

A comparison of Correspondence Analysis, Multidimensional Unfolding and the Generalized Graded Unfolding Model for single-peaked data

Marika Polak, Willem J. Heiser, Mark De Rooij, Frank Busing
Department of Psychology
Leiden University
polak@fsw.leidenuniv.nl

Keywords: Unfolding, Monte Carlo simulation, unipolar data

Abstract

In psychometrics two types of item response data can be distinguished, bipolar and unipolar (single-peaked) data. In this paper we focus on single-peaked data. Two types of methods commonly used to handle single-peaked item response data are the IRT-like probabilistic unfolding models (U-IRT) such as the Generalized Graded Unfolding Model for single-peaked data (GGUM) (see for example Roberts and Laughlin, 1996), and the multidimensional unfolding models (MDU) developed within the multidimensional scaling framework (see for example Heiser, 1981; Busing, Groenen and Heiser, 2002).

One major drawback of the probabilistic models is that only unidimensional scales can be represented. Often items do not fit within this scale and are therefore ignored for further analysis. Furthermore, these methods rely on the probabilistic framework and thus some assumed distribution which may or may not hold. A major drawback of the MDU models is that the minimization procedure can be hampered by local minima, which is a major concern.

In this paper we will explore the way single-peaked data are handled by correspondence analysis (CA). There is some evidence that CA correctly represents single-peaked responses (Heiser, 1981). There are a number of advantages of CA over U-IRT and MDU. Firstly, CA does not run into local minima, and multidimensional solutions can be obtained without the danger of degeneration. Secondly, CA is not a statistical model, which makes it independent of specific assumptions and comparatively easy to use in practice in the hands of relatively non-technical psychologists. To study the use of CA as unfolding technique for single-peaked data, both empirical and simulated data will be analyzed. Results will be compared with the results from the MDU model of Busing et al and the GGUM model of Roberts.

References

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