IzstarMix: Assessment of Person Fit for Mixed-Format Tests

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In a report for the Council of Chief State School Officers, Olson and Fremer (2013) recommended the use of person-fit assessment, in addition to other methods, to detect irregularities in answering behavior of the test takers. Mixed-format tests, which include both dichotomous and polytomous items, are becoming increasingly popular because of an increasing emphasis on performance tasks in the common-core assessments (e.g., Darling-Hammond & Adamson, 2010). However, there is a lack of research on person-fit assessment for mixed-format tests (Sinharay, 2015a; 2015b). One reason is that there exist few statistics and no publicly available software packages to assess person fit for mixed-format tests.

IzstarMix is a function written in R (R Core Team, 2015) to compute the I_z statistic for mixed-format tests (Drasgow, Levine, & Williams, 1985; Sinharay, 2015b). The function also computes the I_z^* statistic for mixed-format tests that was recently suggested by Sinharay (2015a). The null distribution of I_z^* is generally much closer than that of I_z to the standard normal distribution for mixed-format tests. The function IzstarMix currently works when the dichotomous items are modeled using the three-parameter logistic (3PL) model,¹ and the polytomous items are modeled using the generalized partial credit model (GPCM; Muraki, 1992).² The input to the function consists of the item-parameter estimates, and the item scores and estimated abilities (maximum likelihood estimate or weighted likelihood estimates) of several examinees. The output are I_z and I_z^* for the examinees. The function can be used for tests that include only dichotomous items, in which case I_z^* for mixed-format tests (Sinharay, 2015a) becomes identical to I_z^* for dichotomous items (Snijders, 2001), or only polytomous items.

Availability

A free copy of the IzstarMix function, a user manual, a simulated data set, a real data set, and example input and output files can be obtained by contacting the author. The user manual shows examples of how another freely available R function can be used to compute the estimated abilities.

Author's Note

Any opinions expressed in this publication are those of the author and not necessarily of Pacific Metrics Corporation.

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Notes

1. Or the Rasch model or the two-parameter logistic model, which are special cases of the three-parameter logistic model.
2. Or the partial credit model, which is a special case of the generalized partial credit model.

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