



UCD School of  
Mathematics and Statistics

University College Dublin  
Belfield, Dublin 4, Ireland

Tel +353 1 716 2580  
Fax +353 1 716 1196

Scoil na  
Matamaitice agus na Staitisticí UCD

An Coláiste Ollscoile, Baile Átha Cliath  
Belfield, Baile Átha Cliath 4, Éire

Email seminars@maths.ucd.ie  
Web maths.ucd.ie/seminars

## Working Group on Statistical Learning Seminar

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**Damien McParland**

will speak on

### **Latent Variable Models for Ordinal Data**

Fri 1st April 2011 at 1:00PM

Location: Statistics Seminar Room- L550 Library building

Ordinal data arise in many contexts and item response modelling is a long established method for analysing this type of data.

The ordinal response for individual  $i$  on item  $j$  is denoted  $Y_{ij}$ , where  $i = 1, \dots, N$  and  $j = 1, \dots, J$ . Corresponding to each ordinal data point  $Y_{ij}$  is a latent Gaussian variable  $Z_{ij}$ . The value of  $Y_{ij}$  is observed to be level  $k$  if the latent Gaussian variable  $Z_{ij}$  lies within a specified interval. In addition, another latent Gaussian variable  $\theta_i$ , often called a latent trait, is used to model the underlying attributes of individual  $i$ . The mean of  $Z_{ij}$  depends on  $\theta_i$ , i.e.

$$Z_{ij} \sim N(a_j \theta_i - b_j, 1)$$

In the item response literature,  $a_j$  and  $b_j$  are typically known as discrimination and difficulty parameters respectively.

The extension to a mixture of two parameter item response models, which provides clustering capabilities in the context of ordinal data is also explored. In this context the mean of  $Z_{ij}$  also depends on which group individual  $i$  belongs to, i.e.

$$Z_{ij} \sim N(a_{gj} \theta_i - b_{gj}, 1)$$

where  $a_{gj}$  and  $b_{gj}$  are group specific discrimination and difficulty parameters.



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Estimation of both of these models within the Bayesian paradigm is achieved using a Metropolis-within-Gibbs sampler.

This talk is part of the **Working Group on Statistical Learning** series. For more, see <https://maths.ucd.ie/seminars>