

Random-effect models for guessing

Guido del Pino, Jorge Gonzales

Departamento de Estadística, Pontificia Universidad Católica de Chile, Casilla, 306, Santiago 22,
Chile, e-mail: gdelpino@mat.puc.cl

Katalin Balázs

Department of Psychology, K.U.Leuven, Tiensestraat 102, B-3000 Leuven, Belgium
e-mail: Katalin.Balazs@psy.kuleuven.ac.be

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Abstract

The guessing parameter γ in the 3PL model (Birnbaum, 1968) can be interpreted in several ways. One of the interpretations is that people guess when they fail (knowing that they fail), and that γ is the probability this guess is correct. Commonly, γ is considered an item parameter. We will present models with a guessing parameter that varies random over persons, with a normal distribution for the logit of γ . The interpretation of this random gamma could be that people differ in how much they resist attractive wrong responses, or how easily they can eliminate some of the alternatives as being wrong. The model can be estimated with SAS NLMIXED. From a simulation study with data generated on the basis of models with a random θ (for ability) and a random γ (for guessing) but without discrimination parameters, it seems that the true model can be estimated and has a clearly better fit than the model without a random γ . If the number of items is sufficiently high, it seems also possible to obtain reasonable estimates of γ per person. The model and estimation method will be illustrated with a real data example from a large-scale multiple-choice achievement test that is used in Chile.

References

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