



*The University of Mississippi*

*Department of Mathematics*

***Statistics Seminar***

**On the Exchangeable Multinomial Distribution**

By

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**Abstract**

We derive an expression of the joint distribution of exchangeable multinomial random variables. In the literature this problem has mainly been addressed by the use of an extension of de Finetti's theorem for binary data. The use of de Finetti's theorem entails an assumption that the sequence under consideration is a subset of an infinite exchangeable sequence of multinomial trials. However, it has been pointed out by Diaconis and Freeman ( *Annals of Probability*, 1980, 745-764), and several other recent researchers, that when the number of sequence is intrinsically finite, de Finetti's theorem does not hold. We show that the expression obtained in this article generalizes the standard multinomial distribution, while retaining such analytically useful properties as subset collapsibility. Moreover, we show that the form of the covariance and higher moments structures of the exchangeable multinomial random vector are more general than the 'inflated' version of the standard multinomial distribution, that are typically assumed in the statistical literature. Using nonparametric MLEs, we demonstrate a gain in efficiency of GEE estimates of parametric models with the proposed exchangeable multinomial distribution.

**Date: Friday, April 23, 2010**

**Time: 2 PM – 3 PM**

**Location: Hume 201**