

## **Estimation of Intra-Cluster Correlation Coefficient for Ordinal Data via the Failure of Bartlett's Second Identity**

Tsung-Shan Tsou<sup>(1)</sup> and Wan-Jen Chen<sup>(2)\*</sup>

<sup>(1)</sup>National Central University, Taiwan

Cathay Medical Research Institute, Cathay General Hospital, Taiwan

<sup>(2)</sup>National Central University, Taiwan

Department of General Education, Army Academy, Taiwan

sabachen640117@msn.com

### **Abstract**

A new means of estimating the correlation coefficient for cluster ordinal data is introduced. The creation of this method is founded upon the violation of Bartlett's second identity when adopting the multinomial distributions to model ordinal data that are correlated. The new methodology applies to any sensible link functions that connect the cell probabilities and covariates. One can easily implement the procedure by using any statistical software providing the naïve and the sandwich covariance matrices for regression parameter estimates. Simulations and real data analyses are used to demonstrate the efficacy of our new procedure.