Bayesian Estimation of the True Score Multitrait–Multimethod Model with a Split-Ballot Design

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Suggested talk duration (15-60 minutes)

20-60 minutes, time can be flexible. We do not have a preference.

Summary (max. 500 words)

This article (Helm et al. 2017) examines whether Bayesian estimation with minimally informative prior distributions can alleviate the estimation problems often encountered when fitting the true score multitrait–multimethod (MTMM) structural equation model with 2-group split-ballot data. This data design has been used in seven rounds of the European Social Survey (ESS). The split-ballot approach has been combined with the MTMM model to reduce the response burden of the respondents that would only need to answer 2 times to the same question, instead of 3. The 2-group split-ballot design, was implemented in the ESS to maintain, for substantive purposes, the total sample size for the first method, with a planned missingness design.

In particular, the 2-group true score MTMM structural equation model encounters an empirical under identification when (a) latent variable correlations are too homogenous, and (b) fitted to data from a 2-group split-ballot design. Monte Carlo simulations showed that problems were especially

important when the sample size of the experiments was small (Revilla & Saris, 2013). Problems were not present with large datasets (20,000 cases), however, in practice it is very difficult to get huge sample sizes in survey research.

In this article we show, with Monte Carlo simulations and 3 empirical examples, that Bayesian estimation performs better than maximum likelihood estimation.

References:

Helm, J. L., Castro-Schilo, L., Zavala-Rojas, D., DeCastellarnau, A., & Oravecz, Z. (2017). Bayesian Estimation of the True Score Multitrait–Multimethod Model With a Split-Ballot Design. *Structural Equation Modeling: A Multidisciplinary Journal*, 1–15.

Saris, W. E., Satorra, A., & Coenders, G. (2004). A New Approach to Evaluating the Quality of Measurement Instruments: The Split Ballot MTMM Design. *Sociological Methodology*, 34(1), 311–347.

Revilla, M., & Saris, W. E. (2013). The Split-Ballot Multitrait-Multimethod Approach: Implementation and Problems. *Structural Equation Modeling: A Multidisciplinary Journal*, *20*(1), 27–46.

Relevance to conference theme

Given that experimental data in survey research is still scarce, and when it is conducted sample sizes are inevitably small. In our research, we suggest using Bayesian estimation with minimally informative prior distributions when estimating the true score multitrait–multimethod structural equation model with 2-group split-ballot data, when sample sizes are small (500 cases).

Moreover, given the increasing use of planned missingness designs in psychological research and given the reduced logistical costs and potential for reduced response burden of respondents, we also suggest using Bayesian estimation as a potential alternative to ML estimation for analyses using data from planned missingness designs (i.e. 2-group split-ballot design).

Keywords (max. 3)

Bayesian structural equation modeling, Multitrait-multimethod model, split-ballot design.