

Psychometrics

Catell's Gc (crystalised) and **Gf** (fluid) intelligences are second-order factors, related to the tertiary (third order) factor **G** and the primary factors Verbal, Numerical, Mechanical ability etc.

Costa & McCrae's (1992) Big Five model has 5 fourth-order factors, 15 third orders, 30 second orders and 90 first order factors.

Eysenck's Three Factor Theory (197X) can be reduced from 18 scales in to 3 factors: Extraversion, Neuroticism and Psychoticism.

There are two methods: The Kaiser Eigenvalue Criterion and the Scree Plot. The former is often misleading whereas the second is better (the cut off point is where the line changes slope)

How do we know how many factors to extract?

Factor Rotation
The aim here is to maximise interpretability. Without this, factor analysis shows multiple variables having moderate loadings on multiple factors. It's better to have each factor with a few high loading variables.

Orthogonal Rotations keep all factors at right angles and do not allow them to intercorrelate.

Oblique Rotations allow factors to intercorrelate if necessary. But these are harder to interpret.

Convergent Validity The degree to which scores on a test correlate with variables they are supposed to correlate with.

Discriminant Validity The degree to which scores do not correlate (or are orthogonal to) variables they are not supposed to correlate with.

Construct Validity The degree to which a test measures a specified construct as determined by the interpretation of the psychological meaning of the scores.

Criterion Validity The degree to which scores on a test correlate with scores on a relevant external criterion.

Predictive Validity The degree to which scores on a test predict future behaviour on a criterion.

Concurrent Validity Based on the correlation between predictor and criterion scores (self reported and clinically diagnosed depression).

Congruent Validity The degree to which a new test correlates with extant measures of the construct (difficult as extant measure must be valid to be meaningful).

Face Validity Experts review test content to determine if they are appropriate 'on their face'

The extent to which the observed effect is cause only by the experimental treatment.

Six well known confounding variables: History, Maturation, Mortality, Instrumentation, Statistical Regression and Selection.

Factor Analysis

Principal factor/component analysis are statistical methods used to reduce the dimensionality of a correlation. The researchers interest is to find which the variables in a particular set form coherent and relatively orthogonal subsets. Highly correlating factors are grouped in to components or factors.

External Validity

Validity

The property that a measurement instrument measures what it claims to measure. (it is somewhat subjective in comparison to reliability).

Internal Validity

The standard experimental procedure is to monitor behaviour under different conditions. Different IVs are said to elicit different behaviour. The **assumption** is that people are similar, or at least relatively consistent over time

In one of the most famous addresses to the APA, Cronbach outlined the difference between **Correlationists vs. Experimentalists.**

"Everything that exists, exists in some quantity and can therefore be measured" Thorndike

Measurement is the systematic assignment of numbers to represent quantitative attributes of objects or events. It is crucial to falsifiability.

Psychometrics concerns the scientific measurement of individual differences.

Psychometrics has been boosted by cheap computing power and some truly gifted statisticians.

Reliability

The dependability of a measurement instrument OR the extent to which a measurement can be replicated.

Internal Consistency Measured by Cronbach's Alpha. It measures the homogeneity of the test (the degree to which the various parts of an instrument measure the same variable). "Do all 25 questions measure happiness or is there a lot of error?"

<.60 is poor, .60-.70 is adequate, >.90 is perhaps too good.

Alternate-Forms Reliability Conduct two tests of equal length by randomly sampling from the same domain. A pearson correlation coefficient between these two sets is an estimate of the reliability.

Parallel-forms Reliability Involves two tests comprising items of the same difficulty. Again, correlation coefficient determines reliability.

Split-Half Reliability Randomly split tests into two halves. Calculate correlation coefficient between them.

Test-Retest Reliability (A.K.A Temporal Stability). Same test administered on two different occasions. Pearson correlation between them.