
How To

A PRACTICAL GUIDE TO PSYCHOMETRICS

Estimate the effects of a change in length of a test on reliability and validity

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How to 1. Estimate the effect of shortening or lengthening a test on its reliability

Use this formula

$$\hat{r}_{xx} = \frac{mr_{xx}}{1 + (m - 1)r_{xx}}$$

m = length of new test divided by length of old one.

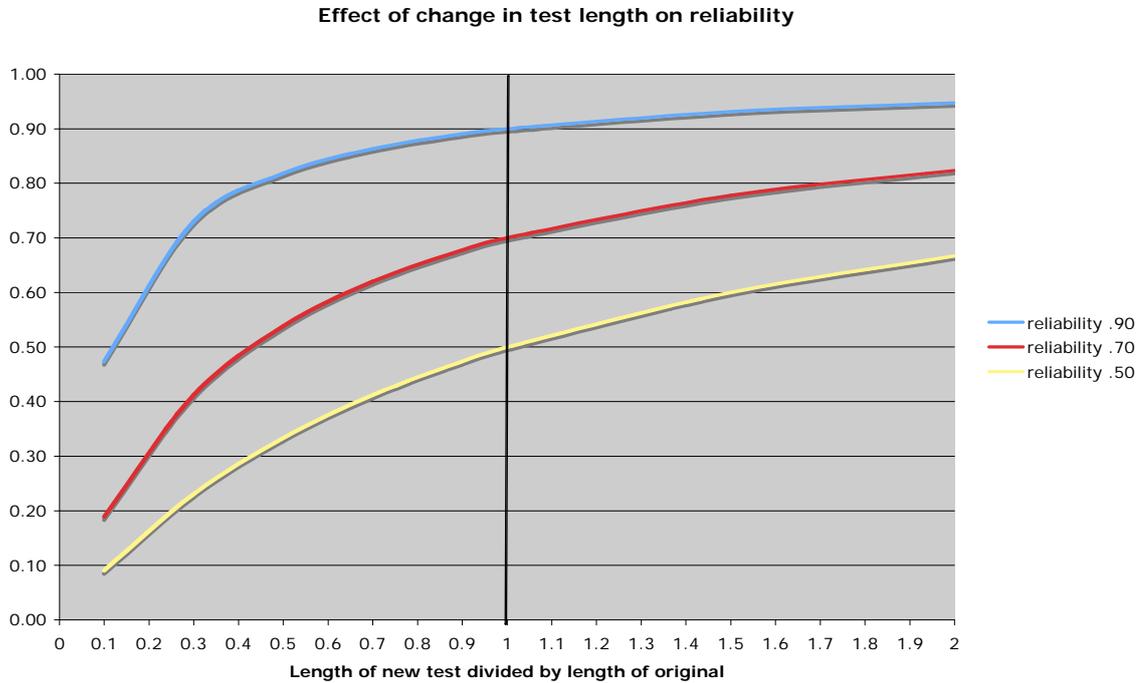
Example. What would you do to the reliability of a test if you decided to only give every third item, supposing that the test has a reliability of .90?

Placing the values in the formula we would get.

$$\hat{r}_{xx} = \frac{.33 \times .90}{1 + (.33 - 1).90} = \frac{.30}{.40} = .75$$

Supposing that someone had obtained an IQ of 111 on the unshortened test, the 95 percent limits for the range within which the true score would lie would be: 103.5 to

118.5 . With the shortened test they would be: 96.2 to 125.7. Finally, here is a graph showing the effects of change in test length on reliability



How to 2. Estimate the effect of a change in reliability on test validity

Reducing the reliability of a test will reduce its validity.

The formula for estimating the reduction is:

$$\hat{r}_{xy} = r_{xy} \sqrt{\frac{r'_{xx}}{r_{xx}}}$$

Where:

r' is the new reliability coefficient.

So, if an intelligence test had a validity coefficient of .70 as a predictor of reading ability, reducing reliability from .90 to .75 would reduce validity from .70 to .64.