

# Statistically Speaking...

News and views from the Statistics Department

Official Newsletter of the Department of Statistics, University of Warwick

Issue 7: January 2016

## News and Events

Welcome to the seventh issue of "Statistically Speaking..." - a publication designed for current and past students and staff of the Statistics Department at the University of Warwick.

Thank you to all who contributed to this issue or participated in its production in any way.

*Christian Robert, Eleanor Ingram*

**Congratulations to PIERALBERTO GUARNIERO who has received a Warwick Award for Teaching Excellence for Postgraduates Who Teach .**

### Public Lecture —

#### **Mathematics and Science in the Home Office**

Professor Bernard Silverman FRS (Chief Scientific Adviser to the Home Office)

#### **Date, time, venue:**

**Wednesday 10 February; 6:15 p.m**

**MS.02, Zeeman Building (Maths and Statistics)**

How many victims of Modern Slavery are there? How long should it be legal to retain a DNA profile on someone who is arrested but not charged? How can we ensure you don't wait too long to be checked when you enter the country?

These and many other questions are the sort of thing where mathematics and statistics play a key role in Home Office policy and operations. I will explain both the role of a departmental Chief Scientific Adviser and also the wider work carried out by the Home Office Science organisation under my leadership.

As well as describing some particular problems, such as those set out above, I will also reflect more widely on the way that science and evidence contribute to Government.



## What Can You Do With A Degree In Statistics?

It was getting towards graduation. I had turned down the one job I had applied for and was not particularly interested in applying for any more. After a MORSE or MathStat degree, do you really have to end up working 24/7 in the banking and finance sector?

Luckily, it turns out that you can do so much more. Out of the blue, I stumbled across an opportunity to go to South Africa for a year to work in mathematics education in South Africa. I seized the opportunity and was soon in an unfamiliar continent, well out of my comfort zone. Working at the African Institute for Mathematical Sciences Schools Enrichment Centre (AIMSSEC) in Cape Town was eye-opening in a number of ways. I was still surrounded by highly talented mathematicians and renowned lecturers. Yet now I was working to support primary and high school maths teachers from across the country, many of whom struggle to teach classes of well over 50 students at a time. What makes it worse is that many of them teach in poor classrooms which have no electricity or experience frequent power cuts. Moreover, many of these teachers did not even pass maths themselves; some are only at the front of the classroom because nobody else will do it. Surprisingly, I soon found myself running courses for these teachers and marking their work as part of their efforts to upskill.

Beyond the workplace, I also found time to also explore the mountains and beaches of South Africa, often doing so before work in a morning. I took part in my first 10k run, hiked up Table Mountain more times than I can remember, and even explored the neighbouring countries of Botswana and Namibia. There truly is a world out there.

So if you are currently studying towards your first degree, my advice is to bear in mind that a bachelor's degree is much more marketable in some countries overseas. With a master's degree in MORSE, I was hugely advantaged compared with most in South Africa, where many do not even complete high school and the average mark in the grade 9 Annual National Assessment for maths was just 11% in 2014. As a Warwick student, it is easy to forget that your skills and education are likely to be far ahead of others' elsewhere in the world. The world truly is your oyster.

As it happens, I am now preparing to leave for Spain on a completely new adventure ...

Iain Carson, MMORSE, 2014

In October, Jane Hutton spent three weeks by the Indian Ocean, at AIMS Tanzania. AIMS is a network of centres for tertiary mathematical education and research, founded in order to build capacity for African initiatives in education, research, and technology. The main AIMS programme is a year's course, which intended to prepare African graduates with mathematically-based degrees for post-graduate study. The Tanzania centre will focus on Statistics for development, and Jane taught the initial probability and statistics course.

Jane writes:

Thirteen African countries are represented among this year's students, and a third of the group are women. A good proportion had degrees in actuarial science, yet they valued learning one of my passions - good, clear summary statistics and graphical presentations. One of the

tasks was for groups to pose themselves a question about Africa, and then find what data were available to answer it. As I expected, this exposed the difficulties of collecting and archiving country level data. For example, the group considering deaths and injuries from road traffic injuries noted several anomalies in data. Their presentation concluded that we all need to be aware of the importance of national statistics and be willing to work to improve data quality. The generosity of many statisticians in providing excellent free software, R, is greatly appreciated by the students.



Staff and students all live and work in part of a large villa on the beach at Bagamoyo. I think the villa's architecture is inspired by Fatehpur Sikri, and it is lovely to be able to work on shaded balconies in the wind, with views of fishing boats and palm trees. Other mathematicians visit. While I was there, a group 'African Data Initiative' met to discuss progress on their contribution to addressing the lack of skills to turn the data into useful information. The project is to provide a simple interface to R for agricultural, environmental, health and other scientists. One of the team is a woman from Cameroon whom

I had taught at AIMS Ghana in January 2014; she is now a statistician with International Crops Research Institute for the Semi-Arid Tropics in Mali. It is always good to hear how our students have progressed.

## Widening Participation: Warwick in Cornwall

### Background

In summer 2014, Mr Alex Lingard, Deputy Head Teacher and Mrs Nicky Hubartt, the Head of Mathematics, of Liskeard School and Community College, Cornwall, welcomed three mathematics students to pilot co-operation with Warwick Statistics in raising aspirations and inspiring enthusiasm for mathematical sciences. Cornwall is a deprived area of the UK, indeed, of Europe, and there is no Russell Group University in the county.

### Master Classes: 8-18 December 2014

One of the Warwick students, Sukhi spent ten days assisting at Liskeard School in classes ranging from year 7 to sixth form further maths. He helped sixth formers with their personal statements and discussed their choices of course and university, and sessions for the sixth form induction day, to encourage the best to study further maths. He also ran a lunch time Rubik's cube club for year 8 students (12-13 year olds) with about 9 members - 2 of whom could solve the cube unassisted after just 2 days! To build on the success of the primary school liaison in the summer, Sukhi and Nicky ran a session starting with modular arithmetic and ending with modular origami for thirty primary pupils.

### Visit to Warwick University: 24-25 March 2015

To encourage sixth formers to explore beyond the universities nearest home, ten year 12 pupils were invited to Warwick University. The journey in the minibus took longer than expected, reminding us how far away the midlands are from Cornwall. Sukhi kindly guided the visitors to the flat in the hall of residence where they were staying to experience university accommodation, and a tour of the Zeeman Building, other departments as requested by the visitors and the campus generally.

Talks on Statistics and Mathematics degrees while the visitors enjoyed afternoon tea. We had dinner together at Xananas, for a meal. Some undergraduates joined us, including Luke Hatcher (3rd yr MMath) and Yuanheng Tang (1st yr MORSE) as prospective volunteers for the summer. I enjoyed hearing the students telling the sixth formers that University required far more work than A-level.

In the morning Richard Lissaman (Further Maths Programme) talked about some interesting mathematics questions and approaches to mathematical problem solving as a prelude to sessions in July 2015. Two practical sessions followed, on student finances, and careers.

cont...

### Summer 2015

In the last two weeks of June, Luke, Yuanheng and Medis Moradi, a Philosophy with Psychology finalist assisted with a summer school held at Liskeard School for academically weaker year 6 primary pupils. The students worked as teaching assistants to improve pupils literacy and numeracy, and went out on the field trips. In the other two weeks, the students observed and assisted in classes at Liskeard School, including some work with an extraction group of the more able students. They also helped third to fifth year students in St. Martin's Primary School with summation, subtraction or multiplication. St. Martin's is the largest feeder primary school, and has some of the most disadvantaged children.

In July, a group of further maths A-level pupils watched video-linked lectures by Richard, and then worked on exercises. Luke took the lead in preparing for this, and enjoyed it. The sixth formers enjoyed the sessions, and staff valued work that isn't just linked to a syllabus with an exam at the end of it. The sixth formers told Luke that more 'STEP' questions would be nice, in order to see what the expectations of Oxford, Cambridge and Warwick are. However they also remarked that they found five sessions tiring: 'Welcome to the world of work!'.

The teachers at Liskeard School were delighted with Yuanheng, Luke and Medis, how receptive to ideas and discussions they were, though the students were modest about their contribution. The summer school went really well, with good interaction with the children. I was shown statistical work which the children had done with the assistance of the students. The week they had in St Martin's Primary had lasting impact on some of the pupils. Yuanheng gave some talks to the classes about life in China: the contrast to Cornwall made quite an impression.

### Thanks

I am very grateful to all students and staff who contributed. We will use the feedback to improve the programme, which will again include Christmas master classes, an Easter visit to Warwick and a summer programme. We are exploring the possibility of expanding to include physics, and to work with other East Cornwall Schools.

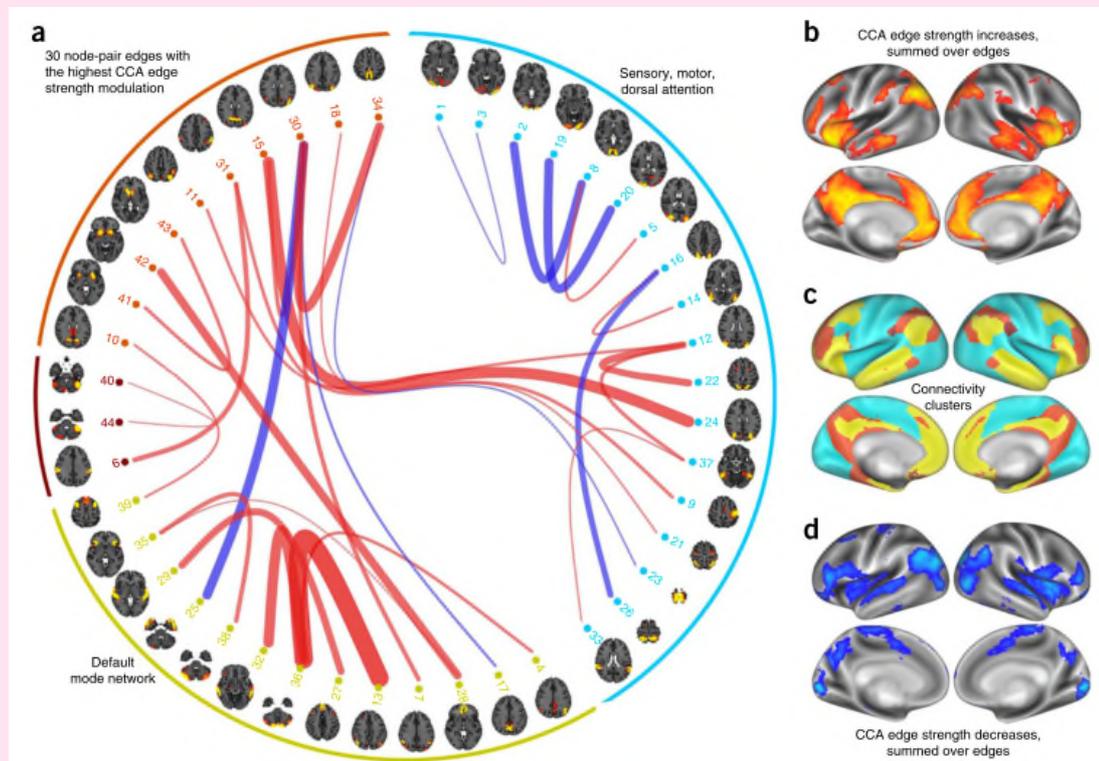
Prof J L Hutton, Warwick Statistics

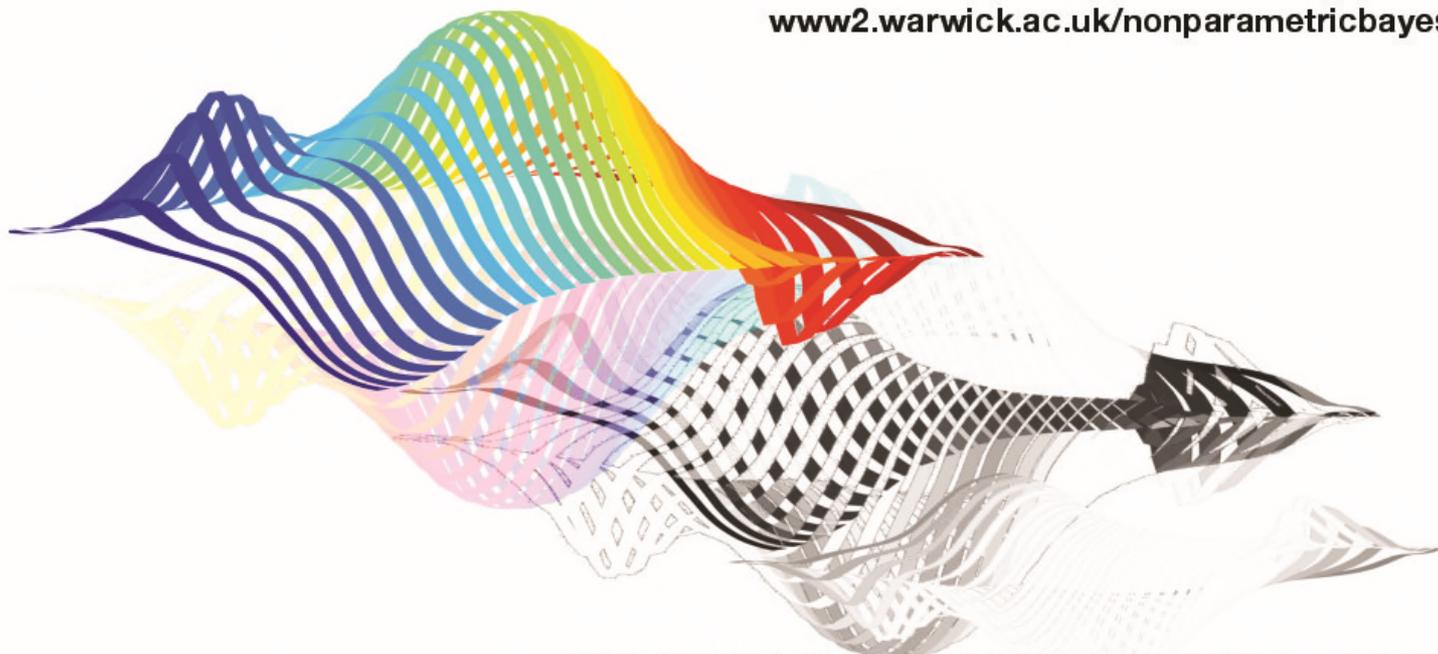
## Happy Brains Are Wired That Way

Research by Tom Nichols and colleagues has been featured in the papers with headlines like "Intelligent people's brains are wired differently" (Daily Mail, 28 Sept.). The research is based on unique data from Human Connectome Project (HCP), a collaboration with researchers in Oxford University and Washington University in St. Louis. The HCP data has produced MRI data with high temporal and spatial resolution, specifically tailored to image the connections between different brain regions. In this project, they used 461 subjects to find associations between brain connectivity and over 280 behavioural, health and demographic factors. A single factor with a clear positive vs. negative axis of life factors was found to correlate with functional MRI connectivity. Factors like memory, vocabulary, life satisfaction and being well-educated weighed against factors like substance use, poor sleep quality and anger-aggression scores. While many reports in the press have implied a causal link between "happiness" and how the brain is "wired", the current observational study doesn't justify these conclusions.

### Reference:

Smith, S. M., Nichols, T. E., Vidaurre, D., Winkler, A. M., Behrens, T. E. J., Glasser, M. F., Ugurbil, K., Barch, D.M., Van Essen, D.C., Miller, K. L. (2015). A positive-negative mode of population covariation links brain connectivity, demographics and behavior. *Nature Neuro-*





# CRiSM MASTERCLASS: NONPARAMETRIC BAYES

David Dunson

4 - 6 APRIL 2016 @ UNIVERSITY OF WARWICK

Harry van Zanten



## Other Seminars & Workshops

### CRiSM Workshops & Masterclasses

**4th—8th April**  
Master Class

**20th April**  
Workshop: Estimating Constants

**7th July**  
Workshop: Retrospective Monte Carlo & Applications

**25th August**  
Workshop: Recent Developments in Large-scale Inference

**30th August—2nd September**  
Master Class

**15th September**  
Workshop: Hypothesis Testing

### CRiSM Seminars

*Seminars will be held in B1.01 (Maths)*

Friday 5th February  
14:00—17:00  
Ewan Cameron (Oxford)

Friday 19th February  
14:00—17:00  
Theresa Smith (Lancaster)

Friday 4th March  
14:00-17:00  
Alan Gelfand (Duke)

### Other Statistics Seminars:

#### SF@W

**Friday, 22nd January (C1.06)**  
14:00—15:00

*Bermudan options by simulation*  
Chris Rogers (Statslab, Cambridge)

#### RSS West Midlands Local Group Meetings

More information can be found via the group's website

<https://sites.google.com/site/rsswmlg/forthcoming-meetings>

#### Young Researchers' Meeting

Meetings take place 4-5pm, Tuesdays (term time) in the Statistics Common Room

<https://www2.warwick.ac.uk/fac/sci/statistics/news/yrm>