IRT in SPSS Using the SPIRIT Macro

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Description

A wide variety of one-parameter item response theory (IRT) models can now be easily run on SPSS using the SPIRIT macro. SPSS (IBM Corp., 2013) is an incredibly popular statistical software within the social sciences, yet does not currently have any built-in procedures that can run IRT analyses. The newly developed SPIRIT macro provides an accessible point-and-click interface that allows researchers to perform item response analyses on this established software. Users can run a large list of possible item response models, including one-parameter models with either a logit or probit link function, explanatory models with item and/or person covariates, models exploring differential item functioning (DIF), multidimensional models, multi-group models, linear logistic test models (LLTM) with item random effects, and rating scale models (for ordinal data). A benefit of this macro is its flexibility in being able to perform any reasonable combination of the aforementioned models to fit the user's needs, while providing a convenient interface tailored to an IRT audience. This tool may be particularly useful in a pedagogical setting, where an instructor may wish to teach IRT at an introductory level but does not wish to burden new students with unfamiliar specialized IRT software.

The SPIRIT macro utilizes the fact that one-parameter IRT models are members of the generalized linear mixed model (GLMM) family (e.g., De Boeck et al., 2011; Rijmen, Tuerlinckx, De Boeck, & Kuppens, 2003). SPIRIT runs IRT models using the penalized quasi-likelihood (PQL) estimation technique (Breslow & Clayton, 1993) that SPSS uses to estimate GLMMs. Despite being an approximate estimation method resulting in slightly less precise estimates, the PQL approach is computationally quicker and allows users to use larger datasets with a greater amount of dimensionality. Comparisons between SPIRIT's results and those from other IRT software have shown similar conclusions.

Availability

The SPIRIT macro can be implemented on both Mac and Windows versions of SPSS (Version 21 or later). A point-and-click version of the tool is easily accessed by installing a free “user

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interface” .spd SPSS file that allows users to use the features of the macro. The macro can also be used with a syntax approach by running the provided syntax .sps file. These approaches and detailed documentation about the macro are available by request. The macro is utilized within the SPSS environment, so the point-and-click interface, once installed, can be used just like any other point-and-click dialogue box within SPSS. Interested researchers should email Jack DiTrapani at ditrapani.4@osu.edu to receive the necessary files or for general inquiries.

Declaration of Conflicting Interests

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References

- Breslow, N. E., & Clayton, D. G. (1993). Approximate inference in generalized linear mixed models. *Journal of the American Statistical Association*, 88, 9-25.
- De Boeck, P., Bakker, M., Zwitser, R., Nivard, M., Hofman, A., Tuerlinckx, F., & Partchev, I. (2011). The estimation of item response models with the lmer function from the lme4 package in R. *Journal of Statistical Software*, 39, 1-28.
- IBM Corp. (2013). IBM SPSS Statistics for Windows, Version 22 [Computer Software manual]. Armonk, NY: Author.
- Rijmen, F., Tuerlinckx, F., De Boeck, P., & Kuppens, P. (2003). A nonlinear mixed model framework for item response theory. *Psychological Methods*, 8, 185-205.