

# Mokken Scale Analysis Using Restricted Optimization Techniques

Alexandra A.H. van Abswoude

Department of Methodology and Statistics, Tilburg University, P.O. Box 90153, 5000 LE Tilburg,  
The Netherlands. E-mail: [A.A.H.vanAbswoude@uvt.nl](mailto:A.A.H.vanAbswoude@uvt.nl)

**Keywords:** Item Response Theory and Test Development

## **Abstract:**

Mokken scaling analysis (MSA) is frequently used for finding unidimensional sets of items within a multidimensional ordinal data matrix. Studies have shown that methods like DETECT, which use a global optimization method to minimize covariances conditional on the latent trait, were superior to MSA in finding the underlying dimensionality of a data matrix. However, when for MSA an improved optimization method (similar to DETECT's method) is used, MSA, which uses the Loevinger's H coefficient to assess the relationship between responses, can compete with conditional covariance-based methods in detecting the dimensionality of a data matrix.

The goal in MSA, however, is not to partition items into disjoint clusters that represent the underlying dimensionality, but to find sets of items (scales) that satisfy some observable consequences of the UD, M and LI assumptions made in the Monotone Homogeneity Model (MHM). However, scales obtained by means of MSA may still show significant dependence for some values of the estimated trait, which may indicate multidimensionality. In this study, we use the improved clustering method with the MSA conditions and an additional scaling condition in which the statistical independence of the responses is tested for detecting the dimensionality of different types of multidimensional data.