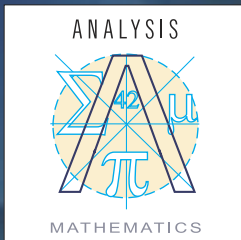


# DATA ANALYSIS AUSTRALIA

## MARCH NEWSLETTER 2011



The theme of this issue is based on Data Analysis Australia's experience in the statistical aspects of weather. At a time when Australians are aware of the extreme visible consequences of the weather, Data Analysis Australia has worked on some critical but less visible consequences, such as the demands on energy systems. This has provided unique insights into how the weather affects our daily life.

**Dr John Henstridge**  
Managing Director

### How Extreme is Extreme?

The recent floods in Eastern Australia have been described as "once in a lifetime" events. Cyclone Yasi was the "largest ever". They have certainly been events that no-one would want to experience more than once. In their aftermath, there have been demands for action to better plan for such events.

Less devastating but more common problems of an extreme nature also need to be planned for. For example, a key question when planning electricity generation capacity is, what might be the highest electricity demand next summer, or in the next 20 or 30 summers? As with floods, it is important to understand the possible extremes so that there is only a low chance that electricity supply cannot meet demand.

Similarly engineers designing offshore facilities need to plan for the largest wave likely to occur. But how do you plan for an event that has not been observed before?

Questions about extreme values are inherently statistical – they ask, what is the probability that a certain level will be exceeded? The answers are often in the form of rates. Hence the

talk of the "one hundred year flood", meaning that there is a probability of 1% of a flood occurring in any given year. Estimating such probabilities is critical in planning since there is often a trade off between the extra cost of building infrastructure to cope with such an event and the cost of rebuilding after such an event. A proper understanding of the risks is essential for good planning.

These questions are different from many in statistics that are concerned with averages and what is most likely to occur. (If you are coping with a cyclone, it is of no comfort to know what the average wind is, or being told that the weather is usually calm.) These different questions require



Queensland floods 2011

different statistical tools. Fortunately this has been an active area of study - theory and practical - for statisticians over the past fifty years.

A particularly exciting development of recent years has been the combining of extreme value theory applied to data such as weather records with large numerical models of the consequences of such weather. Classic studies of this type involve modelling floods, where detailed numerical models of water flow, taking into account the topography of the land, can give an estimate of exactly what flood might be expected at any location in a flood plain. These models are critical in Australia – while we have a dry climate, it is also a climate of extreme events. Floods occur more often than most people are conscious of. Everyone is aware of the Brisbane River floods, but floods in Perth, in 1872 and 1926, devastated a city more known for its dryness rather than its rain.

Data Analysis Australia statisticians have applied extreme value methods to a variety of problems from environmental to financial, most recently understanding maximum likely demands for electricity. Today, peak electricity demand is strongly driven by air conditioning and hence there is a need to understand the extremes in weather – temperature and humidity – and the link between such weather and electricity use. These models have helped clients lower costs and ensure more reliable systems.



Fremantle bridge 1926

For further information contact **John Henstridge**.

## Weather Statistics: Are Averages Useful?

On 1st December 2010, the ABC reported that, according to the Bureau Of Meteorology (BOM), Australia had a bumper spring for rainfall, 160mm on average across the land - about 100mm more than last year. Fantastic news...so why is not everyone happy about this? The BOM report also included a statement that the South West of Western Australia not only had its warmest spring on record but also its driest year on record. So what information, if any, is the average rainfall for Australia giving us? In fact, it appears that the average rainfall data masks more important and interesting information. This article puts forward a discussion using the spring rainfall averages and possible ways that rainfall data can be calculated to be more meaningful. See: [www.daa.com.au/analytical-ideas/weather-statistics/](http://www.daa.com.au/analytical-ideas/weather-statistics/)

## Industry Workshops

As part of its ongoing commitment to professional development and keeping up with, and contributing to, industry best practice, Data Analysis Australia consultants are booked into two industry workshops taking place later this month.

In the first of these, **Anna Munday** and **John Henstridge** will be attending a workshop on the impact of “**Mobile Phone Only**” households on telephone surveys. As it is estimated that between 10% and 13% of adults are not contactable via traditional methods which are limited to landline telephone connections, the workshop aims to investigate this effect on survey sampling and methodology as well as developing best practice to ensure that telephone survey estimates are as representative as possible. This workshop is being run by the Institute for Social Science Research (ISSR) and the Social Research Centre.

In the second of these, **Anna Munday** and **Prudence Thompson** will be heading off to Sydney to attend a two day course in “**Designing Environmental Studies**”. Hosted by the Centre for Statistical and Survey Methodology, University of Wollongong, the course has a focus on practical design and sampling issues for observational studies in the environmental and ecological fields.

## SSAI Committee News

On 8th March, **Prudence Thompson** was elected to the position of Treasurer in the Western Australian Branch of the Statistical Society of WA. Congratulations Prudence!

## Classic Quote

“... statistical techniques are tools of thought, and not substitutes for thought.”

**Abraham Kaplan, The conduct of Inquiry 1964.**

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## Staff Profile - Yuichi Yano

Yuichi joined Data Analysis Australia in February 2010 after completing a Master's degree in Mathematics and Planning at Edith Cowan University, where he gained experience in applying statistical and mathematical models to environmental and health data.

As is the nature of working at Data Analysis Australia, Yuichi was introduced into an array of different projects broadening his knowledge and experience. This included fitting statistical models for ore breakage in the mining sector, using weather correction models on monthly sales of electricity consumption data and analysing customer satisfaction surveys.



In his spare time, Yuichi enjoys listening and playing music with either his acoustic or electric guitar, and also enjoys being outdoors practising his skills in photography.

## It's a Boy!

Data Analysis Australia has continued its joyous run of bouncing baby boys, with the arrival of **Linda Eaton** and her partner Peter's new addition, Lewis. Congratulations to Linda and Peter! We are happy to hear they are doing well, and wish them all the best at this special time.

## Mathematics in the News

Perth and the University of Western Australia recently hosted a major mathematical event, the annual meeting of the Executive Committee of the **International Mathematical Union (IMU)**, the international organisation for mathematics. Organised around the meeting was a two day MathWest workshop of thought-provoking lectures and forums from the IMU Executive and an industry breakfast addressed by Professor Martin Grötschel of the Technical University of Berlin on Production Factor Mathematics, the application of optimisation methods in industry. Martin pointed out that the mathematics that sped up algorithms had actually contributed more to the solution of these problems than increases in computer speed – brains are more important than brawn. The local host for these events was **Professor Cheryl Praeger**, a director of Data Analysis Australia.

