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# Employing item response theory and factor analysis to purify latent trait estimates

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## Abstract

The binary factor analysis (FA) model and the 2-parameter item response theory (IRT) model impose different structures and assumptions, but the models are well known to be equivalent (Martinkov´a & Hladk´a, 2023, Section 7.5). In this work, we investigate a generalization of the FA model to three- and four-parameters using the mixture-dichotomized model, and its relationship with the three- and four-parameter IRT model. We then focus on the estimation of the ability scores cleaned of guessing and inattention in the context of educational assessment, or of pretending and dissimulation in the context of psychological assessment, which we term the NGI (non-guessing and non-inattention) scores. We propose a Bayesian estimation method, and compare it with other alternatives. We discuss the advantages of NGI scores over total scores and other estimates of latent scores, as well as the strengths and limitations of various estimation methods. The methods are illustrated using real data examples from well-being and educational assessment.

## Keywords

IRT, CFA, Bayesian model

## Poster

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