How to Build a Cognitive Ability Test with Reduced Mean Group Differences

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Abstract

- One can build cognitive ability tests with lower mean group differences using items with low g saturation and reducing the reliability of the test. Such a diminished g test predicts g related criteria worse than a g test with high g saturation and high reliability. Assertions about specific item types causing reduced mean differences are likely incorrect.

Challenges and Literature

- There are two challenges in building a general cognitive ability (g) test with low mean group differences.
- Challenge #1 is that there are large Black-White mean differences in g.
- Challenge #2 is that there are large Black-White mean differences in g.
- Spearman (1927) noted that the magnitude of mean Black-White differences co-varied with the extent to which a test was “saturated with g” (Spearman, 1927, p. 379).
- So what... unless so designated by other documentation.
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Empirical Demonstration

- Data from 12 cognitive scales administered to 927 respondents were used to estimate the g saturation of items.
- Scales comparing use of nonsense and real words were written to have the same logical structure which gives them similar g saturation.
- The Siena Reasoning Test shows reduced mean racial differences because it seeks to reduce reliance on prior knowledge, reduce the use of language, and incorporate graphical stimuli.
- Past research does not support the assertions about such item types because responsible for reduced mean group differences (Jenson, 1980, Raven et al., 1994, 1998).
- Test g saturation and test reliability are likely better explanations.
- If situational judgment tests and employment interviews correlate with g as well or better than the Siena Reasoning Test, should they also be called g measures?

Sample-Size-Weighted Correlations with g Tests

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Correlation with g</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 item tests</td>
<td>.32</td>
</tr>
<tr>
<td>40 item tests</td>
<td>.32</td>
</tr>
</tbody>
</table>

- If situational judgment tests and employment interviews correlate with g as well or better than the Siena Reasoning Test, should they also be called g measures?

Means of the standardized mean differences for 100 30-item tests vs. 100 40-item tests

<table>
<thead>
<tr>
<th>Type of Test</th>
<th>Low g</th>
<th>High g</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 item tests</td>
<td>.45</td>
<td>.57</td>
</tr>
<tr>
<td>40 item tests</td>
<td>.47</td>
<td>.58</td>
</tr>
</tbody>
</table>

- Mean reliability of 30-item low g tests was smaller (.80) than mean reliability of 30-item high g tests (.84). Similar findings (.86 vs .88) were found for 40-item tests.

- For predicting educational attainment, mean correlations for 30-item low reliability tests were lower than for 30-item high g tests (.08 vs..13). Similar findings (.09 vs..13) were found for 40 item tests.

References


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