The Statistical Society of Australia
News

SSAI

In this issue

Dr John Henstridge

What is your opinion? Please join the online discussion at http://www.statsoc.org.au/.

THE FUTURE OF OUR SOCIETY

In the lead up to the 2015 Budget, there was much discussion about possible cuts in funding to the Australian Bureau of Statistics (ABS) that might lead to dramatic changes to the Census methodology. In particular, there appeared to be the possibility of changing from a once in five year methodology to a once in ten, with the intervening period supplemented by improved estimation based upon administrative and other data. Many people, members and others, raised their concerns about these changes to me, since they saw the Census data as a key input to their work, as well as to major government and business decisions.

As President of the Society, I wrote to the Australian Statistician, David W. Kalisch, acknowledging the long-standing relationship between the Society and the ABS, as well as raising these concerns regarding the Census, and expressing the hope that any changes would be based on good statistical principles, and not on the pressures of inadequate funding.

The reply and the subsequent news about funding were largely reassuring, but one issue remains a concern for me. The consultation concerning possible methodological changes appears to have been relatively narrow, focusing on government agencies, and I suspect that within many agencies themselves it was also narrow. This presumably reflects the reality that the purposes of the Census are defined by legislation, and the ABS must work with the primary uses as referenced in that legislation. However, the concerns I received clearly indicate that the use of the Census today is much wider than this.

The removal of most charges for accessing Census outputs, an achievement of Denis Trewin's time as Australian Statistician, is a major cause of the wider use of the Census. One implication is that the consultation about future Census development should ideally be much wider. The second, more subtle, implication is that the diversity of uses of the Census make it much harder to implement sophisticated estimation to replace the hard work of collecting raw data – estimation typically makes assumptions which may be suitable for some purposes and not for others, and every day the Census is being used for new problems. Neither of these implications is good news for an agency with barely adequate funding, but they must be faced!

I believe that these issues are of central concern to all statisticians in Australia. If we don't support the collection of good data and its use in making good decisions, who will? The Census is the highest profile statistical event in the Australian community. Many of our members are involved in designing it, managing it or using its results. And I would argue that a robust Census with a rich set of questions should result in better informed public debate, which is essential in a democracy.

We should all make our views and concerns about this known. In my role as SSAI President I will be trying to do that as much as I can.

Dr John Henstridge
SSAI President

June 2015
Issue 151

SSAI

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For details ofadvertising rates, etc. contact the SSAI Executive Officer at eo@statsoc.org.au

DEADLINE FOR NEXT NEWSLETTER
10 August 2015

EDITORIAL

Before plunging into the heart of another SSAI newsletter, please pause for a moment and join me in thanking those fellow members who have taken the time to voluntarily contribute to our newsletter. We are very fortunate to have such knowledgeable and committed people as part of our organisation!

In this June 2015 SSAI newsletter there is a little something for everyone. On one hand we have the SSAI President providing us with his perspective on the importance of us supporting robust ABS Census methodology, and on the other a Young Statistician reporting on the value of attending the experience "Science meets Parliament". Continuing on from the March newsletter, we are updated on what is happening with mathematics related education, as well as informed of opportunities to expand the Secondary Schools Statistical Literacy Poster Competition to a National contest. There are also prospects to share learnings from branch meetings, such as finding out about the modelling language Stan, gaining an overview of meta-analysis, identifying what key skills will allow statisticians to be more computationally sophisticated, understanding the possibilities for evaluating the effectiveness of medical interventions, as well as acquiring an appreciation for the value that specific statistical consultants and academics have generated in their own sphere of work. This and more is available, for your enjoyment and edification this quarter, in the SSAI newsletter.

Being a new editor for the SSAI newsletter, I have been coming to grips with what this involves. To improve my understanding of this role and to make it easier for future editors, I have generated with the Executive Officer's help some guidelines for the SSAI newsletter editor and contributors. Marie-Louise has also been streamlining the process of managing the articles, so that an editor can be anywhere in the world and still make a meaningful contribution. So, if you feel an urge to become SSAI's other newsletter editor (it works best if there are two people to bounce around ideas and manage the contributions), it has just become a lot easier to transition into this role.

The next step is to obtain a better feel for what the SSAI membership wants from the newsletter, before making any major changes. So, if you get sent an email or a survey invite sometime over the course of this year, then please have patience, give me a few minutes of your time, and provide me with your important viewpoint. It will be very much appreciated, and will provide useful feedback as to how the SSAI newsletter can be improved.

Once again, if you have any questions or constructive comments regarding the newsletter, feel free to contact us via eo@statsoc.org.au.

With warm regards from,

Sonia Langford

EVENTS

ACSPRI WINTER PROGRAM

29 June – 10 July 2015, University of Queensland

INTERNATIONAL MEETING OF THE PSYCHOMETRIC SOCIETY

12-16 July 2015, Beijing, China

ACSPRI WINTER PROGRAM

20-24 July 2015, University of WA

60TH ISI WORLD STATISTICAL CONGRESS

26-31 July 2015, Rio de Janeiro Brazil

3RD ANNUAL NATIONAL CONFERENCE 'ADVANCING ANALYTICS 2015'

4 August 2015, Sydney

JOINT STATISTICAL MEETINGS 2015

8-13 August 2015, Seattle Washington USA

THE 36TH ANNUAL CONFERENCE OF THE INTERNATIONAL SOCIETY FOR CLINICAL BIOSTATISTICS (ISCB 2015)

23-27 August 2015, Utrecht, The Netherlands

SPORTS ANALYTICS CONFERENCE 2015

28 August 2015, Melbourne

2015 RSS CONFERENCE

4-10 September 2015, Exeter UK

BIG DATA 2015

20-21 October 2015, Sydney

XXVIIITH INTERNATIONAL BIOMETRIC CONFERENCE (IBC 2016)

10-15 July 2016, Victoria, BC Canada

ECO-STATS '15: TECHNOLOGICAL ADVANCES BETWEEN ECOLOGY AND STATISTICS

8-10 December 2015, Sydney NSW

12TH GERMAN PROBABILITY AND STATISTICS DAYS 2016 – BOCHUMER STOCHASTIK-TAGE

1-4 March 2016, Bochum, Germany

AUSTRALIAN STATISTICAL CONFERENCE 2016

(WEBSITE NOT YET AVAILABLE)

5-9 December 2016, Canberra

CALL FOR PAPER: INTERNATIONAL CONFERENCE FOR ESTABLISHMENT SURVEYS, 20-23 JUNE 2016

The Fifth International Conference on Establishment Surveys (ICES-V) will be held June 20-23, 2016 in Geneva, Switzerland. The Program Committee invites you to submit a proposal for an invited paper *from June 1st, 2015 to September 30, 2015.*

For more information on invited sessions, including session formats, suggestions for topics, criteria, instructions and a template for submitting proposals, please consult http://www.portal-stat.admin.ch/ices5/invited-sessions/.

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SCIENCE MEETS PARLIAMENT 2015

Science meets Parliament 2015 (L to R: John Henstridge, Jake Humphries)

Thanks to the SSAI, this past March I had the opportunity to attend Science meets Parliament (SmP) with John Henstridge, SSAI's President. I first learnt about this event through an email the month before from SSAI, which was soliciting applications for a "Young Statistician" representative of the Society for the event. It was described as a: "two-day program of professional development and networking aimed at helping [attendees] better communicate their science to the media, policymakers and parliamentarians". It sounded like a great opportunity, and I was enthusiastic in applying.

The first day was essentially a "do this, not that" for communicating science. First there were representatives of the media discussing what they need to turn your science into news. Next was a discussion on "the art of the political meeting", chaired by the CEO of the Royal Flying Doctor Service. My favourite discussions of the day were "How to talk/think like a policymaker" and "Getting your science out of the lab". Both were presented by academics, with the speakers for the former talk including Nobel Laureate Brian Schmidt. It was no surprise that most of the discussions focused on effective communication and knowing your target audience. In addition, a considerable focus of these talks was how to communicate our messages to parliamentarians, with whom we would be meeting on the second day. The most oft repeated advice was not to request funding.

The day's program ended with an exercise practicing the short verbal presentation we would deliver to parliamentarians in our meetings. It seemed every attendee had some sort of agenda, often, but not always, to promote their field of research. I didn't have an agenda, and this instilled in me at least a little apprehension about my meeting the next day.

In the evening, I attended the gala dinner in the Great Hall of Parliament House. (I had lived in Canberra almost twelve months but hadn't yet visited New Parliament House. I also had never been to a gala dinner.) A few attendees were dressed as though they were from a James Bond flick. They had some big names presenting at the dinner including the headline speaker Bill Shorten, Leader of the Opposition, as well as the Minister for Industry and Science, the Hon Ian Macfarlane. Whilst seated I had to my left a member of the House from Western Australia, who told me about his PhD on high temperature semiconductor physics and views on climate change.

On the second day we heard from the Shadow Minister for Innovation, Industry, Science and Research, the Hon Kim Carr. Afterwards, those of us not in meetings with parliamentarians had lunch at the National Press Club, where a national address was given by Ian Chubb, the Chief Scientist for Australia. After lunch I had my meeting with a Senator accompanied by two other attendees. I chose to simply voice how I feel mathematics education is of the utmost importance.

I wish to thank the SSAI for allowing me to attend this year's SmP. It was a great opportunity to learn about how to better engage with the media and politicians, and to see up close our federal government in action. It was also a great opportunity to network. I met many scientists in diverse fields from around Australia. If you work in science and ever get the chance to attend this event, I say do it. I also encourage you to have a clear idea beforehand of what you wish to discuss with the parliamentarians. I think this will let you get the most out of the experience.

Jake Humphries

ACSPRI 2015/16 PROGRAMS

ACSPRI Methods Courses are intensive small group 'hands on' courses run over five days for researchers and higher degree students.

EACH COURSE COVERS A TOPIC SUCH AS:

> general statistics
> multiple regression
> structural equation modelling
> experimental design
> survey research
> social networks
> qualitative research
> mixed methods
> program evaluation

AND lab based courses use the latest social scientific software and technology. ACSPRI courses cover a variety of levels from Fundamentals (Introductory Level 1) through to very Advanced (Level 5).

2015 WINTER

29th June – 10th July
University of Queensland, St Lucia

20th July – 24th July
University of Western Australia, Perth

Early Bird Deadline 6th May
acspri.org.au/winterprogram2015

2016 SUMMER

18th January – 22nd January
Australian National University, Canberra

1st February – 12th February
University of Melbourne

Early Bird Deadline 18th November
acspri.org.au/summerprogram2016

2015 SPRING

28th September – 2nd October
University of Technology, Sydney

Early Bird Deadline 5th August
acspri.org/springprogram2015

FURTHER INFORMATION

Email: **info@acspri.org.au**
Phone: **03 8376 6496**
Website: **www.acspri.org.au**
Find us on Facebook:
/acspri.org.au

A full list of courses can be found at **www.acspri.org.au/courses** and a list for each program is publicised around four months in advance on the Winter, Spring and Summer webpages.

ACSPRI are now offering intensive 2-day weekend Master Classes in our Melbourne office throughout the year. Visit the website for details.

ACSPRI members receive generous discounts on all our courses and master classes.

ACSPRI
Australian Consortium for
Social and Political Research Incorporated

STATISTICAL META-ANALYSIS: POTENTIAL FOR NEW RESEARCH OPPORTUNITIES

Editor's Note: This article was written in conjunction with a reminder regarding the workshop "Statistical Meta-Analysis: Methods and Applications" 16-17 June organised by Professor Suhail A R Doi of Australian National University. Due to circumstances beyond our control, this newsletter is later than anticipated in its delivery. Our thanks to Professors Khan and Doi for submitting this article, and we apologise for any inconvenience this delay has caused them. For those unfamiliar with meta-analysis, the article provides an overview of the topic, as well as highlighting some of the current research challenges and opportunities.

In this age of evidence based decision making through systematic reviews of the literature, the statistical meta-analysis has been extensively used to synthesise published summary data on a particular topic of interest from a number of independent studies, in order to allow researchers to reach more credible and scientifically valid conclusions.

This method is being increasingly used in scientific decision making, due to its ability to combine data from various studies to estimate a common underlying effect size. Although it is extensively used in clinical and public health studies, meta-analysis is also widely utilised in many other disciplines including business, psychology, education, epidemiology, biometry, environment and agriculture. The Cochrane Collaboration publishes thousands of meta-analytic studies on health and medical related topics, and the Campbell Collaboration publishes many others on key aspects of other fields of research in modern life.

Statistical meta-analysis deals with a variety of sophisticated methods to effectively and efficiently combine the results of several independent, published studies all sharing a common underlying effect. By combining aggregate information meta-analysis ensures higher statistical power for the effect measure of interest due to increased sample size. Affecting the credibility of any meta-analysis are the choices that researchers must make on issues including the quality and type of studies to be incorporated into the analysis, the extent of exhaustive literature searches to ensure coverage of the relevant studies, the objective criteria used to select studies, dealing with incomplete or inconsistent data, the methods used to analyse the data, heterogeneity amongst the estimates of effect size, and the handling of publication bias.

The main objective of meta-analysis is to estimate the underlying common effect size for an intervention of interest expressed as a pooled statistic, perform tests on appropriate hypotheses, and construct a confidence interval for the common population parameter. The meta-analytic methods are used to deal with effect measures related to binary outcome variables such as relative risk, risk ratio or odds ratio, as well as those related to continuous outcome variables such as the standardised mean difference or weighted mean difference. For the construction of confidence intervals the distribution of the effect size is assumed to be normally distributed.

All meta-analytical methods are based on weighted averaging of study effects, so one of the key areas for consideration is the choice of implementation of these weights. The most "natural" system of weights is of course equal weighting but that may lead to paradoxical results and may not be most efficient in terms of the variance and MSE (mean squared error) of the resulting estimator. Empirical weighting has therefore become the norm with two forms predominating in the literature. The first form is known as the fixed effect (FE) model where empirical weights are the inverse variance weights which adjust for the contribution of variance due to random error. When there is heterogeneity of effects across studies, this estimator exhibits over-dispersion and to remedy this situation the random effects (RE) weights were proposed. These RE weights adjust study variance by adding a constant RE variance component to each study variance before computing a modified inverse variance weight. Researchers commonly call it the random effects model, and this is the recommended approach by several organisations such as the

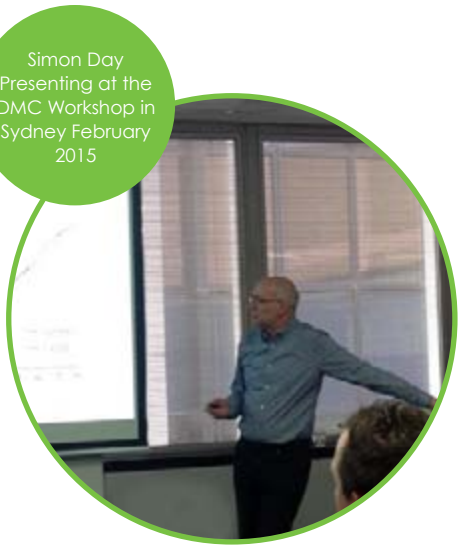
Cochrane Collaboration. However, the problem is that it still exhibits over-dispersion, even though this approach results in a wider confidence interval compared to utilising the standard inverse variance weighted estimator.

Both the FE and RE estimation methods commonly used in the scientific literature underestimate the statistical error if there is heterogeneity among the studies. To remedy this situation, some researchers have called for a better alternative to the random effects estimator, namely the inverse variance heterogeneity (IVhet) estimator. The latter is a variant of the quality effects model of meta-analysis. The advantage is that none of these newly developed estimators suffer from the problem of over-dispersion.

The newer methods potentially generate new research opportunities for both applied and methodological researchers. We recommend that researchers keep pace with and take advantage of the rapid developments in this field, to produce syntheses that offer significant advantages in terms of estimator performance. This is now accessible with the availability of software to run such analyses (www.epigear.com). Given that the conclusions from meta-analytical results have sometimes been questioned, we are hopeful that these new developments will herald an era of more robust conclusive results for translation into practice or policy.

Shahjahan Khan and **Suhail A R Doi**

PARTNERSHIP WORKSHOP: DATA MONITORING COMMITTEES AND INTERIM ANALYSES IN CLINICAL TRIALS



Simon Day Presenting at the DMC Workshop in Sydney February 2015

In late February 2015, the Australian Pharmaceutical Biostatistics Group (APBG) in partnership with the SSAI presented a 2 day workshop on Data Monitoring Committees (DMC) and Interim Analyses in Clinical Trials, which was conducted by Dr Simon Day. The course covered topics on: the roles of a DMC other than 'stop/continue' decisions, an overview of group sequential methods, regulatory guidance, DMC composition and the responsibilities of DMCs. The course was based in Sydney and attended by over 30 people representing various industrial, academic and government organisations.

Simon has spent 30 years working in clinical trials, and thus brought a wealth of experience and insight into working on DMCs, which invoked very good discussions. The example based learning was crucial to the success of the course, and based on the feedback from participants, it was a real success.

I'd like to thank all those who attended and continue to help support APBG in such endeavours.

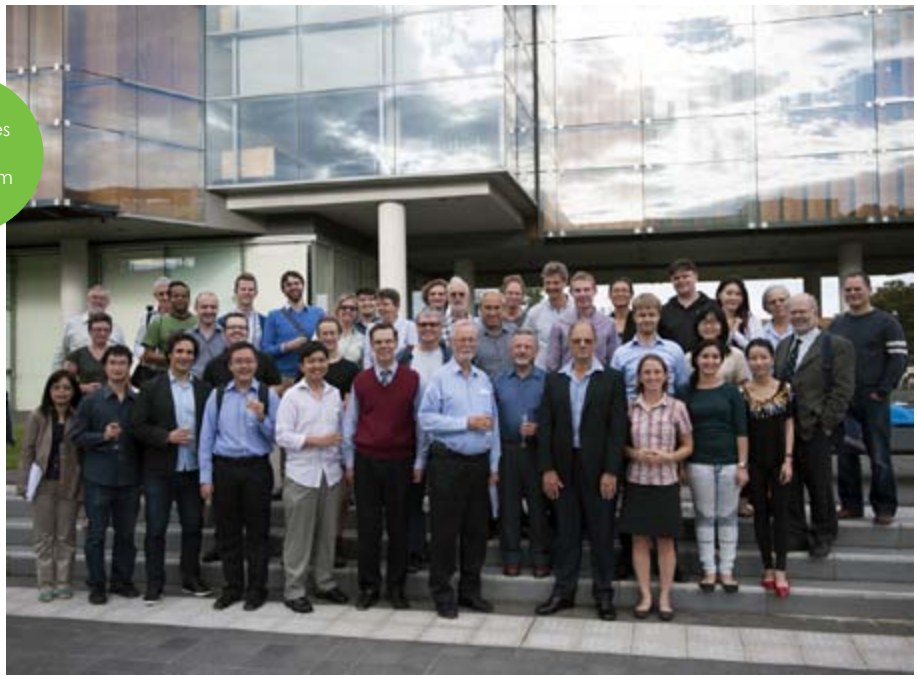
Watch this space for more workshops!

Alan J. M. Brnabic
Chair APBG

MUCH MORE THAN U-STATISTICS: A SYMPOSIUM TO CELEBRATE NEVILLE C. WEBER

Neville stands out as one of the best that academia can produce. His mentorship helped fast-track many a career. His generous help was experienced by all who had the pleasure to interact with him. His career spans more than three decades - the majority of which was spent at the University of Sydney. In recognition of his distinguished service, in January 2014 Neville was awarded the title of Emeritus Professor. While Neville planned to retire quietly, after talking to some of his current and previous colleagues, it was more than clear that Neville deserved better. Hence, we organised a symposium to celebrate his career which was held on the 30th January 2015 at the University of Sydney.

Attendees at the symposium



The event was a huge success with 60 people attending the symposium and afterwards 50 people attended the dinner. Many people contributed towards a retirement gift for Neville, which was spent on a travel voucher for $1320 along with a plaque that read:

On the transition of
Professor Neville Weber
to senior statistician.
Researcher, teacher, mentor, friend:
a leader in the field;
a generous servant to the discipline;
an invaluable colleague;
a complete academic;
and the finest possible role model.
Presented by colleagues, students and friends.

30 January 2015

We heard opening remarks from Professor Trevor Hambley, Dean of the Faculty of Science at the University of Sydney, who praised Neville's administrative work during his five years as Head of the School of Mathematics and Statistics. Professor Eugene Seneta, chair of the first session, took us on a trip down memory lane, with a choice selection of photographs and anecdotes from the history of the School of Mathematics and Statistics.

Neville's first PhD student, Philip Kokic (CSIRO) gave an enlightening presentation on their early research together and shared with us some revealing photos of their extra-curricular hiking trips. It's fair to say that Neville looked quite fetching in shorts as a younger man. Next off the ranks was Neville's most recent (we're hesitant to say last) PhD student, Garth Tarr (ANU). He bemoaned the pain and suffering Neville put him through during his PhD, by suggesting he look at the properties of an estimator under long range dependence.

The first session was rounded out by David Warton (UNSW) who outlined the PIT-trap: a general bootstrap procedure for inference about regression models with non-normal response. He also reminisced about how little had changed in the Carslaw lecture theatres in the 20 years since he was an undergraduate student at the University of Sydney. We were then treated to a delicious afternoon tea, kindly sponsored by the Faculty of Science and the School of Mathematics and Statistics, before Professor John Robinson welcomed us back as the chair of the second session.

The next session began with Vasilis Sarafidis (Monash), a relatively recent collaborator of Neville's, who highlighted the depth and diversity of Neville's statistical ability. As an example he spoke about a joint paper they had recently published entitled: "A partially heterogeneous framework for analysing panel data". Justin Wishart (UNSW), another of Neville's recent PhD students, then took the floor and described aspects of his PhD research on nonparametric change point problems with long range dependence. Justin also outlined how Neville was there to provide unfaltering guidance and support through tragic circumstances related to his PhD studies. Finally, Alan Welsh (ANU), Neville's first honours student, regaled the audience with a discussion on recent work he's been doing with a masters student on jackknife estimation of prediction mean squared error in linear mixed models, and drew parallels with his own honours research with Neville. Alan also made the point that while all the speakers had been thanking Neville for the impact he has had on their lives and careers, there should be recognition of the positive impact that Neville's students have had on him.

With that, it was time for Neville's right of reply. He gave an entertaining overview of his career progression, singling out a number of people who made an impact on him including Harry Mulhall, George Cooney and Malcolm Quine as lecturers, Peter Hall as his lab tutor, Geoff Eagleson who was visiting from Cambridge, as well as John Robinson, Eugene Seneta and Howard D'Abrera who were outstanding role models and mentors. Agreeing with the sentiment on which Alan ended his presentation, Neville made the comment that: "It is the students that make a University career so rewarding." Neville finished with a quote from Mario Cuomo:

"You find your own good in the good of the whole. You find your own individual fulfilment in the success of the community."
(Mario Cuomo, New York Governor, 1983-94)

Oliver Lancaster told Neville when he was first appointed as an academic that service is important and Neville clearly took this to heart. Neville didn't list any of the committees he's served on or professional service activities he's generously

given his time to over many years (which is good, because we would have been there for a long time if he had). However, special mention should be made of his longstanding role as the chair of the Technical Committee on Scaling for university admissions, his contributions to the NSW branch of SSAI and to the University of Sydney Graduate Studies Committee, particularly the Postgraduate Awards Sub-Committee. We eagerly anticipate the future contributions Neville is yet to make to the discipline of statistics, the practice and administration of education, and the lives of those around him.

After the symposium, champagne was served and frivolity followed as colleagues, young and old, mingled and exchanged thoughts and memories. This was continued at a dinner held at Chedi Thai in Newtown, where the festivities kicked on until we were kicked out well past their usual closing time. It was a memorable afternoon and enjoyable evening spent celebrating an unforgettable pillar of the statistical community.

Many people need to be thanked for their help organising this event: Alan Welsh for crafting the text on the plaque; Sonia Morr and Susan Liddell for helping with administration and catering; and Yinan Zhang for taking photos throughout the afternoon.

Garth Tarr and **Samuel Müller**

L to R:
Neville Weber and
Trevor Hambley

XXVIII[th] International Biometric Conference

Victoria Convention Centre, July 10 – 15, 2016

"I warmly invite you to the XVIII[th] International Biometrics Conference in Victoria, Canada, traditional territory of the Lekwungen First Nations, and capital city of British Columbia. Victoria is located on the southern tip of Vancouver Island, off Canada's Pacific Coast. The conference will be held at the Victoria Conference Centre, adjacent to the famous Empress Hotel. Victoria is named the City of Gardens and has easy access to recreational activities such as kayaking, whale watching, hiking, and much more. The temperate climate and relaxed island lifestyle should make for a memorable 28[th] IBC."

– Laura Cowen, University of Victoria, Local Organizing Chair

SCIENTIFIC PROGRAMME

- Opening Ceremony & Presidential Address
- Invited Oral Sessions
- Contributed Oral and Poster Sessions
- Young Statisticians Showcase Session
- Biometrics and JABES Showcase Session
- Short courses

SOCIAL PROGRAMME

Sunday July, 10	**Welcome Reception**
Monday July, 11	**Young Statisticians Mixer**
Tuesday July, 12	**Regional Officers' Reception**
Wednesday July, 13	**Range of social excursions**
Thursday July, 14	**Gala Cultural Event**

For constantly updated information,
please see the website www.biometricsociety.org

SSAI GOLDEN JUBILEE TRAVEL GRANT

It provides overseas travel funds to SSAI student members, who can prove consecutive SSAI membership for a minimum of two years and who wish to attend overseas conferences at which they present a paper or poster.

A maximum of $1000 is available per application, limited to a single trip during the course of the student's studies. Students will not be supported in their first year of study and will have had to be members of the Society for at least 2 years prior to the application deadline. Applications are required to be lodged in advance of travelling. In exceptional circumstances an application can be for post-conference support, but the application will then have to be made within 1 month of returning and the 2 year mandatory membership period prior to departure must still be met. Exceptional circumstances are limited to unforeseeable student out of pocket expenses arising from other funding sources not fulfilling their obligation or changes to the trip that could not have been avoided.

If successful the student member is required to produce original receipts for amounts of equal or greater value than the grant. These receipts will be returned to the student marked with how much has been reimbursed. The student will therefore still be able to use the receipts for proof of attendance or to claim any funding shortfall from other organisations. The student member will also need to supply a report of his or her involvement in the conference to be published in the SSAI newsletter. This report should confirm the actual travel details and papers presented.

Recipients of the grant are asked to acknowledge the SSAI's support in the presentations and in any published version of the paper.

One travel grant is available per year. Assuming that more than one application will be received per year, either the Executive Committee or a special committee would help with the selection process.

For more information or to apply, contact the SSAI Office (eo@statsoc.org).

With this travel grant program the SSAI seeks to underline its objective to further the study, application and good practice of statistical theory and methods in all branches of learning and enterprise. It has been implemented to confirm to members that the SSAI is willing to support student statisticians and their budding careers.

A complete application will consist of

- Information on the conference and its importance to student's work (2-3 lines)
- Details of the paper/s/poster student wants to present at the conference
- A list of other funds sought or promised, including student's home institution
- Student's out of pocket expenses expected
- Any other supporting material student feels is necessary
- A letter of support SIGNED by one of student's supervisors AND student's Departmental Head
- Student's CV

The application deadline is 31 March 2016.

SENIOR FELLOWSHIP IN DATA SCIENCE, COMPUTATIONAL MODELLING AND SIMULATION SCIENCE

Are you looking for a postdoc or more senior fellowship in Data Science, Computational Modelling and Simulation Science? Are you up for an adventure in Australia, located at one of the country's oldest and largest group of Bayesian statisticians? If so, please consider applying for a prestigious QUT Vice-Chancellor's Fellowship. Email ISBA member Kerrie Mengersen or QUT Associate Dean for Research Bronwyn Harch (a world-class statistician as well as research director) and click here for more details. Note that applications close on 29 June 2015.
Come and join us!

Kerrie Mengersen Professor, Statistics, QUT Brisbane Australia

FOR MATH'S SAKE: LET'S GET TOGETHER!

The Inspiring Mathematics and Science in Teacher Education (IMSITE) project, is one of five multi-institutional grants funded by the Office of Learning and Teaching (OLT), as part of the Enhancing the Training of Mathematics and Science Teachers (ETMST) programme. The IMSITE project involves a partnership between six universities in three Australian states, one of which is the University of Newcastle (UoN). The UoN team's members are listed at the end of the article.

One of IMSITE's aims is to foster genuine, lasting collaboration that unites mathematics, science and education scholars across the disciplinary boundaries that have previously divided them. On the 1st May 2015, The UoN team hosted the Newcastle Mathematics Educators Conference entitled "For Math's Sake: Let's Get Together!". The one-day event organised by the IMSITE team, was aimed at building a Mathematics Educators Community in the Hunter Region. Specifically, the conference was targeted at having participants feel they could work together to:

- Establish a sustainable maths educator community which everyone could contribute to and which was beneficial to all.
- Identify, develop, build and explore awareness of possible avenues for collaboration.
- Promote mathematics holistically to the next generation and in a new way!
- Nurture and support the next generation of mathematicians.
- Be aware of possibilities to create true partnerships.
- Act locally while thinking globally.

The vision for the community was one of becoming champions of Mathematics as a collective, in both the promotion of Mathematics and in developing the next generation of mathematicians (which includes all math educators and students), and to ultimately develop a mathematics education that inspires both students and mathematics educators.

The conference brought together like-minded individuals to generate greater success via collaboration. Conference participants consisted of about 20 tertiary educators (education, mathematics, and statistics), 60 secondary school mathematics educators, and 15 pre-service secondary school mathematics teachers (the latter were those currently in training to become mathematics teachers). Secondary school teachers' participation was by invitation: Principals of secondary schools in the region were invited by the IMSITE team to select one or two of their school's current or potential leaders in Mathematics Education to attend.

To help initiate a feeling of comfort and unity the conference began with a light-hearted presentation. This described the varying levels of teaching experience, backgrounds, educational experiences and other demographics represented at the conference, based on a pre-conference survey. Malcolm Roberts, coordinator of UoN's Young Mathematician's program, then provided his vision for a structure of National Mathematics support and development, which he likened to the Australian Cricket Board and its structure for developing and supporting cricketers from grass roots through to the thriving State and National levels.

What followed were five 8-minute presentations covering the topics "Being a New Teacher" (presented by a young teacher in their first year), "Using technology in the classroom", "Action Planning-Teacher Researchers",

"Mentoring and the Maths Community" and "Extra-curricular enrichment activities". These provided the basis for group discussion under the theme of "Sharing Practice". Conference participants were then allocated to one of nine discussion tables (ensuring a mix of experience and backgrounds at each table), where for each topic and/or one of the participants' own choosing, the tables discussed challenges they have experienced, how a cross-collaboration might assist, as well as perceived logistics and other considerations required to ensure a cross-collaborative effort was successful. Lively and enthusiastic discussion ensued and the results of these two 40-minute discussion sessions were then summarised across the tables and reported later in the day.

Participants mingle around noticeboards to rate the key issues

The conference was fortunate to have two special guest speakers. Prof. John Fischetti (Head of School of Education, UoN) discussed his view of Education in the 22nd century, and the need to focus on quality of teaching, research and leadership, as well as replacing poor habits with good ones. Mr Ian Sheppard, Wesley College's Head of Mathematics, Perth, then had the audience taking off their teacher hats and returning to the classroom to enjoy an authentic mathematics activity as students.

Following the summary report on the discussion groups, participants were invited to place stickers on noticeboards which listed the key issues reported for each of the topics, thus rating each of the noted issues and helping to prioritise future action. The conference concluded with a reflection on the day's activities, the conference aims and a consideration of where we go from here.

The conference was designed to be a key first step towards developing a Mathematics community, so, did it work? Participants have been invited to evaluate the conference via an online survey which is based around the aims of the conference. Whilst preliminary results are very encouraging, we wait with bated breath for the final results following the survey's closing date.

Activity breeds success, so it is anticipated that the formation of a dynamic, sustainable community is dependent upon continued valued activity. With that in mind, the IMSITE team is moving forward to develop projects with schools. **We invite interested readers to contact the team should you also wish to be involved in this developing community.**

Peter Howley

UoN's IMSITE TEAM

School of Mathematical and Physical Sciences/Statistics

Peter Howley (Chair of Statistics Education, SSAI),
Phone: 02 49 21 5518 peter.howley@newcastle.edu.au

School of Mathematical and Physical Sciences/Mathematics

Judy-Anne Osborn; Malcolm Roberts; Andrew Kepert

School of Education

Elena Prieto-Rodriguez; Kathryn Holmes

Project Officer

Edwina Butler

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Email custservice@johnwiley.com.au

Secondary Schools Statistical Literacy Poster Competition

IT'S TIME WE GO NATIONAL!

Poster Display Area at Award Night

In the previous SSAI Newsletter (March 2015), we wrote about the successful pilot of the National Statistical Literacy Project competition in the Hunter Region in 2014, run under the auspices of the International Statistical Literacy Project. Details are provided below** and also at http://www.ssaipostercomp.info/.

We wish to expand the pilot in 2015 by establishing multiple 'coordinator sites' around Australia, each replicating the Hunter Region experience. The 2014 pilot helped establish processes and materials that we would like to see utilised elsewhere, as we expand the competition.

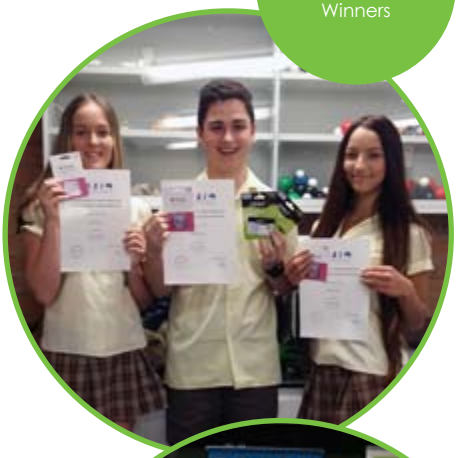
Do you have some interest in helping create the next generation of Statisticians, working with Schools and Teachers, developing interest in the types of activities you enjoy?

Would you like to know more about what is involved in coordinating locally as part of the national competition?

Please contact peter.howley@newcastle.edu.au or phone 02 49 215518 to discuss.

NOTE: By making contact it doesn't mean you are entering into a binding commitment, nor will it result in you perpetually bombarded with pleading emails should you find you do not wish to be involved.

Year 9 – 10 Poster Competition Winners



Year 10 Honourable Mention

Having had the experience of creating, coordinating and delivering the pilot, I will ensure that you feel supported in whatever way you wish to be involved, and that we work together. I will endeavour to make the experience simple and enjoyable. Having a local friendly and interested person as a point of contact for schools will be invaluable to the expansion of the competition.

I am pleased to advise that the CSIRO's Scientists- and Mathematicians-In-Schools Coordinator has offered their program's involvement in the competition, and will provide personnel to act as project facilitators within schools where possible.

So please contact peter.howley@newcastle.edu.au or phone 02 49 215518 to discuss.

**In brief, the poster competition involves secondary school students undertaking an activity-based learning project, in teams of 2 to 5, and creating a poster presentation (as per a conference poster) based on the collection, analysis, interpretation and reporting of data towards addressing a practical research question of interest to them. Details of the project aims and support available are presented on the website.

Details of the 2014 competition, including examples of winning posters are available at http://www.ssaipostercomp.info/winners.html.

Peter Howley and **Michael Martin**
SSAI Chairs of Statistics Education

NSW BRANCH

Annual Lancaster Lecture

Professor Thomas Lumley

The NSW Branch hosted their annual Lancaster Lecture on March 10, 2015. Co-sponsorship was provided by the ARC Centre of Excellence in Mathematical and Statistical Frontiers (ACEMS).

This lecture honours the memory of Professor Henry Oliver Lancaster and his many contributions to the statistical profession, especially in NSW. This year's speaker was Professor Thomas Lumley from the University of Auckland, New Zealand. Originally from Melbourne, Thomas returned back to the southern hemisphere several years ago after a highly successful career in the Department of Biostatistics at the University of Washington, Seattle. He is well known for his contributions on the interface of statistical methods and scientific computing.

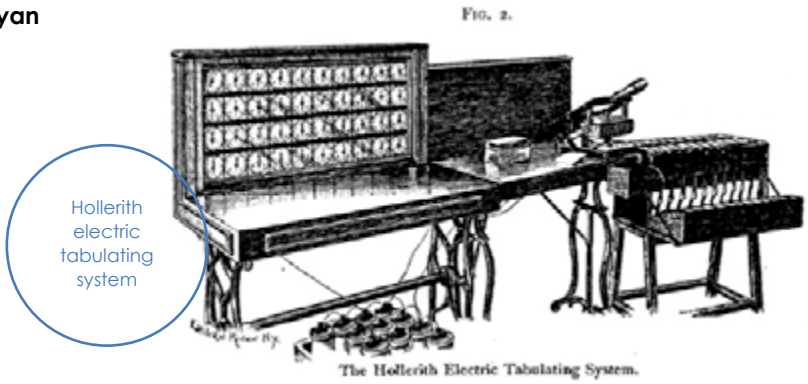
Thomas' provocative lecture title "Data Science: Will Computer Science and Informatics Eat Our Lunch?" drew a large and diverse crowd. His talk was excellent with his main theme being that we statisticians MUST be computationally sophisticated if we are to retain our rightful seat at the data science table. In an interesting quote from his presentation, he says: "Data science is statistics in the same way that epidemiology is statistics, opinion polling is statistics, agricultural field trials are statistics". In other words, there is a lot more to it than simply data analysis and statistical modeling, with technologies to capture, store and analyse extremely large data sets being key. Thomas argued that we should be teaching our students not only about programming in R, but also a bit about databases and SQL, concepts such as 'tidy data', 'sparse', 'map/reduce', reproducible data analysis (e.g. rmarkdown and knitr) and finally, Collaborative version control (e.g. git/github). Unfortunately, most of us just don't know about these things, so WE need to learn them too!

Thomas gave a historical perspective about the rising importance of computers for the discipline of statistics, with lots of interesting graphics and pictures, including a sketch of the old Hollerith electric tabulating system that was a precursor to modern day computing.

Thomas talked about all the great things that us statisticians CAN contribute to data science, including modeling of "messy" as opposed to simply large datasets, handling missing data, and statistical design. We know about subtle things such as weighting, matching and selection models. We have a lot to contribute as well around issues such as privacy protection.

Thomas concluded with an answer to the question posed in his title about whether or not the data scientists will eat our lunch: "Only if we let them, and it would be bad for data science, too.".

Louise Ryan

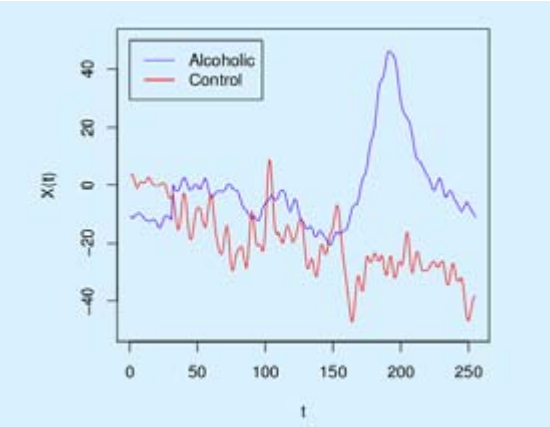


Hollerith electric tabulating system

Aurore Delaigle introduced us to Functional Data Analysis

On an almost cyclonic April evening we were very lucky to hear from the ARC Future Fellow Professor Aurore Delaigle, University of Melbourne. A good-sized audience braved the weather to hear her give an introductory talk on one of her research areas, Functional Data Analysis.

It is not easy to give a digestible talk to a mixed audience about a technical area of which one has deep knowledge, however, Aurore managed to do this with apparent ease. She started by presenting various examples of functional data, from Australian rainfall and brain activity of alcoholics (both pertinent on the night perhaps!) to human growth curves and speech patterns. One of these plots is shared below.



Brain electrical activity measured from electrode placed on two patients' scalp

$X_i(t)$: measurement of ith patient at time $t \in \mathcal{I} = [1, 256]$

She then proceeded to explain the rather subtle point that although most such functional data is discretely observed, it is advantageous in various senses to run these noisy observations through a nonparametric smoother, and then apply the suite of functional data analytic techniques to these smoothed curves.

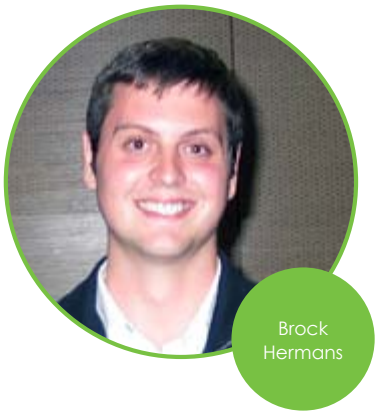
Another rather technical concept i.e. that of eigenfunctions, was then introduced in a very clear way in the context of the rainfall data. Aurore explained that most of the variability in the rainfall curves could be explained by the first 3 or 4 eigenfunctions, and indeed the graphs she showed made this very plain. Thus, she drew connections between some more traditional aspects of multivariate analysis such as principal component analysis and functional data analysis, which helped the audience assimilate some tricky concepts easily.

Aurore then went on to discuss some important problems, such as dimension reduction and classification in a functional data setting, touching on some recent research whereby evaluating the functions at a carefully chosen grid of points can be more useful for classification than computing projections on eigenfunctions. Indeed the talk had something for everyone, even touching on the delicate issue of how the degree of presmoothing might affect the performance of competing classification methods.

In all, the talk was a refreshingly accessible introduction to a complex area given by a leading researcher in the field. We can consider ourselves lucky that this bright star chooses to call Australia home.

Michael Stewart

Inference for Epidemics on Networks


Brock Hermans

Following the 2015 South Australian AGM, Brock Hermans from the University of Adelaide gave a talk on "Inference for epidemics on networks". Brock is in his second year of a Masters of Philosophy at the University of Adelaide, working in Statistics and Applied Mathematics. His main interest is in solving stochastic systems using statistical methods.

The motivating question for many epidemiologists is: "At what rate do people become infected by a particular disease?". Brock introduced the links between epidemics and network theory, plus explained a method for applying the susceptible-infective-recovered (SIR) model that uses network theory. The SIR model assumes that an individual in a population is equally likely to have contact with everyone else in the population. However, by applying the SIR model to a network we can remove this assumption.

When simulating an epidemic using an Erdos-Renyi network, the edges of the network form a possible path of infection. Brock's work focuses on observing an outbreak of a disease on a network and trying to estimate the infection rate, ß, for that outbreak. He presented pictorial examples of three measures (the number of pairs, triples and triangles) that were used to represent how 'clustered' or 'connected' the network is. What separates Brock's approach from others is that he estimates an auxiliary value for the infection rate, and then adjusts this auxiliary value using the three network measures. The auxiliary estimate is the estimated value for ß, assuming that the outbreak came from the usual SIR model and not the SIR model on a network.

Estimating the infection rate requires the auxiliary estimate for ß, and then an adjustment to this estimate based on how the network varies (which depends on network properties' measures). Brock estimates the infection rate by simulating data, and then uses a linear model that regresses the true infection rate on the auxiliary estimate and network measures. He discussed two approaches for building the model used to estimate ß: one restricts the size of ß and the other simulates values and then only retains entries that give a large enough final epidemic size.

In concluding his talk, Brock noted his work so far had formed a linear model that estimates the rate of infection on an Erdos-Renyi network. By looking at the box-plots of the raw prediction error he was able to get an idea of where the model under or over estimates that value of ß. His best model to date gives quite good accuracy, with larger errors when there were large values of ß. Brock believes these large errors to be an identifiability issue, rather than an error in the approach. Future work includes looking not just at the final epidemic size, but also at the number of people infected day-by-day (discrete time data).

The talk generated questions related to the extension to non-linear models, how it would apply to the Ebola virus, the use of more complex shapes, and the simulation time in RCPP software.

Paul Sutcliffe

A day without randomisation is a day without progress

It was a pleasure to hear Professor Ben Mol talk to the SA Branch of the society in late April. Prof. Mol is a distinguished professor of Obstetrics and Gynaecology at the University of Adelaide, where he is focused on the stimulation and innovation of multi-centric evaluative research in Obstetrics, Gynaecology and Reproductive medicine. He challenged conventional thinking and engaged the audience throughout the talk, encouraging a lively discussion.

Prof. Mol began by highlighting the environment in which clinicians in his area currently work. Of all major interventions about one third are known or likely to be beneficial, but about one half are of unknown effectiveness. Just as everywhere in the world, around 50% of our $5 billion health care budget facilitates the delivery of medical interventions that we cannot say with empirical certainty will make us healthier. Given this, his overarching theme addressed the issue of how medical knowledge could advance at a faster rate.

In many countries, including Australia, ongoing evaluation of the effectiveness of interventions is now prioritised within health systems themselves, rather than being dependent on externally funded research. With a particular focus on the role of medical research today in the area of reproductive health, Professor Mol posed questions such as: "Do we need trials?" , and: "Should we take and act on secondary results that are seen to be positive?". These questions were counterbalanced by numerous examples where it was shown that commonly held beliefs were debunked only after rigorous, randomised clinical trials were conducted.

It was clear that the audience greatly appreciated the talk, which was presented in a context of candour and humility. Afterwards, a small group of people enjoyed a meal at a nearly restaurant.

Steve Quinn

Professor Ben Mol

VIC BRANCH

Recent advances in the area of Deep Learning for Big Data

On the 24th of March, the Victorian Branch of the Statistical Society of Australia held its Annual General Meeting at the University of Melbourne. Later that evening, close to 60 attendees crammed into the Evan Williams theatre to listen to Zhen He's seminar entitled: "Recent advances in the area of Deep Learning for Big Data". Zhen, an Associate Professor from the Department of Computer Science and Computer Engineering at La Trobe University, gave a very enlightening talk that was accessible to a mixed audience consisting mainly of SSA Vic members, and computer scientists from around Melbourne.


Zhen He

The main focus of the talk was on the use of neural networks for machine learning. Outstanding results have emerged in the last few years with respect to large scale machine learning, which has given rise to a neural network resurgence. Zhen began his talk by acknowledging "big-time" researchers. Their recent work has resulted in deep learning becoming not only one of the hottest fields going around, but also a field that is impacting industry in a big way. For example, Zhen highlighted that Facebook and Google are going head-to-head for supremacy in deep learning, with the latter last year acquiring the company DeepMind for more than half a billion dollars.

Zhen then clearly discussed complex deep learning neural networks, which can consist of many layers and potentially billions of parameters. The complexity of such systems can allow for accurate categorization of unlabeled data, provided that the system is adequately trained with labelled data. For example, in the area of image categorization in which an uncategorized picture (i.e. a picture that has not been labelled) is obtained, a trained neural network system will attempt to apply a category to the picture (e.g. car, motorbike, cat etc.). To do so, the neural network is first of all "trained" on existing labelled data, in this case pictures, where the training consists of fine tuning the parameters within the network such that the layers of neurons can successfully determine specific features of the image that will eventually lead to correct categorization. Recently, a data set consisting of 14 million labeled instances called Imagenet was collected. This allows models to be trained using an unprecedented number of labeled instances. As an example, Google used all of the Imagenet dataset and 2000 computers to tune 1 billion parameters for image recognition. The training process lasted one week. Zhen subsequently provided several examples for which the results from neural networks in machine learning have far surpassed previous state-of-the-art systems.

Zhen's talk convinced the audience that deep learning is not only a hot topic, but that continued improvements in methodologies will reap more benefits for years to come. Problems such as the lack of open source deep learning software, how best to train systems to construct more descriptive categorizations, and also the time required to process an over-abundance of data are at the forefront of challenges that lie ahead. One thing that was very clear by the conclusion of Zhen's talk is that there is an opportunity for computer scientists and statisticians to collaborate closely to develop new models for further improvements and to explore further unchartered applications.

At the conclusion of the seminar, many attendees joined us for dinner and Zhen was more than happy to continue discussions on deep learning, as well consider new collaborations. We would like to thank Zhen for his very entertaining seminar.

Luke Prendergast

WA BRANCH

Statistical consultancy and Surprises in high dimensions

The monthly seminar series of the WA Branch kicked off in March with a talk by outgoing WA Branch President, Anna Munday. Anna provided insight into the complexities of running a statistical consultancy, and the importance of effective management in ensuring the day-to-day and long term viability of a consultancy.

Using examples from her work at Data Analysis Australia, Anna discussed some of the challenges faced by statistical consultancies, including juggling multiple projects at one time, being forward looking in terms of securing additional project commitments, matching skill sets to particular projects, and providing high quality statistical analyses and reports under tight timelines. She also addressed some of the tradeoffs that may occur when taking a long term focus to a consultancy. For example, the ongoing professional development of staff in terms of their statistical and consulting skills is critical to the sustainability of a consultancy, and this will sometimes demand that staff be assigned to teams working on projects that require skills outside their areas of expertise. Although not optimal in the short term, such decisions are important in expanding skill sets, leading to more competent staff and an improved level of service in the long term.

The March meeting coincided with the WA Branch AGM, and a number of new committee members were elected, including incoming President Dr Alethea Rea. She will oversee a busy year for the WA Branch with a full slate of speakers and workshops, including the biennial WA Young Statisticians' Workshop and a workshop to be given by the 2015 Frank Hansford-Miller fellow. A workshop given by Steve Marron has already taken place in April.

Steve Marron is the Amos Hawley Distinguished Professor at the Department of Statistics and Operations Research at the University of North Carolina at Chapel Hill. He decided to use his recent stint as Saw Swee Hock Professor of Statistics at the National University of Singapore to visit some old friends and colleagues in Perth. During his visit in April, Steve gave a short course on "Big Data and Object Oriented Data Analysis" and also a talk on "Surprises in High Dimensions" at the Branch's regular monthly meeting.

The short course was well attended, and Steve gave an interesting series of talks in which he shared his ideas and experiences on object-oriented data analysis: the statistical analysis of populations of complex objects. One example was the population of curves (also known as functional data analysis), where standard Euclidean approaches such as principal components analysis have been used very successfully. Another example was the challenges in modern medical image analysis which motivate the statistical analysis of populations of more complex data objects (elements of mildly or strongly non-Euclidean spaces), such as spaces of tree-structured data objects. In addition, a major challenge in the world of Big Data that Steve identified and talked about is heterogeneity, often resulting from the aggregation of smaller data sets into larger ones. Such aggregation creates heterogeneity because different experimenters typically make different design choices. However, classical mixture estimation methods are usually useless in Big Data contexts because there are far too many parameters to efficiently estimate. Thus, there is a strong need for statistical procedures which are robust against mixture distributions without the need for explicit estimation. Some ideas in this important new direction were discussed.

Steve's talk on "Surprises in High Dimensions" at the Branch's regular meeting discussed some counter-intuitive results in high dimensional data analysis. Examples included the normal distribution, whose behaviour in high dimensions is quite different to what our intuition based on low-dimensional spaces in which densities and data clouds can be visualized, would make us believe. The consequences of these surprising behaviours were illustrated for analysis techniques such as principal components. More theoretically, Steve argued that the asymptotics of growing sample size are the foundation of classical mathematical statistics, but that modern big data challenges suggest consideration of growing dimension as well. A perhaps extreme case of this has fixed sample size and increasing dimensions, a scenario in which Steve is particularly interested, and which is seen to have some counter-intuitive mathematical structure. These non-standard ways of thinking about data are seen to be the key to understanding important aspects of real genomic data.

Ryan Admiraal and **Berwin Turlach**

STATISTICAL JOB BOARD NOW AVAILABLE!

Looking for a change? Create a Job Seeker account, upload your resume or simply create a job alert and let the job find you.

Not looking for a job but offering one? Simply create an Employer account and see where it will lead you!

Best of luck finding top talent…or that dream job!

http://careers.statsoc.org.au/home/index.cfm?site_id=18859 (Job Board)

FROM THE OFFICE

Marie-Louise Rankin

Since the last newsletter came out, the branches had their AGMs and branch councils have been reshuffled. Welcome to all new branch council members and welcome back to those brave ones who decided to continue in their office for another year, or who took on a different role in their branch council. If you need any assistance or the contact details of your counterparts in the other branches, just send me an email or give me a call.

Just recently I completed a one-day blogging course and I was pleased to discover that the platform used in the course was WordPress. When our instructor took us to the back-end of the demo website it looked very familiar, obviously because SSAI's website is on WordPress. We "learnt" how to add posts, but I felt quite clever, having been posting articles on the website for 18 months now. However, during the course I thought about the posts I had published and I was a bit puzzled as to why no one had ever commented on anything. When I checked our website later that evening, I discovered that the way it is set-up does not allow comments unless you are logged in as a member and on a forum page. I believe the site was designed like this because we knew at the time of implementation that SSAI does not have the staff to monitor comments, and we were worried about people using the website inappropriately.

Thanks to the course I learnt that comments can be managed quite easily. First of all, the page can be set so that I have to authorise people who comment for the first time, but after that initial interaction any new comments will appear on the page straight away. I can also choose not to display comments that contain a link, thus reducing the possibility of spammers using the comments area. And of course I can set up the page so that copies of any comments are sent to me by email, so if I see anything that shouldn't be there, I can take the appropriate action. Yes, I know, to many of you this is not exactly a news item, but for me this was a revelation! And so exciting! The first thing I did when I came back to the office on Monday morning was contact our website designers to ask them to make the comments area available when I add a post. This will allow members and non-members to start a discussion and make the website more interactive.

Speaking about new: You would have seen the poll about changing SSAI's name, either to a completely new one or simply by dropping the "I". Thank you to all those who participated. These days, when you are constantly asked to complete surveys, on anything from your last interaction with Telstra to doing something as mundane as buy a bottle of wine at your local bottle shop, it's very much appreciated that you gave up your time to give us your perspective.

The overwhelming majority of you opted for a change one way or another, and almost everyone was keen to see a new logo! So watch this space. It won't be long before SSAI will get a fresh new name and look. I'd like to give a special thanks to the member who suggested "StatVic": I dare say though that at this stage quite a large proportion of our members would not be too keen. We still need to know a bit more of what you would really like your association to be named, so expect another brief poll coming your way soon.

It won't be long before SSAI (or rather SSA? AuSA? Ozstats? These were just some of the suggestions made previously) will get a fresh new name and appearance. By the time the September issue of this newsletter comes along, who knows what our banner will look like!? Exciting times indeed!

Marie-Louise Rankin
Executive Officer