

# The Effect of Model Based Imputation of Missing Data on the Estimation of the Parameters in Rasch's Speed Tests Model

**Margo G.H. Jansen,**

Department of Education/ GION, University of Groningen  
Grote Rozenstraat 38,9712 TJ Groningen The Netherlands  
g.g.h.jansen@ppsw.rug.nl

## **Keywords:**

Speed Test(s), Multiplicative Gamma Model, Incomplete Data.

## **Abstract**

The model which we will consider here, is the Rasch model for response speed, which is a latent trait model for a set of pure speed tests. The MGM, if reasonably descriptive, can be used for solving some of the practical problems we encounter in achievement testing with the use of speed tests, such as test bias detection, test calibration and others. In practical situations where a number of tests is given to a sample of subjects, some cells in the data matrix will invariably be empty. The data can be missing by design when an incomplete data collection scheme is used, but also due to non-response caused by other, usually unknown, mechanisms.

When a data set is incomplete, a decision has to be made how to deal with it. Numerous methods for handling missing data have been proposed. In an IRT context, model based imputation methods were shown to perform somewhat better than more conventional methods such as subject or variable mean substitution. Here we will study imputation methods for missing response in speed test data, in particular with respect to parameter estimation. Illustrations based on simulations will be presented.

## **References**

- Eggen, T.J.H.M. (1993). Item response theory and incomplete data (In Dutch). In: Eggen, T.J.H.M. & Sanders, P.F. (Editors). *Psychometrie in de Praktijk (Psychometrics in Practice)*. Arnhem, CITO.
- Huisman, M. (1999), Item nonresponse: occurrence, causes and imputation of missing answers to test items. Leiden, DSWO press.
- Jansen, M.G.H. (1997). The Rasch Model for Speed Tests and Some Extensions with Applications to Incomplete Designs. *Journal of Educational and Behavioral Statistics*, 22, 125-140.