

# NEWSLETTER

DECEMBER 2007

*Australia has just experienced a deluge of polls and statistics associated with the Federal Election. Some predictions were good, many were poor. As professionals in good data collection, Data Analysis Australia reflects on what has happened.*

*Dr John Henstridge  
Managing Director*

## Statistics In Space

Almost every measurement has a "where" attached to it. The Census collects data from households, the where being the household address, environmental samples are collected from a specific site and geological samples taken from a drill hole have a position in three dimensions.

To a statistician these spatial aspects can be critical, not only in understanding the data, but to collecting good data in the first place. The obvious reason is that the positions themselves may be of interest. For example, if monitoring for pollution the spatial element is critical when relating back to potential sources. A less obvious reason is that samples close together in space are likely to be similar to each other, affecting the information content and what inferences can be made. This means that even something as ordinary as a political poll can be made more efficient if spatial relationships are considered.

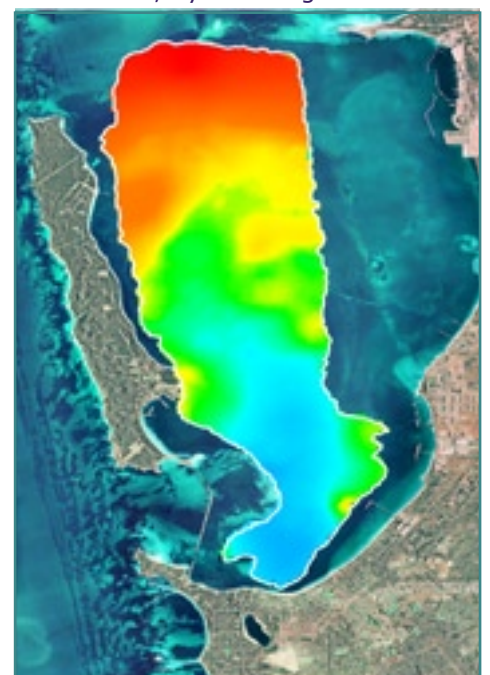
Telephone surveys often use a randomly selected sample from a listing of telephone numbers in the area of interest (often an electorate or suburb) with no further consideration of the spatial aspect of the sample. However, people who live close to each other will face the same local issues and are likely to provide similar responses. People who live further apart will face different issues and therefore provide different information. For example, if you ask three people in the same street about the state of footpaths, you are likely to get three similar answers and asking a fourth person from that street is unlikely to provide new information. If you instead ask a fourth person from several streets away, you may get a very different answer – which provides you with information on the variation within that suburb. In a statistical sense, more information is obtained by surveying the people who live further apart from each other.

This can be built into sophisticated sample designs. A simple way is to break up the original listing into smaller geographical areas, such as Census Collection Districts, and ensure that sampled households are spread across all areas. Alternatively, a systematic procedure can be used to force sampling points apart, increasing the statistical value of the information collected and obtaining a similar precision from a smaller sample. Data Analysis Australia assisted in the design of the Household, Income and Labour Dynamics in Australia survey, one of the biggest survey projects in Australia, by ensuring a reasonable physical spacing between clusters of households. To achieve the same precision by increasing the sample size would have cost millions of dollars more.

Once the data is collected, there are several analytical techniques, which come under the heading of 'geostatistics', that can be used to examine spatial relationships. These measure the strength and extent of spatial relationships, and form a logical framework for interpolation and understanding. Data Analysis Australia recently used geostatistical techniques in this way for the analysis of biological communities in Cockburn Sound, identifying areas of high and low diversity as illustrated on the right.

We have also used geostatistics to gain an understanding of the accuracy of emissions measurements collected from an industrial plant. While this involved analysing temporal relationships, to a mathematician time is simply another dimension of the data, and the same techniques can be applied. The results of this analysis have allowed informed decisions as to the most appropriate way to measure changes in emissions over time.

Further information is available from **Donna Hill**.



### "Can I Have Confidence In Political Polls?"

Confidence in political polls is a belief that the results will be close to the actual election outcome. The recent election has shown that not all polls deserve our confidence. This highlights the issue of why do some polls perform better than others? The answer lies in understanding the procedures used and at its core are sound statistical principles. A discussion of these principles is available on our website.

See [www.daa.com.au/analytical-ideas/political-polls/](http://www.daa.com.au/analytical-ideas/political-polls/)

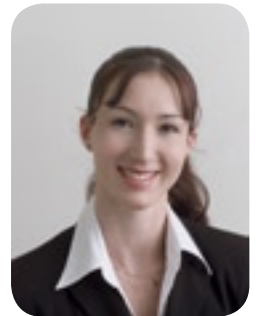
## Staff Profile - Miriam Maclean

**Miriam Maclean** has been with Data Analysis Australia for two years as a Consultant Survey Researcher. This role involves designing and managing surveys tailored to give clients information for their strategic decision-making. Part of this is the development of reliable and valid survey instruments, using a range of statistical and qualitative analyses.

Miriam has a Bachelor of Arts degree in Psychology with first class honours. It surprises some people that a person with training in psychology works amongst an office of statisticians and mathematicians. But with a strong grounding in research and human issues, a psychology background blends well with the analytical talents at Data Analysis Australia.

Miriam has particular interest in employee and organisational surveys. At Data Analysis Australia, Miriam was largely involved in the running of the 2006 Public Sector Retirement Intentions Survey for the Department of Premier and Cabinet. She has managed surveys on topics such as organisational effectiveness, working hours practices and employee satisfaction. She also has worked on social research projects with topics ranging from violence in Australia to driver safety.

Miriam is currently visiting relatives in New Zealand and is looking forward to reading a pile of novels, going jet boating and watching other people bungee jump.



## Company News

**John Henstridge** was an invited speaker at the recent International Symposium on Business and Industrial Statistics in Ponta Delgada, Azores. John's presentation was entitled "Beyond a Statistical Toolkit". John also gave this presentation at a recent meeting of the Statistical Society of Australia.

**John Dickson** has accepted our job offer and will begin work at Data Analysis Australia in January. John was a practicum student here in 2005, whilst undertaking his Bachelor of Computer and Mathematical Sciences degree at the University of Western Australia.

**Hussain Munir** recently completed a statistics practicum, part of his UWA course, at Data Analysis Australia by investigating the distribution of maximum temperatures in Perth. **Scott Brown** and **Anna Munday** were his industry supervisors for the project that will be of use to energy retailer Synergy. **Peter Marks**, a year 10 student at St. Mark's Anglican Community School, has also spent time with us recently, completing a week of work experience.

**Anna Munday** and **Donna Hill** recently attended a workshop on Analysing Spatial Point Patterns in R held at the University of Western Australia. The workshop ran for two days and was organised by the WA branch of the Statistical Society of Australia. **Donna Hill** and **Rhiannon Marchant** attended a two day Road Safety conference in late November.

The 2006 Census data is now available. Data Analysis Australia has received the 2006 Basic Community Profile Data and is able to apply this information to numerous projects such as those involving population projections and demographic profiles.

Data Analysis Australia will be closed over the Christmas period with Friday 21st December being our last day open in 2007. The office will re-open on Wednesday 2nd January 2008. We wish everyone a safe and happy festive season.

## Classic Quote

*"A statistician is a person who stands in a bucket of ice water, sticks their head into an oven and says 'on average, I feel fine!'"*

**K. Dunnigan**

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