials that aim to determine optimal treatment strategies. However, the discipline struggles to remain viable in Australia because of the absence of major centres of sufficient critical mass. Our proposal aims to address this structural problem by establishing a collaborative centre that will bring together many of the leaders of this field in Victoria.

IG: In broad terms, what do you hope the Centre will achieve? What will be different, in five years' time, because of the Centre's work?

Broadly speaking, the aim of the Centre is to foster the careers of a new generation of biostatistical leaders, by developing an integrated program of methodological and collaborative research that will be led largely by postdoctoral-level biostatisticians who will be supported by the grant. It is important that training in biostatistics includes both methodological and collaborative work, and this typically extends the time that is needed to achieve a high level of proficiency and research output. The research program will be closely linked to training programs in biostatistical methods, including specialist PhD training as well as courses for epidemiologists and other health researchers. We expect the Centre will play an active role in the dissemination of sound statistical methods throughout the health research sector. Although the Centre is Victorian-based, building on

existing strengths and collaborations, we hope its impact will be national, building on linkages with our colleagues in other states. In the end we would like to see the establishment of a critical mass of advanced trainees and enhanced collaborations on a sufficient scale and with sufficient visibility to underpin the ongoing development of the discipline. In our application we contrasted the situation in Australia with that in North America and the UK where substantial investment in biostatistics has been made over several decades by the national research funding agencies, resulting in the establishment of large academic departments, centres and national networks. To date in Australia, although many health researchers recognise the need, there have been no vehicles for building the necessary high-level capacity.

IG: More specifically, I guess you have particular research themes that you and the team intend to pursue. Can you tell us what they are?

In our application we pointed to the substantial volume of academic research, published typically in journals of mathematical statistics, that develops biostatistical methods at a broad and often abstract level. We then outlined the concept of a "methodological and translational pipeline" which we see as guiding the work of the centre. This proposes that applied biostatistical research is required at multiple levels in order to enable the fruitful application of new statistical methods in health and medical research studies: (i) the methodology needs to be understood at a deep level in order for it to be tailored to suit practical application; (ii) it needs to assessed analytically or by numerical simulation in realistic practical scenarios; (iii) it needs to be translated into more accessible language and software to enable broad use by the practising applied biostatistician or data analyst working in government, industry or university departments; and (iv) awareness of the methodology needs to be promulgated   >>
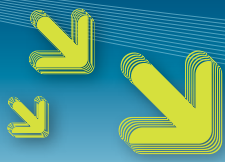
Bayes on the Beach

widely to the broader research community in order to enable its acceptance and ultimate use in health/medical research studies that will inform appropriate health policy or practice. With this in mind, we proposed a program of research across eight areas within four broad themes:

(a) Analytical issues in cohort studies (missing data problems; longitudinal outcomes competing with loss to follow-up due to death; repeated exposure measures and causal questions).

(b) Modelling of multilevel structured (correlated) data (pharmacokinetic-pharmacodynamic modelling related to antimalarial treatment; regression models for binary outcomes from matched pairs).

(c) Development of new designs for intervention studies: cluster randomised crossover trials with application to intensive care research.

(d) Treatment comparisons beyond head-to-head randomised trials (propensity score analyses in end-stage renal disease; methods for indirect comparisons).

No doubt the actual research will unfold in unexpected directions but we are very firm on the principle that the research should be both novel and useful. Being useful requires the work to be embedded within collaborative relationships with a range of epidemiologists and clinical researchers, while being novel is a little harder to define — following our "pipeline" metaphor it doesn't always mean that new mathematical concepts need to be developed.

Editor: On behalf of the Statistical Society, I would like to second Ian's congratulations and wish you and the team all the best with the new Centre. We look forward to regular updates through this newsletter and other avenues that you choose.

Ian Gordon ▪

Master student Jegar Pitchforth, discovers modelling requires much thought at Bayes on the Beach.

Bayes on the Beach (2011) was successfully held in early October on the Gold Coast. In addition to the conference a satellite workshop was also offered.

The satellite workshop was about an Introduction to Hieratical Modeling for Spatial Data, held by international guest Sudipto Banerjee. Sudipto had co published a book (by the same name) which has become a key reference to people working in the field.

"The workshop was fantastic" said Jenness Warin, an attendee who works for the Brisbane City Council. The workshop attached a range of people for all over the country from post-grad students, to people working in the field. All were delighted to experience the workshop first hand.

The Gold Coast did not live up to its sunny reputation. However Bayes on the Beach continued despite the weather. The keynote speakers were Sudipto Banerjee and Edward Cripps. Sudipto gave an engaging presentation on "Computationally feasible hierarchical modelling strategies for large spatial datasets". Ed Cripps' talk on "Mixture of random effects for an individual's

learning behaviour" had many people questioning the ideas we hold about the concept of talent and whether it exists.

The range of delegates attending from international and local universities was pleasing in the diversity of departments these Bayesian statisticians were working in. They ranged from standard mathematics departments to health, ecology, engineering, computer science and social sciences. There were also a number of representatives from different branches of CSIRO.

The two days of the conference comprised of contributed sessions and Case Studies session where everyone broke into three groups. Each group presented their Case **>>**

Su Yun Kang enjoying the modelling challenge.

Bayes on the Beach cont.

Dow Jaemjamrat

Studies result on the final day. The first night started with seemingly harmless social games which quickly disintegrated into quite fierce competition. Here many statisticians got to try their hands at a different type of modelling.

This conference could not have been run without the help of SSAI and QUT. This event provided the opportunity for people studying and working in Bayesian Statistics to come together to meet diverse range of people, to discuss ideas, to collaborate and to look at working together in the future.
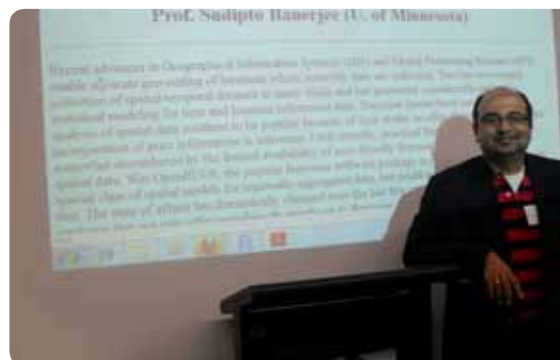
Dow Jaemjamrat ■

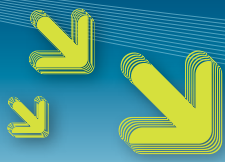*Attendees at Bayes on the Beach.*

Edward Cripps and Sudipto Banerjee where the keynote speakers.

Left to right, Xiaodong Huang, Charisse Farr and Indriati Bisono, smile while involved in modelling games.

Invited speaker, Sudipto Banerjee.

Sarjinder Singh

Stat-Hawkers

Sarjinder Singh, Department of Mathematics, Texas A&M University-Kingsville, Kingsville, TX organized a booth, STAT-HAWKERS, at the Joint Statistical Meeting, Miami Beach, FL during July 31 to Aug 3, 2011, to promote his research among the distinguished statisticians attending the conference. At the booth he displayed the 'simple model' and the 'crossed model', proposed by Lee, Sedory and Singh (2011), using a poster. The problem of estimation of proportions of smokers, drinkers and both was considered using the proposed crossed model.

He made two decks of cards: Deck-I, a green deck of cards and Deck-II, a pink deck of cards. Two types of cards bearing two different statements made up the green deck of cards: 56 cards with the statement, "I consider myself a smoker" and 24 cards with the statement, "I do not consider myself a drinker." Two types of cards bearing two different statements made up the pink deck of cards: 56 cards with statement, "I consider myself a drinker" and 24 cards with the statement, "I do not consider myself a smoker." During the three days, a total of 75 conference attendees participated in the survey.

The respondents took an interest after being assured of their anonymity. The respondents were cooperative and smiling while drawing cards. Many participants also told that they felt like they were playing a card game. A two-way classification of 75 responses is given in the Table. By using the proposed crossed model estimators, the estimate of proportion of smokers is 0.240, that of drinkers is 0.360, and that of smokers as well as drinkers is 0.237. It seems that a smoker is likely to be a drinker, but a drinker may not be a smoker. The estimate of correlation between smoking and drinking attitude is 0.733569. The estimate of the relative risk of a drinker to be a smoker is 140.44, which means

Sarjinder Singh (Left) with a deck of cards and a conference attendee (Right) drawing one card from the deck at the booth STAT-HAWKERS at the Joint Statistical Meeting, Miami Beach, FL.

a smoker is 140.44 times as likely to be a drinker than a non-user of both; whereas the estimate of the relative risk of a smoker to be a drinker is 6.10, which means a drinker is 6.10 times as likely to be a smoker than a non-user of both. This study shows that 63.7% among the conference attendees had neither a drinking nor a smoking habit. To learn more about STAT-HAWKERS, please send an e-mail to: sarjinder@yahoo.com

Reference

Lee, C. S., Sedory, S.A. and Singh, S. (2011). A magical talk: Estimating at least seven measures of qualitative variables from a single sample using randomized response technique. *Proceedings of the 58th World Congress Conference of the International Statistical Institute, The Netherlands, at Dublin, Ireland.*

Sarjinder Singh ◼

Responses from the survey		
	Pink Deck-II	
Green Deck-I	Yes	No
Yes	13	14
No	23	25

ANZJS Editors' Column
December 2011

Stephen Haslett

The last two years have seen some major changes at ANZJS. The majority of these have happened out of sight, or are only partially on view, so I thought it may be useful to give a glimpse behind the scenes.

The most obvious example is the ScholarOne (S1) paper submission system http://mc.manuscriptcentral.com/anzjs. S1 is now the only conduit for submitting manuscripts to ANZJS. This electronic system is standard, and similar to that for other journals. It operates independently of the journal's publisher. Simplicity of use has been questioned at times, by associate editors and referees as well as authors. However, for the editors, and I trust for you as authors, it has been a marked improvement over the previous fragmented and sometimes opaque system for paper tracking that it has replaced. Those of you with questions about your submitted but not yet published papers will I hope have noticed a marked improvement.

Production has changed too. Wiley (USA) and Blackwell (UK) have merged. Previously, Blackwell was the publisher and production editing took place in Australia through a senior Blackwell editor in Melbourne. Under Wiley-Blackwell, ANZJS production editing has been shifted to Singapore, we have already had two different production editors there, and overall authority for journal production is now at Wiley-Blackwell in New Jersey, USA. Other publishing aspects are now in the UK: the senior editor at Wiley-Blackwell is now in Oxford and the marketing is run from Chichester. Recently, Wiley-Blackwell indicated they intended to move production yet again, this time to Manila in the Philippines. The ANZJS editors' strong objections have been listened to for now, but continuing change seems to be inevitable. Every change of location and personnel has thrown considerable additional editing work back onto the ANZJS editors,

particularly on Neville Bartlett our technical editor. There has also been teleconferences and extensive ongoing correspondence with Wiley-Blackwell, and I have found it necessary to proof read the entire issues from Wiley-Blackwell several times rather than just once very near the end of the production process. A number of extra steps, such as regular telephone conferences with the production team in Singapore, have been now put into the process. In August, I also visited the senior editor at Wiley-Blackwell in Oxford during research leave in the UK. I also plan to visit the Wiley-Blackwell production team in Singapore on my way to Cambodia for the UN World Food Programme in early December. This personal contact should help improve workload control, at least until the next change of production editor at Wiley-Blackwell, when our proof reading load will almost certainly climb again. These changes have had consequences for you the ANZJS authors and readers too: we are currently behind in the production schedule for 2011, but we are (along with Wiley-Blackwell) doing our best to catch up, subject of course to maintenance of technical standards.

The annual editors' face to face meeting will take place in Canberra in late November. Previous meetings have been in Melbourne but, with none of the Wiley-Blackwell editors for ANZJS located there any more, we have greater flexibility about location. We had initially planned to meet in New Zealand this year, but Mervyn Silvapulle had to go into hospital (from which I am pleased to be able to tell you he has now returned home) and holding the meeting in Australia instead was then an obvious decision. Mervyn is standing down as Theory and Methods editor, and in recognition of workload is to be replaced by two people, Michael Martin, and Martin Hazelton. Since Michael, and Alan Welsh our current Applications Editor, are both in Canberra, having our meeting there seemed an obvious

choice. In terms of editorial structure, this means Martin and Michael are the new Theory and Methods Editors, Alan is the Applications Editor, Petra Graham is the Book Review Editor, Neville is Technical Editor, and until mid-2012 at least I remain Managing Editor. I also must note here and thank the forty or so Associate Editors, since without them, the referees, and of course the authors and readers, ANZJS would not be in operation.

A final comment, not strictly editorial but nevertheless relevant. The publication contract with Wiley-Blackwell, which is being negotiated through the ANZJS Management Committee, is close to final agreement. Those of you at the NZSA and SSAI AGMs this year will remember motions were passed agreeing to the signing. There has been a delay however, due to concerns about the currencies specified in the draft contract through which payments to and from Wiley-Blackwell were to be made. Marked currency movements now seem to be characteristic of foreign exchange markets. The original arrangement would have severely disadvantaged ANZJS and hence SSAI and NZSA. A solution has now been agreed in principle: all transactions will happen in a single currency. The likely prognosis is that the publication contract will be agreed and signed quite soon.

Stephen Haslett
Managing Editor, ANZJS
anzjs@statsoc.org.au
20 October 2011

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Canberra Branch News

MIXTURE LONGITUDINAL BENT-CABLE REGRESSION FOR ASSESSING THE EFFECTS OF SHOCKS

At the meeting of the SSAI Canberra Branch on 30 August, Grace Chiu from CSIRO Mathematics, Informatics and Statistics, Canberra, talked about bent-cable regression. Her work is joint with Shahedul Khan from University of Saskatchewan and Joel Dubin from University of Waterloo.

In some monitored systems, shocks may result in desirable effects. For example, the recent steady decline in atmospheric chlorofluorocarbon (CFC) concentrations could well be a direct result of the Montreal Protocol; in this case, the enforcement of the Protocol since 1989 induced a shock to the system of atmospheric CFCs. Another example is administering controlled hypothermia as a therapeutic tool to prevent brain damage due to cardiac arrest.

Whether it be applied to field data collected at various CFC monitoring stations around the globe, or to laboratory data from a rat experiment on the response of body temperature to controlled hypothermia, the mixture longitudinal bent-cable model provides insights into questions of key research interest: (a) At what time does the response reach the "point of no return"? (b) At this critical time point (CTP), does the time trend change directions abruptly or gradually, or both? These insights are associated with practical implications regarding the possible effects of the shock.

 In her talk, Grace presented a brief history of the segmented regression model that she has coined the bent cable. In the limiting case the model becomes the 'broken stick' model, with just two straight lines. Data, often responses over time, which appear as roughly two straight lines with a possibly curved join, can be modelled using these techniques. The curved join, if it exists, is modelled to be a quadratic. In her examples

the response is in the form of a line with positive slope which, following some form of intervention or shock, turns around at the CTP to become a line with negative slope. These models can be fitted by maximum likelihood or least squares assuming i.i.d. errors or conditional maximum likelihood or conditional least squares assuming AR errors. Grace has produced an R package,'bentcableAR' to do the modelling.

Grace used the hypothermia case study to demonstrate the bent-cable regression methodology. In one paper, the body temperature responses for some of the 38 rats to an induced hypothermia treatment were fitted separately to determine the CTP for each rat. Then in a recently submitted paper, the mixture longitudinal AR model was used on all 38 rats to obtain the full population fit via Bayesian inference. The mixture model suggested that the rats came from both a broken stick population and a bent cable population, and there was great consistency in the estimated CTPs across the populations.

Further details of this work can be found in *DOI: 10.1198/016214505000001177; arXiv: 1006.5117; DOI: 10.1002/cjs.10070* and http://www.amstat.org/PUBLICATIONS/chance/2009/22.3Web/index.cfm.

Warren Müller ■

CANCER PROJECTIONS

Melissa Goodwin, and Brett Davis from the Cancer and Screening Unit of the Australian Institute of Health and Welfare gave a talk to the Canberra Branch on 27 September 2011.

Cancer projection is necessary for development of health policies such as prevention, detection and treatment of cancer. The age-standardised incidence of new cancers has shown a slow but steady rise since 1982, with the exception of a sharp rise above trend in 1994. Digging deeper into the data and examining the incidence of different types of cancer shows

a sharp rise in the number of new prostate cancer cases from 1988 peaking in 1994. However this is believed to be caused by the introduction of the Prostate Specific Antigen test in 1988, so was at least partly a bringing forward of cases that would not otherwise have been detected until later. Additionally the incidence of lung cancer shows a steady decline, but analysis by gender shows the female rate to be increasing while the (higher) male rate is decreasing, reflecting different changes in smoking patterns in the preceding decades.

Making projections for all the combinations of 100 cancers, gender, age groups and geography would result in an intractable number of models, so a way must be found to reduce the number of models to those that can be supported by the data, be generalisable, repeatable, and automatable. Deciding which cancers to project at what levels depends on the purpose of the projection and questions being answered.

Many cancers show a 'joinpoint' incidence where the trend shows breakpoints in the slope. Within each trend an OLS model is fitted to each 5-year age-group and depending of the significance of the slope coefficient a linear trend, log-linear trend or constant is predicted. The rate of cancers is then the predicted incidence multiplied by the predicted population, with the uncertainty captured by prediction intervals.

The joinpoint analysis can sometimes equally support several different numbers of segments, and then choices need to be made. Both for this and more general model validation the ingredients include comparisons with projections from other agencies, time and sensitivity analysis.

After the talk and discussion members enjoyed dinner with the speakers at Sanur's Balinese Restaurant at Belconnen.

Ray Lindsay ■
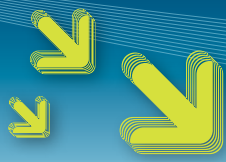
NSW Branch News

In the August meeting, we invited Dr Philip Holmes-Smith from the School Research, Evaluation and Measurements Services (SREAMS) to speak to us. The title of his talk was "The Statistical Analysis of Student Performance Data". We received requests to join this talk using Access Grid Room (AGR). Richard Gerlach and Shelton Peiris coordinated the use of the AGR in the School of Mathematics & Statistics, University of Sydney with the technical support from Robert Pearson. We had five members from the University of Wollongong and University of Newcastle who successfully used the AGR to join us that evening. This facility can be considered in the future. In total, we had twenty-two people attending this meeting. Seven of them were non-members.

Dr Philip Holmes-Smith

Phil is a very experienced secondary teacher and lecturer. He teaches Structural Equation Modelling at the Australian Consortium for Social and Political Research as well as at numerous universities around Australia. He is the founding director of SREAMS, an independent educational research company. His current interests lie in the areas of teacher effectiveness and school improvement, accountability and benchmarking, national achievement testing programs, research related to students at educational risk, resource allocation modeling for school and early childhood systems.

Phil described the statistical theory of Item Response Theory and explained how this method underpinned the scale used to report the National Assessment Program

- Literacy and Numeracy (NAPLAN) results. He then helped us to understand the NAPLAN Scale Score. He gave an overview of the statistics available through the "MySchool" website. Also, he provided an overview of the web-based "Student Performance Analyser" (SPA) program. This program is currently used in Victoria by 1300 schools to further analyse not only NAPLAN data but also Victoria's previous testing program (AIM), an online testing program called the "On-Demand Adaptive Tests" and several of ACER's summative tests (e.g. PAT-R, PAT-Maths, etc.). For those who would like to find out more about his talk, his presentation is available from our website for download.

Arthur Hung

NSW Branch News cont.

Left to right, Michael Stewart, Leon Bombotas, Arthur Hung

In our October Meeting, Dr Ross Wilkinson from the Australian National Data Service (ANDS) spoke to us about the importance of having a suitable data environment to enable researchers to address the nation's important problems. Dr Wilkinson explained the role that ANDS is playing in creating a data commons, describing the data that has been collected as a result of funded research and data from other sources, so that the data can be reused, and value added. Dr Wilkinson also described some of the challenges that are facing such a resource, privacy issues and the volume of data for instance.

Following this talk, the speaker was joined by a group of members at the Tapas Spanish Restaurant in Glebe.

Stephen Bush

The September talk featured Leon Bombotas on the topic of "big data" and the business of online. His current role is Director of Insights and Research Asia Pacific for CBS Interactive (which includes such brands as CNET, ZDNET, Gamespot and Last.fm). His talk started with a comprehensive overview of the degree to which Australians in particular are engaged online, including various interesting summaries on various aspects of communication and social networking as well as advertising and other aspects of e-commerce. He regaled us with some YouTube clips which included the snippet that Australia is the number one country in the world in terms of percentage of population using Facebook. In the second part of the talk he gave some examples of novel statistical and analytical problems he has encountered in his current and previous roles with Telstra media, eBay and Hutchison Telecom. These included a design-of-experiments-type approach to website design and the analysis of social networks to identify trends and key influencers. He concluded by pointing out that using certain key measures, Australia is lagging sadly behind many other smaller countries in the world in terms of number/

proportion of graduates with "deep analytical training".

The central message was that huge amounts of data are being generated while at the same time we have a dire shortage of appropriately skilled analysts who have some (or indeed any) idea of how to go about extracting information from it. The talk provoked several interesting lines of discussion which continued at a local Japanese restaurant. Brian Jersky was particularly chuffed at Leon's warm reference to his undergraduate days at Macquarie!

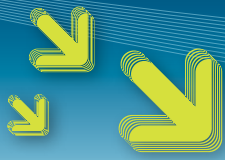Thanks to Boris Choy for providing the photo.

Michael Stewart

Dr Ross Wilkinson making his presentation.

South Australian Branch News

Aiden Fisher and Lyron Winderbaum.

Alan Branford discussing exploratory data analysis with Aiden and Lyron.

For the September meeting of the South Australian Branch, talks were presented by two current Adelaide University students, Aiden Fisher and Lyron Winderbaum. Earlier this year the Branch sponsored Aiden and Lyron to attend the SSAI Young Statisticians conference in Brisbane.

The Phase-Type distribution: the forgotten distribution?

The topic of Aiden's talk was the Phase-Type distribution, a distribution he has studied as part of his PhD research. Aiden introduced the Phase-Type distribution through its Markov Chain representation, where each state of the Markov Chain represents one of its 'phases'. The Phase-Type distribution can be represented by a random variable describing the distribution of time until absorption of the Markov process in which absorption is certain.

The Exponential and Erlang distributions are special cases of the Phase-Type distribution.

Aiden discussed some of the properties of the Phase-Type distribution through two examples of using the distribution to model survival analysis data. In his first example, which concerned data on the amount of force required to break 22 cables supporting the Brooklyn Bridge, the fit of Phase-Type distributions was contrasted with other distributions commonly used in survival analysis. Allowing more phases improved the fit of Phase-Type distribution, but even when 11 phases were used the fit was inferior to the fit of alternatives presented. The data for the second example was the duration of stay of patients in hospital. In this case the outcome variable can be related to a phase process, and the Phase-Type distribution provided a better fit compared with the first example.

Although versatile the Phase-Type distribution is inherently over-parameterised. The large number of parameters which need to be fitted means the distribution does not lend itself well to general data fitting, which is perhaps why it has been labelled as "the forgotten distribution".

Fool's gold — It'll fool you

Lyron's talk was about exploratory data analysis he has undertaken for his Honours project work on the analysis of trace element concentrations in pyrite, "fool's gold". The study dataset consisted of 164 measurements on 27 distinct trace elements in Pyrite extracted from Moonlight Prospect, Pajingo, a mine in North Queensland.

A focus of the study was the hypothesis that 'lithophilic' elements (including but not limited to Chromium, Tungsten, Titanium, Vanadium and Niobium) tend to occur together in Pyrite. Lyron introduced Parallel Coordinate Plots as a way to

South Australian Branch News cont.

SA
Julian Whiting

visualise information in a high-dimensional dataset with a single two-dimensional plot. He then discussed the principles of hierarchical agglomerative cluster analysis, explaining how the method is defined by measures of distance and linkage. The dendrogram visualisation of the cluster analysis was illustrated by presenting dendrograms arising from alternative distance measures. Using Pearson's correlation coefficient as the measure of distance between sets of measurements for pairs of trace elements, Lyron showed how the lithophilic elements do tend to occur together.

In the final part of his talk Lyron illustrated the impact of influential observations on the cluster analysis when using a distance measure like Pearson's correlation coefficient which is not robust to outliers. He explained how Efron's non-parametric bootstrap has been a useful as a tool to systematically identify influential observations in his high-dimensional data.

The SANT Data Link Early Childhood Demonstration Project: the experience so far

In October the second joint meeting of the year with the Australian Epidemiological Association was held at the Australian Bureau of Statistics. The speaker, John Lynch, Professor of Public Health at the University of Adelaide, gave at talk on the experiences so far with SANT data linkage project. The emphasis of the talk was the role researchers can play in using linked data to monitor population health and interventions.

The project is overseen by a consortium of government organisations and universities. John argued that the benefit of having a consortium of data custodians and researchers is that the policy makers are in from the start. A steering committee of representatives from all consortium parties as well as community representatives meets quarterly.

John provided an overview of the statistical linkage project application process which while is long and drawn out at the moment, is expected to improve as more streamlined processes are developed.

Privacy and ethical considerations are a key element of all linkage projects and processes have been implemented so that all linked data is de-identified. The Privacy Committee of SA and NT have endorsed SANT DataLink provision of de-identified data to researchers and policy makers. The aim is to have no publication of reÐidentifiable data by keeping the data safe via restricted access to it, incorporating cell size restriction ($\leftarrow$5), and having very strong incentives to comply. Data custodians can impose further limitations on what information is available based on their own concerns about the potential for re-identification. Ethics review panels then can also make other stipulations about the data and processes of storing and using the de-identified data file. Ethics committees are increasingly coming to grips with data linkage which can be a complicated process to describe. More attention needs to be applied to educating ethics committees and streamlining the number of committees that are involved. For the ECD project there may be as many 5 committees from which we have to seek approval!

Securing on-going funding from national and state sources is a major issue in the continuation of the project. Improving capacity to link data by removing clerical review bottlenecks will hopefully reduce delivery times. Unfortunately, custodian capacity to deliver data is not resourced. User capacity and interest must be generated, which might mean training researchers and policy makers. External environment for using federal data (e.g.

Medicare, AEDI, Pharmaceutical Benefits) might mean an additional layer of approval via "Integrating authorities" to who will handle federal govt data according to "risk".

The reward for a successful project is an increased capacity to create population laboratories to improve public health and health services. There is also potential for remote access laboratories similar to some Nordic and European countries.

Some key research challenges are the validity of data, how to treat missing data using imputation, using longitudinal data optimally, and determining what questions can linked data answer and not answer?

John's parting words of wisdom were that data linkage, by itself, is not a research 'gold mine'. Administrative data are a rich source of information and the project needs more than one-off linkages. To sum up, John's view is that university researchers live in an environment where "quality" outputs matter. What researchers also need is 'easy' access to unit record data and they will need clever ways to use it. So in the end the proof of the pudding is in the eating, it is not in the careful assembly of the ingredients!

Julian Whiting ▪
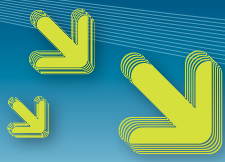
Victorian Branch News

The Victorian Branch has continued to hold monthly seminars throughout 2011, with the final seminar for the year being held on 22 November.

This newsletter contains information on the August and October seminars plus an abstract of the September seminar (more detail in the next newsletter). The October seminar was the annual Belz lecture, this year presented by the SSAI President, Kerrie Mengersen.

The Victorian Branch Council took advantage of Kerrie's visit to Melbourne to discuss with her a wide range of national and branch SSAI issues. For any Victorian members, please contact Sandy Clarke, Council Secretary, sjclarke@unimelb.edu. au, if you would like information on the issues we covered in this discussion.

Detailed reporting of the September and November seminars will be provided in the next newsletter.

2012 program

We anticipate that our first seminar for 2012 will be in March, with our AGM. Victorian members, please put Tuesday 27 March in your diaries now!

August 2011 seminar

The August meeting for the Victorian Branch included a talk by Luke Prendergast from La Trobe University on 'Simple dimension reduction methods with some useful insights via the influence function'.

Luke Prendergast

Luke began by introducing the standard use of Ordinary Least Squares (OLS) for Multiple Linear Regession (MLR) but showed that

this framework could be useful for many other models where we are interested in the slope not the intercept. In fact, there has been a lot of research into this general use of OLS but it usefulness is relatively unknown to many. The main result in this area is Brillinger's Lemma from 1977 the consequence of which is that, as long as the response is a function of the usual linear terms, the form of the link function doesn't need to be specified when the predictors are normal. The model is of the form:

$$Y = f(\boldsymbol{\beta}^{\mathrm{T}}\mathbf{x}) + \epsilon$$

The real advantage of this approach is the possibility for visualisation, as a plot of $\widehat{\boldsymbol{\beta}}^{\mathrm{T}}\mathbf{x}$ versus the response should give a good indication of the link function. We have reduced the dimension from many predictors to one-dimensional $\boldsymbol{\beta}^{\mathrm{T}}\mathbf{x}$. In order to illustrate this, Luke used an example with sine as the link function with two predictor variables where the data may be viewed in a three dimensional scatterplot. Dimension reduction can be seen as rotating to the right angle to obtain the right view and the following plots demonstrate the way the direction affects our ability to see this relationship.
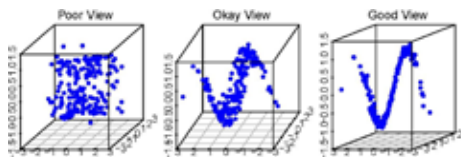
We can easily visualise the two-predictor case but it is not possible to do so for larger dimensions. However, we can visualise the relationship between   and the response easily. Here is the same example but with 10 predictor variables:
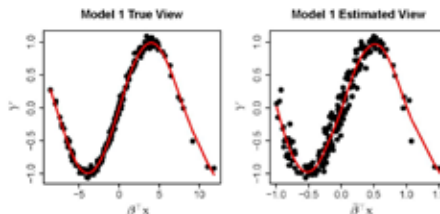
However, even when necessary distributional conditions hold, there are some link functions for which the OLS is not expected to be successful. For example, Luke also presented a quadratic link function case where this approach fails due to symmetrical dependency about the predictor mean.
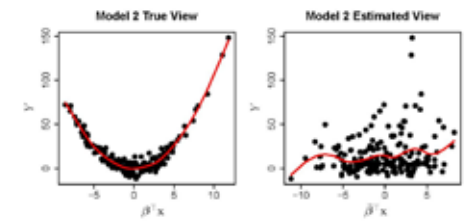
The estimation of the coefficients is just the OLS solution which is easily calculated in any software. This useful result has been somewhat of an unknown; Brillinger's original lemma was hidden in a time series paper.

"Our interest in this area was motivated in part the surprise on learning of Brillinger's results" Li and Duan (1989, The Annals of Statistics)

Li and Duan generalised the results of Brillinger to allow for non-additive error, relaxation of the normality assumption and the use of other methods with convex criterion functions. Then, in 1991, Li further generalized the model allowing for more directions so that:

$$Y = f(\boldsymbol{\beta}_1^{\mathrm{T}}\mathbf{x}, \dots, \boldsymbol{\beta}_k^{\mathrm{T}}\mathbf{x}, \epsilon)$$

This can provide a better fit in more complex cases. Cook generalised the model further so that there is no need for an error term allowing for discrete response where conceptualizing an error can be difficult. These results are conditional on elliptic symmetry for the explanatory variables but for a sufficiently large number of predictors, this is not even often necessary. There are a variety of methods that can be employed in this framework including OLS, sliced inverse regression (SIR, Li 1991), sliced average variance estimation (SAVE, Cook & Weisberg 1991), and principal Hessian **>>**

Victorian Branch News cont.

VIC
Sandy Clarke
Owen Jones

directions (PHD, Li 1992). All of these are simple to implement in most packages.

Luke then went on to give an example where these methods were used by the Proietto Research Group (University of Melbourne, Austin Health & Northern Health) to predict long term weight loss success. Standard analyses have struggled to distinguish between drop outs, regainers (those who regain 30% or more of lost weight) and maintainers (those who regain less than 30% of lost weight) but SIR is able to model a discrete outcome like this and seems to perform well. The number of observations was small (n=47) and the numbers of parameters was large (p=29) but the results suggest power to distinguish between the groups with only two directions. Needless to say, the researchers at Proietto were excited about this finding!

Luke then began the second part of this talk: the influence function. Consider the possibility that the data are "contaminated" by an individual observation. A useful quantity for assessing this is the empirical influence function. Typically Cook's distance has been popular in the multiple linear regression setting but this is not always informative in the dimension reduction setting because an observation can influence the length of the OLS slope vector without influencing the direction. Luke gave the following contrived example where an observation that looks like an outlier and has a large Cook's distance (51) has no influence on the dimension reduction where another observation (17) is genuinely influential. Something that is considered an influential observation by standard methods can even help depending on the direction of the observation.
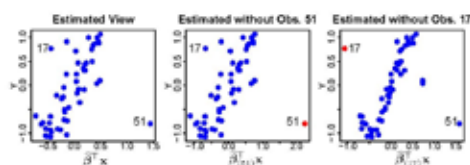
As well as excluding such observations, robust regression methods can also be employed to improve results. Surprisingly, simulations show that the robust regression methods can work better for many models than their non-robust counterparts even when there are no outliers.

Also, the influence function indicates that in a case like the power transformation model it doesn't matter which method (OLS, SIR, etc.) you use. However, in general, Luke recommended trying many approaches as there are types of models for which each of the methods is the better performer.

One of Luke's key points was that these methods are interpretable and OLS at least can be implemented by a non-statistician in any package, but the question arose at the end of the talk as to why they aren't more popular. Luke attributed this, in part, to the need for more widespread implementation of all methods in standard software.

Sandy Clarke ◼

September seminar

"Bicycle commuting in Melbourne during the 2000s energy crisis: A semiparametric analysis of intraday volumes" — Michael Smith, Professor of Econometrics, Melbourne Business School, the University of Melbourne.

Abstract

Cycling is attracting renewed attention as a mode of transport in western urban environments, yet the determinants of usage are poorly understood. In this talk some of these are investigated using intraday bicycle volumes collected via induction loops located at ten bike paths in the city of Melbourne, Australia, between December 2005 and June 2008.

The data are hourly counts at each location, with temporal and spatial disaggregation allowing for the impact of meteorology to be measured accurately. Moreover, during this period petrol prices varied dramatically and the data also provide a unique opportunity to assess the cross-price elasticity of demand for cycling. Over-dispersed Poisson regression models are used to model volumes at each location and at each hour of the day. Seasonality and the impact of weather conditions are modelled as semiparametric and estimated using recently developed multivariate penalized spline methodology.

Unlike previous studies that use aggregate data, the empirical results show a substantial meteorological and seasonal component to usage. They also suggest there was substitution into cycling as a mode of transport in response to increases in petrol prices, particularly during peak commuting periods and by commuters originating in wealthy and inner city neighbourhoods. Last, we extend the approach to a multivariate longitudinal count data model using a Gaussian copula. Using this, we find first order serial dependence in the hourly volumes and a 'return trip' effect in daily bicycle commutes.

This talk focused on the empirical results and importance of careful econometric model formation, not the statistical methods of estimation.

Owen Jones ◼
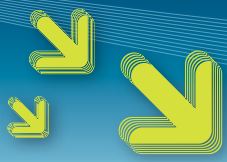
On behalf of the SSAI Office, I would like to take this opportunity to wish all of our members, committee members, supporters and friends a very Happy Christmas and a peaceful New Year.

Marie-Louise Rankin
Executive Officer

The SSAI Office will be closed from
22 December 2011 — 2 January 2012,
16–27 January 2012 and
6 and 7 February 2012

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