Investigating multidimensional unfolding models using R2WinBUGS

Shiu-Lien Wu[1] , Wen-Chung Wang[2]

1. National Chung-Cheng University, Taiwan
2. The Hong Kong Institute of Education
*Contact author: subert4@gmail.com

Abstract

It has been argued that unfolding models could be more appropriate for describing responses to attitude items or Likert items than dominance models. However, most existing unfolding models are either unidimensional or fitting to binary data under the framework of item response theory (IRT). When there are multiple tests of Likert items, or when a Likert item measures more than one latent trait simultaneously, unidimensional unfolding models become inefficient or inappropriate. Meanwhile, if a model can be fit only to binary data, the applications are limited. To resolve these problems, we developed the confirmatory multidimensional generalized graded unfolding model, which is a multidimensional extension of the generalized graded unfolding model (Roberts, Donoghue, & Laughlin, 2000), and conducted a series of simulations to evaluate its parameter recovery by using *R* and the *R* package **R2WinBUGS**. The simulation study demonstrated that the parameters of the new model can be recovered fairly well. In addition, we analyzed a real data set about tattoo attitude to depict the implication and applications of the new model and to demonstrate its advantages over the unidimensional model. The results showed that the multidimensional model had a better fit than the unidimensional one (log PsBF = 27.2); the multidimensional model yielded higher reliability estimates (.92, .89, .83) for the 3 latent traits than the unidimensional one (.84, .85, .83); and the multidimensional model yielded higher correlation estimates among the 3 latent traits (.20 ~ .84) than the unidimensional model (.04 ~ .30).

Keywords: multidimensional item response theory, unfolding models, Markov chain Monte Carlo, R2WinBUGS

References

Sturtz, S., Ligges, U., & Gelman, A. (2005). R2WinBUGS: A package for running WinBUGS from R. *Journal of Statistical Software, 12*, 1-16.