Australasian Region

IBS-AR

Newsletter

**Issue 22
March 2018**

President's Corner

Every sample from a non-trivial univariate distribution has a smallest and largest number as well as the many numerical characteristics that we are all familiar with. Rather than overly focussing on extremes and single observations, statisticians know that changing the distribution has the potential to change properties of the sample by magnitudes more than by merely resampling from the old distribution.

This is exactly what we do in our region. Over the turn of the year, a working party was formed to come up with a communication and implementation strategy to achieve a zero tolerance towards harassment culture. There will always be best and worst behaviour but its range does matter! You will find an official first statement in this newsletter that was also circulated by email to all members and posted on the ANZStat mailing list.

Fortunately the positive is abundant. We had a very successful 2017 Biometrics by the Border conference, excellently organised by Alison, Bethany, Clayton, Melissa and Ross who were ably assisted by Regional Council and other members. The program was diverse and of high quality - a special thanks goes to James Curran, the Chair of the Scientific Committee, and to Garth Tarr who supported James.

The conference in Kingscliff was well attended and the many celebrated the success of women, young statisticians and the achievements of individuals. I congratulate Warren Mueller and Alan Welsh for having received the E.A. (Alf) Cornish award as well as Marcela Cespedes (Best Poster – AgResearch People's Choice), Bethany Macdonald (Best Poster - GRDC's Choice), Kevin Wang (Best Student Presentation) and Michelle Trevenen (Best Student Presentation - Runner Up).

I welcome Ian Renner as the inaugural Membership Officer and I am thankful to Alan Welsh for having accepted the nomination then

election as President-elect and to all other office holders who were re-elected in their various roles.

The next biennial regional biometrics conference will be organized under the coordination of Olena Kravchuk. South Australia is calling in 2019.

S. Müller

Samuel Mueller (samuel.mueller@sydney.edu.au)

Harassment Statement

The Regional Council of the Australasian Region of the International Biometrics Society takes very seriously any reports of inappropriate behaviour towards our colleagues. We strive for a society where all members are treated equally and with respect and have been deeply affected and disheartened to read about ongoing problems in our field. We are working with the other statistical organisations in Australasia – the New Zealand Statistical Association and the Statistical Society of Australia - to develop appropriate approaches to this serious issue, which may result in having joint elements as well as individualised strategies and best future practices for each society.

Australasian Regional Council

President	Samuel Mueller (University of Sydney)
President-Elect	Alan Welsh (The Australian National University)
Past-President	Ross Darnell (CSIRO)
Secretary	David Baird (VSN NZ)
Treasurer	Warren Müller (Retired)
Membership Officer	Ian Renner (University of Newcastle)
Newsletter Correspondent	Vanessa Cave (AgResearch)
Regional Website Manager	Hans Hockey (Biometrics Matters)
IBS President	Louise Ryan (University of Technology Sydney)
IBS Executive Board	Brian Cullis (University of Wollongong)
IBS Representative Council	Alison Kelly (Queensland Dept. of Ag. & Fish.)
	Kevin Murray (University of Western Australia)
	Ross Darnell (CSIRO)

www.BiometricSociety.org.au

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Facebook group: IBS-AR

E.A. (Alf) Cornish Award

The E.A. (Alf) Cornish award is conferred in recognition of a member's "long-time" service to the Biometric Society and to the advancement of biometry. The two 2017 awardees, Alan Welsh and Warren Müller, were announced at the regional conference (Biometrics by the Border). Congratulations!

Alan Welsh

Citation for Alan Welsh written by Warren Müller and Samuel Mueller.

Alan H. Welsh, E.J. Hannan Professor of Statistics at the ANU, received the 2017 E.A. Cornish award for i) his outstanding, extensive and longtime support of the Australasian Region of the International Biometric Society and international representative for the region, his leadership in other societies to biometry; ii) his fundamental contributions to statistical methodology and theory, advancing the field of biometry; in particular, in robustness and model selection in linear models, robustness and bootstrapping in linear mixed models, semiparametric estimation, modelling zero-inflated data, modelling compositional data and the analysis of data from sample surveys; iii) for his continued and extensive mentoring of junior faculty in biometrics; and for his outstanding work as a teacher and scholar.

Alan is also a wonderful mentor, colleague and friend, to the nominator and numerous junior academics and biometricians outside academia. He excels as a teacher and scholar evidenced in his many accolades received such as the Pitman Medal (2012) of the Statistical Society of Australia Inc. for "outstanding achievement in, and contribution to, the discipline of Statistics" or in his many quality publications totalling more than 5400 citations.

Alan's contributions to the International Biometrics Society are extensive indeed and include eight years as Associate Editor for Biometrics (from 1993 to 2010), more than ten years as Member of Council and then later elected member of the Executive Council (2006 - 2016) and outstanding and longtime organization of four regional conferences. He will continue to serve the society, as President-elect of the Australasian Region in 2018 and then as its President (2019-2020).

E.A. Cornish award recipients, Warren Müller (left) and Alan Welsh (right) pictured with the President of the Australasian Region, Samuel Mueller (centre).

Warren Müller

Citation for Warren Müller written by David Baird and Ken Russell.

Warren Müller's award recognises his dedicated service to the Australasian Region of the International Biometric Society as Treasurer for the last 18 years (a role which is still ongoing).

Warren agreed to take on the role of Treasurer at the 1999 Annual Meeting in Hobart. We didn't realise how fortunate we were. Eighteen years later, Warren is still Treasurer and his contribution to the local region has been outstanding. Not only has he kept our finances and records in top shape, but he has done many other things for the Region. Warren's work is always meticulous, and he has an excellent memory for all the rules and systems used by the society. He is always approachable, pleasant and helpful in all his dealings with members.

Warren takes care of all the membership details and payments, following up members for overdue payments and keeping email addresses current, and issuing receipts. He deals with the Society's head office in Washington whenever journals go missing or records need fixing. He organised the registration of the Region as a company and obtained an Australian Business Number for us. He is involved with the selection and payment for student and conference awards. He plays a very active role in the organisation and finances of the Regional conferences, nine during his tenure, keeping track of registrations, taking all payments, returning receipts and producing a financial report for each of these. He has also been involved in the background work for arranging IBS-AR to be an incorporated body, to limit the financial liability of the committee and members. Council members will attest he provides calm, measured and wise counsel on many matters - too many to count. When Warren finally retires, the IBS-AR committee has recognised that the role Warren has filled over the last 18 years will probably take two people to handle in future. (Ian Renner was elected as Assistant Treasurer at the 2017 Annual Meeting in Kingscliff.)

He is a prolific author/co-author with over 130 articles, covering a wide range of applied sciences from ecology, plant biology, animal science, horticulture, agricultural research, soil research, tree physiology, marine biology, epidemiology, wildlife research, cell biology, botany and food chemistry. Despite the extra work he has to do around conferences, Warren has also spoken at most of the IBS-AR conferences over the last 30 years on the practical applications of biometrics to a wide range of applied sciences.

When the idea of nominating Warren was first floated, Samuel Mueller summed it up very well: "*Warren is more than just a treasurer, he's a treasure to our region!*" Warren is a most deserving recipient of the E.A. ("Alf") Cornish award.

Biometrics by the Border: Conference Report

Kevin Wang (University of Sydney)
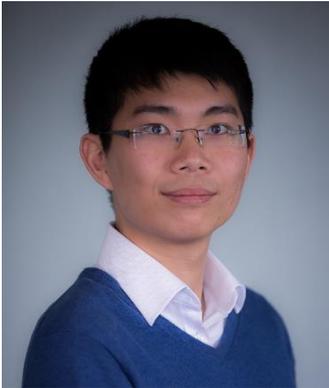
In Nov 2017 I was fortunate enough to attend the International Biometrics Society Australasian Region conference in Kingscliff, New South Wales, Australia. Kingscliff is a seaside town near the border of NSW and Queensland. About 200 delegates from the Region gathered at this beautiful location for this conference.

The welcome reception was held on the Sunday at a nearby resort. There was a real sense of community as many delegates already knew each other and were greeting each other as old friends. This made it a very enjoyable atmosphere on the night. This gave the attendees a chance to meet other fellow researchers and plan out their activities for the next few days.

On the Monday morning, the conference was officially opened by the IBS-AR President, Prof Samuel Mueller and a welcome to the country by a representative from the local Indigenous people. The academic program was well-planned and covered many topics in biometrics research, ranging from methodological developments to applied data analytics. The keynote speech by Prof Jean Yang was very informative and it was inspiring to see how different pieces of her research were connected together towards the goal of developing personalization of treatments in complex diseases. The poster session at the conference was particularly nice as it was held in the open garden, giving the attendees a chance to catch the afternoon sunshine and breeze after a long day of conference talks.

Tuesday afternoon was the social activity day and most people from my research group chose the Byron Bay excursion. Our initial plan was to make a short trip to the iconic Byron Bay lighthouse and enjoy a cold beer before heading back. However, we severely overestimated our ability to climb the hills and we were left beer-less on the trip back. Any disappointment was quickly solved by the Young Statistician Dinner that night. The dinner was great because it gathered all the early career researchers together in a relaxed environment so we could all introduce ourselves to each other and discuss our research.

My talk was the last talk before lunch on Wednesday. In my talk, I described the challenges in exhaustive variable selection for Generalised Linear Model (GLM) and how that may be reduced into a simpler problem in terms of a linear model. By utilizing fast computational algorithms, the variable selection results from the linear model could be used to approximate that of the original GLM problem. This method is particularly useful because it pushes the capability of variable selection for GLMs to a scale that is equal to that of linear models while maintaining an approximated exhaustive search. I managed to get a few chuckles at some of my jokes along the way, which was very calming for my nerves. After the talk, I

gathered some useful feedback from people in the audience and my supervisors, which will be valuable for me to turn this work into a publication.

The best event in the conference was perhaps the conference dinner. It was set in a restaurant surrounded by hills. While the food was locally sourced and excellent in quality, the highlight of the day was when most people got onto the dance floor. It was breathtaking to see so many professors performing Brownian motion to the tunes of 90s music.

In the closing day of the conference, unexpectedly, I was awarded the best student talk. It was an honour for me to receive this award, particularly given the high standard of talks delivered by other students. I'd like to thank IBS-AR for this award and giving me a chance to present my research and meet other excellent researchers in the Region. I'm hopeful that the connections I made will lead to fruitful collaboration in the future!

Best Student Presentation

Winner: Kevin Wang (right) from the University of Sydney.

Runner-up: Michelle Trevenen (right) from the University of Western Australia.

Conference photos are available here:
https://www.flickr.com/photos/australasian-biometrics/albums

Member Profiles

Thank you to Esther Meenken and Ian Renner for kindly agreeing to provide profiles. We invite our mid-career members (i.e. members approximately 5 to 15 years into their professional career) to provide a profile for inclusion in a future newsletter. Please email the editor (Vanessa.Cave@agresearch.co.nz) for more information.

Esther Meenken

AgResearch Ltd, Lincoln Research Centre.

When and why did you join IBS? I joined originally around 2005 because I was working on a casual contract at what is now Agriculture Victoria, so IBS-AR was the obvious choice for a professional society.

What biometrics related work do you do? A research thread for me over the years has been a focus on quantification of uncertainty in deterministic computer simulation models. Consulting-wise I have had a heavy focus in the areas of soils and agronomy, with experimental design and structured data being a big part of my day to day activities. More recently I have also started to work in animal breeding applications, and as part of that I sit on an Animal Ethics Committee that covers much of the animal research in the South Island of New Zealand.

What other research interests do you have? Digital Agriculture is a topic that I am keenly interested in at the moment. As more reliable and fit-for-purpose technologies come on line, more voluminous and diverse data are being generated and the benefits for the arable and pastoral sectors range from improved productivity and efficiency, to enhanced environmental outcomes. The data literacy of users of these technologies must correspondingly increase, and the role of statisticians may therefore be not just in the research and application areas of visualisation, management and analysis of large and disparate data sets, but also in training and support (whether directly or indirectly) of industry and farmer groups.

What is your most memorable conference moment? Ha, ha there have been many memorable moments! I love going to IBS conferences because it is so comfortable and easy, it's always in a beautiful location and the food is always great! But I probably remember my first conference in Thredbo in 2005 the most clearly – it was a terrifying experience since a) it was my first conference, b) I was the first contributed speaker of the whole conference, and c) it was my first face-to-face meeting/interview with Crop and Food Research Biometricians. Happily, I got the job and worked there, later Plant and Food Research, for 12 years.

Where do you see IBS-AR as a professional organisation in 10 years from now?
IBS-AR is an excellent professional society for agricultural statisticians and biometricians. I think over the next 10 years there is a huge amount of potential to really grow as a society, and to pull in data science practitioners from a range of backgrounds.

Ian Renner
University of Newcastle
IBS-AR Assistant Treasurer

When and why did you join IBS? I joined IBS as a PhD student in 2011 ahead of the IBS-AR conference in Kiama, as my research made me a natural fit for the biometrics community. At the conference, I was pleased to discover what a vibrant, diverse, and friendly community IBS-AR is and knew I would keep my membership well beyond my time as a PhD student. My subsequent experiences with IBS-AR have only strengthened my appreciation.

What biometrics related work do you do? As an ecological statistician, I develop species distribution modelling techniques, in which available data on species presence are related to the environment to come up with predictions of species distributions that are useful for understanding the biological needs of the species and can inform conservation strategies. I maintain a package on R called `ppmlasso` in which users can fit point process models using presence-only data on species occurrences with LASSO-type penalties to boost predictive performance. My current research aims are to extend these tools to contexts where multiple sources of species data are available.

What other research interests do you have? My other research interests include model selection techniques, mixture models, and sports statistics.

What is your most memorable conference moment? It is difficult to limit it to one, as I have enjoyed each of the past four conferences. My favourite talk has probably been Alan Welsh's invited talk about mixture models in Mandurah, from which I took many lessons in how to deliver a technical talk in a manner which was still highly accessible, but it is some feat to limit it this way given the breadth and quality of talks which define these conferences. The atmosphere of each conference has been memorable, including both planned excursions such as kayaking in Hobart, in which Daniel Fernandez and I watched in amazement as the other kayakers were able to follow the guides while we were helplessly kayaking out to sea, and impromptu excursions for dancing and karaoke. All in all, the IBS-AR conferences are always one of the highlights of the year.

Where do you see IBS-AR as a professional organisation in 10 years from now?
Given the explosion of data and the need for robust analysis in the face of great challenges in health and environment, I see the need for biometrics growing greater by the day, and in turn, I see the role of IBS-AR as the flagship organisation to steer innovation and necessary action in this fields throughout the Australasian region. As we grow in number and expertise, I also see the IBS-AR building upon its strong cultural foundation to become an exemplary organisation in terms of collegiality and respect.

Recent Papers

The International Biometrics Society publishes two journals, Biometrics, and, jointly with the American Statistical Association, the Journal of Agricultural, Biological, and Environmental Statistics. Papers recently published by our members in these journals include:

Journal of Agricultural, Biological, and Environmental Statistics

December 2017, Volume 22, Issue 4

Jenni Niku, David I. Warton, Francis K.C. Hui, and Sara Taskinen. Generalized Linear Latent Variable Models for Multivariate Count and Biomass Data in Ecology.

Graham Hepworth and Brad J. Biggerstaff. Bias Correction in Estimating Proportions by Pooled Testing.

To submit a manuscript visit: http://www.editorialmanager.com/jabe/

Biometrics

September 2017, Volume 73, Issue 3

Louise F. McMillan and Rachel M. Fewster. Visualizations for Genetic Assignment Analyses using the Saddlepoint Approximation Method.

To submit a manuscript visit: http://www.biometrics.tibs.org/

If your paper has been inadvertently omitted from this list, please email the editor (Vanessa.Cave@agresearch.co.nz) so that it can be included in the next edition.

Software Corner

emmeans: estimated marginal means in R

Garth Tarr
School of Mathematics and Statistics, University of Sydney

One of my favourite R packages of the last couple of years was the `lsmeans` package which enabled users to easily obtain least-squares means for many linear, generalized linear, and mixed models as well as compute contrasts or linear functions of least-squares means, and comparisons of slopes. The language around `lsmeans` was largely driven by the SAS equivalent procedures.

A new package has been created, `emmeans`, which continues the great work of `lsmeans`. This transition is similar to how the `ggplot` package was replaced by the `ggplot2` package. The first version of the package was good, but along the way the authors realise there are better ways to implement certain functionality and it ends up being easier to transition to a new package rather than make many changes to an existing package. So if you've been using `lsmeans`, now's a good time to switch. If you haven't been using `lsmeans`, I'll give a quick overview of why `emmeans` is a great package to add to your R toolkit.

The [emmeans package](#) has a variety of vignettes that provide a comprehensive overview of how to perform a number of common tasks. In the analysis below, I've borrowed heavily from these resources.

The pigs data set, which is provided with the `emmeans` package, is a two-factor experiment, where the dependent variable is `conc`, the concentration of free plasma leucine, and the explanatory variables are `source`, the source of protein (fish meal, soybean meal or dried skim milk), and `percent`, the protein percentage in the diet (9%, 12%, 15% or 18%).

```
library(emmeans)
pigs.lm1 <- lm(log(conc) ~ source + factor(percent), data = pigs)
```

We can obtain estimated marginal means (aka least square means or adjusted means) using

```
emm1 = emmeans(pigs.lm1, specs = "percent")
emm1

## percent  emmean          SE df lower.CL upper.CL
##       9 3.445307 0.04088810 23 3.360723 3.529890
##      12 3.624861 0.03837600 23 3.545475 3.704248
##      15 3.662706 0.04372996 23 3.572244 3.753168
##      18 3.745156 0.05296030 23 3.635599 3.854713
```

```
## 
## Results are averaged over the levels of: source
## Results are given on the log (not the response) scale.
## Confidence level used: 0.95
```

It is also trivial to visualise these EMMs. One big change in the move from `lsmeans` to `emmeans` is that the default plotting engine is now `ggplot2` though you can recover your lattice plots if desired. Using the `ggplot2` engine enables us to easily customise the plots produced.

```
library(ggplot2)
plot(emm1) + theme_bw() +
  labs(x = "Estimated marginal mean (log conc)", y = "Protein %")
```
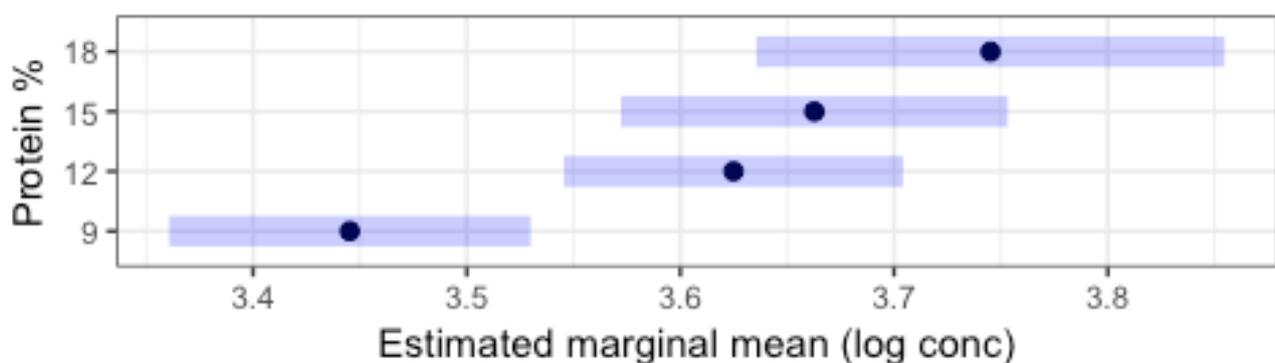

The `emmeans` package also generates interaction plots. It is important to note that these are interaction plots from the **model**, not interaction plots of the **data**. We haven't allowed for an interaction between `source` and `percent` in `pigs.lm1` so no interaction can be seen in the interaction plot below.

```
emmip(pigs.lm1, source ~ percent) + theme_bw()
```
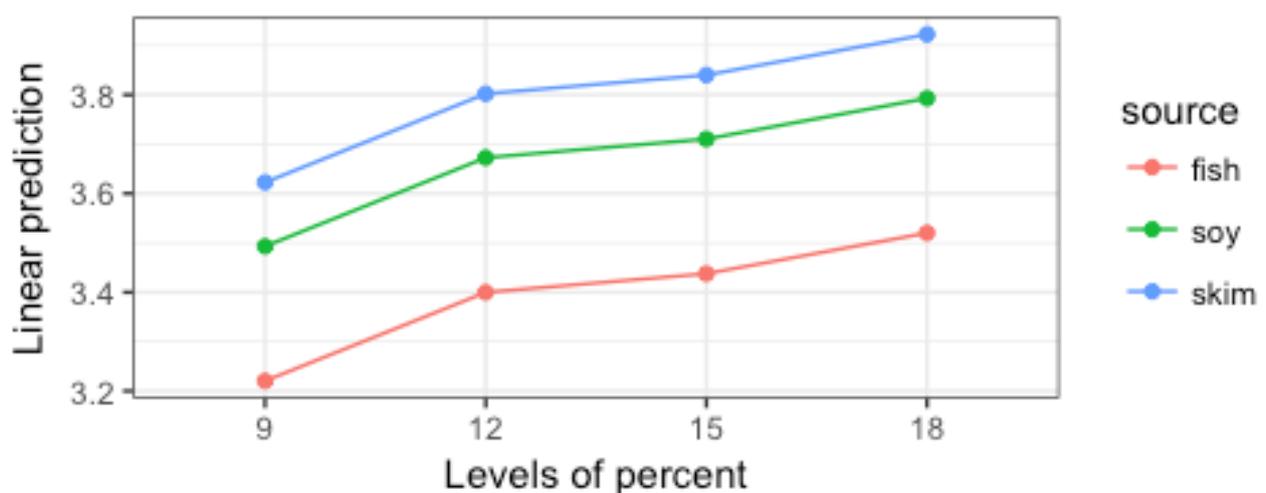

The data can be added to the plot by additional `ggplot2` layers.

```
emmip(pigs.lm1, ~ percent | source, CIs = TRUE) +
  geom_point(aes(x = factor(percent), y = log(conc)),
             data = pigs, pch = 2, color = "blue") +
  theme_bw()
```
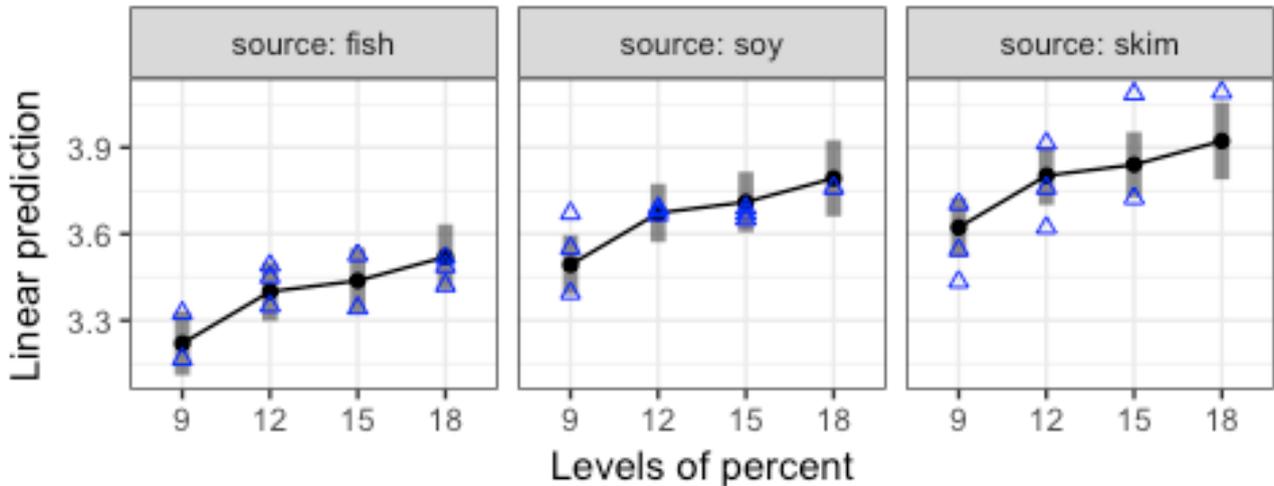

The `emmeans` package also makes it easy to calculate and visualise pairwise comparisons and compact letter displays (`cld`). In the plot below, the blue bars are confidence intervals for the EMMs, and the red arrows are for the comparisons among them. If an arrow from one mean overlaps an arrow from another group, the difference is not significant.

```
emm2 = emmeans(pigs.lm1, specs = "source")
plot(emm2, comparisons = TRUE) + theme_bw() +
  labs(y = "", x = "Estimated marginal mean (log conc)")
```
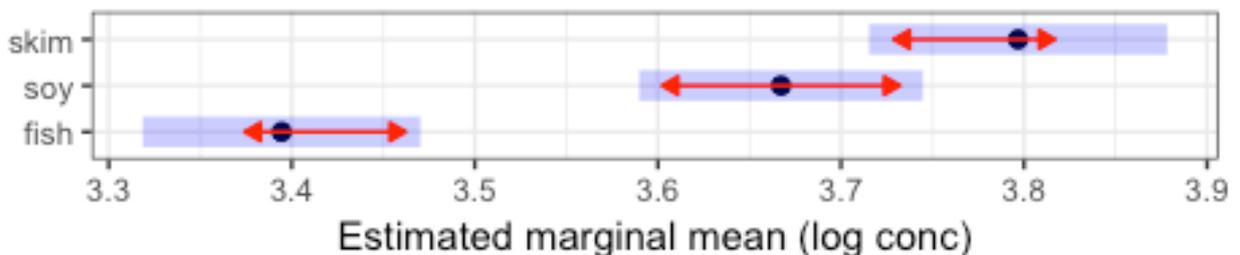

We can formalise the plot using the `pairs()` function. In the plot above, the soy and skim arrows *just* overlap, which is reflected in the soy - skim comparison adjusted p-value being *just* greater than 0.05.

```
pairs2 = pairs(emm2)
pairs2

##  contrast       estimate         SE df t.ratio p.value
##  fish - soy   -0.2727678 0.05293450 23  -5.153  0.0001
##  fish - skim  -0.4022777 0.05415929 23  -7.428  <.0001
##  soy - skim   -0.1295098 0.05304280 23  -2.442  0.0570
##
```

```
## Results are averaged over the levels of: percent
## Results are given on the log (not the response) scale.
## P value adjustment: tukey method for comparing a family of 3 estimates
```

```
plot(pairs2) + theme_bw() +
  labs(y="", x = "Estimated mean difference")
```
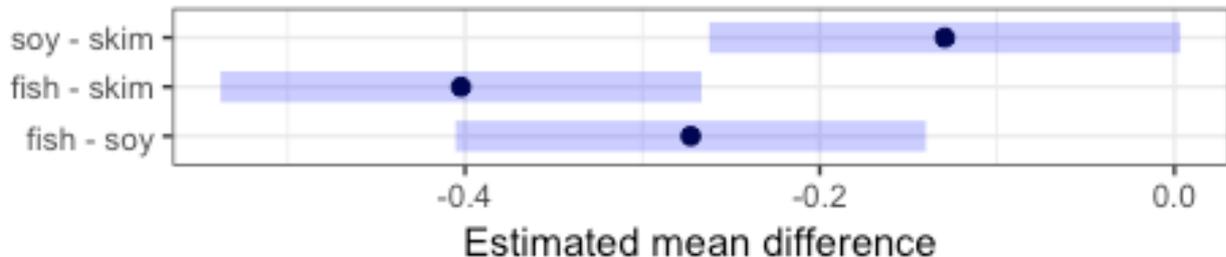

Another way to depict the comparisons is by compact letter displays, where we have the group column at the end.

```
cld(emm2)
```

```
##  source    emmean          SE df lower.CL upper.CL .group
##  fish    3.394492 0.03668122 23 3.318612 3.470373    1
##  soy     3.667260 0.03744798 23 3.589793 3.744727    2
##  skim    3.796770 0.03938283 23 3.715300 3.878240    2
##
## Results are averaged over the levels of: percent
## Results are given on the log (not the response) scale.
## Confidence level used: 0.95
## P value adjustment: tukey method for comparing a family of 3 estimates
## significance level used: alpha = 0.05
```

We've only scratched the surface of what can be achieved with the emmeans package. It supports a huge range of fitted models (including mixed models) from many popular packages. It's worth spending a bit of time looking through the vignettes to see if you can easily integrate the package into your analysis workflow.

Membership News

John Koolaard
19 July 1965 - 11 January 2018

It was with great sadness that we said goodbye to a valued friend, colleague and statistician who died after a battle with cancer. John began his statistics career at Massey University, and was awarded his PhD in 1997 with a thesis entitled "Regularised discriminant analysis".

In 1996 he began working at Crop & Food before moving to AgResearch in 2005, based at Grasslands campus in Palmerston North. In 2007, he become the Team leader for the statistics team based at Grasslands, and continued in this role until taking sick leave at the end of 2016. During his time on sick leave he remained part of the team, attending team meetings and supporting others around him.

As colleagues we will remember John as a calm, cheerful, honest and very friendly person. He was a great team leader, involving the Grassland team members in various discussions as often as he could. These included discussions on how best to analyse certain data that came our way and of course discussions on various management issues such as budgeting, conference attendance, project handling, AgResearch leadership and how to handle "challenging clients". John was an excellent statistician with a wide range of capabilities. Most of all, he was someone who simply got on with work but with care and patience.

The scientists that John worked with all have positive words to say about him, describing him as a really nice guy who was enjoyable to work with, acting with humour and empathy. They also describe him as an expert in his professional field and a "patient champion of statistics" who was forever helpful and insightful.

John joined the Australasian Region of the Biometrics Society in 2000, and was a strong supporter of the regional and international conferences.

John was always open about his Christian beliefs and allowed them to guide his character. It is this faith that gave him and his family strength and resolve in his final days. May he rest in peace in Heaven.

Membership Milestones

Congratulations to the following members who've celebrated membership anniversary milestones*:

≥40 years
Brian Cullis, Allan Lisle, John Reynolds, and Kenneth Russell

Special congratulations to Jeff Wood, who's celebrating 50 years of membership.

25 years
Philip McCloud, and Alan Welsh

10 years
Caro-Anne Badcock, Karyn Reeves, and Hideyasu Shimadzu

Welcome to our new members: Niranjan Adhikari (RMIT University), Joshua Joannes Bon (University of Western Australia), Lauren Borg (University of Wollongong), Joanne De Faveri (Queensland Department of Agriculture and Fisheries), Christopher De Ieso (University of Adelaide), Daniel Gerhard (University of Canterbury), Emy Guibault (University of Newcastle), Gunter Hartel (QIMR Berghofer), Md Hamidul Huque (Murdoch Childrens Research Institute), Hon Hwang (University of Technology Sydney), Petra Kuhnert (CSIRO), Alastair Lamont (University of Otago), Wendy (Yiwen) Li (University of Adelaide), Esther Meenken (AgResearch Limited), Kenyon Ng (University of Western Australia), Ellis Patrick (University of Sydney), Erin Peterson (Queensland University of Technology), Nishika Ranathunga (La Trobe University), Alethea Mary Rea (University of Western Australia), Evelyn Tay (University of Western Australia), Russell Thomson (Western Sydney University), Daniel Tolhurst (University of Wollongong), Thi Huong Trinh (Toulouse School of Economics), and Yu Yang (University of Otago).

* If your membership milestone has been overlooked, please contact the Membership Officer (ian.renner@newcastle.edu.au) to have the membership records corrected.

Membership as of 12 March:

Life Member	2
Regular Member	188
Senior Retiree	17
Student Member	27
Supporting Member	9
	243

Jeff Wood speaking at the 2015 IBS-AR conference in Hobart. This year, Jeff celebrates 50 years of membership.

Australasian Applied Statistics Conference 2018

Rotorua, New Zealand

Monday 3rd December - Friday 7th December

Millennium Hotel

Join us for the Australasian Applied Statistics Conference and Pre-Conference Workshops. Invited speakers include: Salvador Gezan (University of Florida), Roger Payne (VSN International), Chris Auld (Microsoft) and Alison Smith (University of Wollongong). More information will be available soon!

Chairperson: David Baird (david@vsn.co.nz)
Treasurer: Chris Triggs (triggs@stat.auckland.ac.nz)
Secretary: Vanessa Cave (vanessa.cave@agresearch.co.nz)

http://2018.biometricconferenceorg/

XXIXᵗʰ INTERNATIONAL BIOMETRIC CONFERENCE

Barcelona International Convention Centre, Barcelona, Spain, 8-13 July 2018

www.BiometricSociety.org.au

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