

A comparison of item response models: Dynamic versus static

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Abstract

A distinction is made between variation between individuals, interindividual variation (IEV), and variation within individuals, intra-individual variation (IAV). Most of the models in current psychometrics pertain to IEV. Although the analysis of IAV requires a different approach than the analysis of IEV, models for IEV can be used for the analysis of IAV after appropriate adjustments. That is, the replacement of stochastic variables by stochastic processes.

It is stressed that conditions under which analyses of IAV and IEV produce the same results are very strict. These conditions are implicated by the so-called ergodic theorems. In the presented research, the results of an analysis of IAV are compared to the results of analysis of IEV. This is done in the context of item response models.

Dynamic extensions of item response models are used to make it possible to model IAV. One of the goals was to obtain estimates of the latent process. This was made possible by using the recursions of the Kalman filter. In a simulation study, the performance of this estimation procedure was investigated. Furthermore, a comparison between standard IRT analyses and analyses with the presented models was made. More specifically, different amounts of heterogeneity were added to the individual models after which item response models for IEV were fitted to cross sections of the simulated data.