How to Improve Bayesian Estimation When Synthesizing Single-Case Experimental Design Studies' Random Effects' Variance Components

Moeyaert, M.^{1*}, Beretvas, S.N², Rodabaugh, E¹, Ferron, J³, & Van den Noortgate, W⁴

¹ University at Albany-SUNY, USA

² The University of Texas at Austin, USA

³ Katholieke Universiteit Leuven, Belgium

⁴ The University of South Florida, USA

* Presenting author

Briefly Explain Your Question (max. 100 words)

Variance component estimates using maximum likelihood for two-level modeling of single-case study participants' data are biased and imprecisely estimated. Bayesian estimation using weakly informative priors results in biased and less precise variance estimates for scenarios with three participants. With more participants, unbiased and more precise estimates can be obtained. For two-level data, informative priors lead to more precise estimates even for only three participants. However, this worked for a very specific subset of conditions. We want to know the optimal functional forms and information necessary to construct appropriate, high-performing priors for Bayesian estimation of three-level syntheses of single-case studies' data.

Scientific field(s) of the author(s)

Educational / Social science statistics

Relevance to conference theme (max. 50 words)

It is natural and logical to apply Bayesian estimation in the context of singlecase studies because it does not rely on asymptotic assumptions and immediate probability statements can be made.

Keywords (max. 3)

Bayesian, Multilevel, Single-Case Experimental Data