APRIL 2002

Thirty-Eighth Gregynog Statistical Conference Programme

All talks will take place in Seminar Room 1 (Floor 2, far end)

Friday	16.00	*Tea*
12 April	17.00	Professor Harvey Goldstein (Institute of Education) *Multilevel modelling: an introduction, applications and extensions to more complex data structures*
	19.00	*Dinner*
	20.00	Dr Chris Palmer (Cambridge) *Data dependent designs in clinical trials.*
Saturday	08.00	*Breakfast*
13 April	09.30	Dr Ruth King (Cambridge) *Model discrimination via trans-dimensional Markov chains.*
	11.00	*Coffee*
	11.30	Professor Harvey Goldstein *Multilevel modelling II.*
	13.00	*Lunch*
		Afternoon free
	16.00	*Tea*
	17.30	Professor Harvey Goldstein *Multilevel modelling III.*
	19.00	*Dinner*
Sunday 14 April	08.00	*Breakfast*
	09.30	Professor Chris Jones (Open) *The skew t and other families of order statistic distributions.*
	11.00	*Coffee*
	11.30	Robert Matthews (Science correspondent, The Sunday Telegraph) *Amazing - but is it true? Bayesian methods for assessing the credibility of new research findings.*
	13.00	*Lunch*
	14.00	Professor Beth Chance (California Polytechnic State University) *Using Simulation Activities to Improve Students' Reasoning: An Example of Classroom Based Research in Statistics Education.*
	15.30	*Tea and finish.*

Speakers

Professor Beth Chance and Mr Chance	California Polytechnic State University
Professor Harvey Goldstein and Mrs Goldstein	Institute of Education, London
Professor Chris Jones	Open University
Dr Ruth King	Cambridge University
Mr Robert Matthews	Science correspondent, The Sunday Telegraph
Dr Chris Palmer	Cambridge University

Staff

Aberystwyth
Dr John Basterfield
Dr John Lane
Prof Dennis Lindley
Mr Alan Jones
Miss Sylvia Lutkins

Bangor
Mr Chris Whitaker
Mrs Rhiannon Whitaker

Birmingham
Prof Malcolm Faddy
Dr Rachel Hilliam
Prof Tony Lawrance

Cardiff
Mr Terry Iles

GSK
Dr Roger Owen

Keele
Prof Peter Jones and Mrs Jones
Dr John Preater

Nottingham Trent
Professor Neville Davies

Swansea
Dr Mark Kelbert
Dr Alan Watkins
Dr Alan Mayer

University of Wales College of Medicine
Dr Barry Nix
Dr Kerry Hood

Warwick
Prof John Copas
Dr Jen Marsh
Dr Rob Deardon
Dr Alex Morton

Students

Martin Koduah
Louise James

Louise Kingman

Anna Maria Madrigal
Raquel Voorduin
Grace Kwong
Liliana Figueroa-Quiroz

Dan Jackson
Ben Cowling

Abstracts

Multilevel modelling: an introduction, applications and extensions to more complex data structures.

Professor Harvey Goldstein *Institute of Education, London*

Provisional Abstract:
Multilevel modelling will be introduced as a set of statistical models for hierarchically structured data. Examples will be given, mainly of applications in the social and health sciences. Worked examples will be demonstrated using the MLwiN software. Likelihood and Bayesian (MCMC) approaches will be used.
More complex data structures involving cross-classifications and multiple membership (fuzzy set) classifications will be introduced and examples of applications given.

Using Simulation Activities to Improve Students' Reasoning: An Example of Classroom Based Re search in Statistics Education.

Professor Beth Chance *California Polytechnic State University*

This talk describes a collaborative classroom-based research project at two American universities. Our research goal has been to investigate how technology can best help students understand, integrate, and apply fundamental statistical concepts, such as sampling distributions.
I will describe the evolution of the software, activities, and assessment instruments we used to measure the impact of technology on students' conceptual understanding and to investigate effective implementation of such technologies. Key findings include the need to establish cognitive dissonance with student predictions.
We hope our study serves as a model of classroom-based research for investigating the impact of technology on student learning.

Model discrimination via trans-dimensional Markov chains

Dr Ruth King *University of Cambridge*

Model discrimination is an important issue within analyses of many data sets. The models themselves describe the underlying dynamics of the system, and hence different models generally represent competing hypotheses. We consider the issue of how we may potentially discriminate between all defined plausible models, in both classical and Bayesian contexts. Within the classical approach, we discriminate between models based on some information criteria, such as the AIC (Akaike's information criteria) or BIC (Bayesian information criteria). Conversely, within the Bayesian paradigm, we discriminate between models by calculating the posterior model probabilities for each of the plausible models.
We shall begin by showing how we can construct a Markov chain to calculate either the classical MLE's of the parameters for a given model, or summarise the posterior distribution of the parameters in the Bayesian context. We then describe how the

methodology has been extended so that the Markov chain can traverse different dimensions, using the reversible jump MCMC algorithm. This methodology is then applied within both the classical and Bayesian contexts to potentially discriminate between all plausible models (irrespective of their number), and simultaneously calculate estimates of the parameters of interest. To illustrate the ideas, we consider a particular example relating to capture-recapture data, where the different models represent different biological hypotheses, each telling us something different concerning the population under study.