

McMASTER UNIVERSITY  
GRADUATE PROGRAM IN STATISTICS

**STATISTICS SEMINAR**

**Speaker:** Dr. Rong Zhu, Department of Mathematics and Statistics,  
McMaster University

**Title:** *“Generalized Poisson Distribution: The Property of Mixture of Poisson and Comparison with Negative Binomial Distribution”*

**Day:** Tuesday November 16, 2004

**Time:** 3:30 - 4:30 PM

**Place:** HH/217 - Deloitte Colloquium Room (Refreshments in HH/216 at 3:00 PM)

**SUMMARY**

We prove that the generalized Poisson distribution,  $GP(\theta, \eta)$  ( $\eta \geq 0$ ), is a mixture of Poisson distributions; previously it was only known to be overdispersed relative to Poisson like the negative binomial distribution. We compare the probability mass functions and skewnesses of the generalized Poisson and the widely used negative binomial distributions with the first two moments fixed. We find that the generalized Poisson and negative binomial distributions with means and variances fixed have slight differences in many situations, but their zero-inflated distributions with masses at zero, means and variances fixed, may show large differences. These probabilistic comparisons are helpful in selecting a better fitting distribution for modelling count data with long right tails. Through a real example of count data with a large zero fraction, we illustrate how the generalized Poisson and negative binomial distributions

as well as their zero-inflated distributions can be discriminated. This is joint work with Dr. Harry Joe from UBC.

## REFERENCES

1. Bondesson, L. (1992). *Generalized Gamma Convolutions and Related Classes of Distributions and Densities*. Springer-Verlag, New York.
2. Consul, P.C. (1989). *Generalized Poisson Distribution: Properties and Applications*. Marcel Dekker, New York.



**ABOUT THE SPEAKER:** Dr. Rong Zhu is an Assistant Professor of Statistics in the Department of Mathematics and Statistics at McMaster University. He obtained his BS and MS in Statistics degrees from USTC (China), and Ph.D. in Statistics from UBC. Dr. Zhu's research interests include non-normal time series, modelling, and generalized clustering analysis.

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