New York State Regents Examination in Physics

Partial-Credit Model Item Analysis Summary

$$m_{Fk} \quad \frac{1}{n_{F\ k} \sum_{t} y_t n_{Ftk}}$$

is the mean item score of the focal group members at the kth level; and m_{Rk} is the analogous value for the reference group. As can be seen from the equation above, the SMD is the difference between the unweighted item mean of the focal group and the weighted item mean of the reference group. The weights for the reference group are applied to make the weighted number of the reference-group students the same as in the focal group within the same level of ability. A negative SMD value implies that the focal group has a lower mean item score than the reference group, conditional on the matching variable.

Multiple-Choice Items

For the MC items, the MH odds ratio (converted to the ETS delta scale [D]) is used to classify items into one of three categories of DIF.

The Odds Ratio

The odds of a correct response (proportion passing divided by proportion failing) are P/Q or P/(1 íP). The odds ratio is the odds of a correct response of the reference group divided by the odds of a correct response of the focal group. For a given item, the odds ratio is defined as follows:

$$\text{Ù}_{\text{ÆÁ}} = \frac{2_{\text{å}}\,\text{¤}3_{\text{å}}}{2_{\text{Ù}}\,\text{¤}3_{\text{Ù}}}$$

and the corresponding null hypothesis is that the odds of getting the item correct are equal for the two groups. Thus, the odds ratio is equal to 1:

$$\text{Ù}_{\text{ÆÁ}} = \frac{2_{\text{å}}\,\text{¤}3_{\text{å}}}{2_{\text{Ù}}\,\text{¤}3_{\text{Ù}}} = 1$$

The Delta Scale

To make the odds ratio symmetrical around zero with its range being in the interval í ’ W R , the odds ratio is transformed into a log odds ratio according to this equation:

$$_{MH} = \ln(._{MH})$$

This simple natural logarithm transformation of the odds ratio is symmetrical around zero. This DIF measure is a signed index; a positive value signifies DIF in favor of the reference group, a negative value indicates DIF in favor of the focal group, and zero has the interpretation of equal odds of success on the item. $_{MH}$ also has the advantage of a linear relationship to other interval scale metrics (Camilli & Shepard, 1994). $_{MH}$ is placed on the ETS delta scale (D) using the following equation:

$$D = \text{í}2.35\ _{MH}$$

Test														

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Test	Form	Type	Item	Max	N-Count	RID	S1	S2	INFIT
2014_PHYS	841	CR	42	1	1052	í0.1700			0.79
2014_PHYS	841	CR	43	2	1052	í0.4900	í0.0300	0.0300	0.76
2014_PHYS	841	CR	44	2	1052	0.0300	í1.7800	1.7800	0.99

Appendix F: Operational Test Maps

June 2014

[redacted]

Appendix G: Scoring Tables

June 2014

Raw Score	Ability	Scale Score
0	í6.245	0.000
1	í5.026	2.062
2	í4.310	4.013
3	í3.882	5.765
4	í3.572	7.540 5
5		