Examining Parameter Invariance in a General Diagnostic Classification Model

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Abstract

The present study aimed at investigating invariance of a general diagnostic classification model across two gender groups: male and female. To this end, item responses of about 3000 male and female individuals to a high-stakes reading comprehension test were subjected to multi-group DCM analysis. Multigroup G-DINA was run and item parameters were compared across the two samples. The better fit of the model with invariant item parameter assumption was corroborated by the fact that relatively small number of item parameters were statistically significantly different between the two groups. The results also showed that correlations between the attributes were not significantly different across the two groups. In addition, it was shown that despite some differences of the mastery probabilities for all the attributes, mastery probabilities for none of the attributes were statistically different across the two groups. Model selection at item level showed that the from among the 18 items that required multiple attributes, 16 items picked different rules across the groups. On the face of it, it may seem that the relationship among the attributes of reading comprehension differs diametrically across the two groups. Nevertheless, a closer inspection of the rules picked by the items shows that almost in all cases the relationships were very similar. If an item in the female group picked a compensatory rule, it picked a rule belonging to the same family of rules in the other group. The implication of the results of the study is that when the DCM fits the data, model parameters are invariant across different groupings.

Keywords: Parameter invariance, Diagnostic classification models, G-DINA

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