Psychology: Individual Differences, Personality and Assessment Lecture Notes

Lecture 1:

Introductory Lecture:

4 Series:

- Psychometrics and Personality (7)
- Bias in Decision Making (3)
- Intelligence (9)
- Applied Individual Differences (5)

Lecture 2:

Introduction:

- Individual Differences in Psychology
- Differential Psychology
- Personality Psychology
- Intelligence

Dispositional Attributes: abilities, interests, personality.

Background: Individual Differences:

- Two approaches in scientific Psychology
  - Experimental vs. Correlational
- Structure of individual differences
- Determinants of Individual differences
- Individual differences constructs are latent
  - Do they actually exist?
  - Can they be measured?

Psychometrics: is the branch of psychology concerned with the measurement of individual differences.

- Psychometric tests measure individual differences
- Measurement of latent constructs is controversial
- Psychometric tests measure traits
- Users of psychological tests should have an understanding of their construction, validation and the assessment of measurement error and bias.
- Measurement in Science:
  - The scientific method has an essential component: precise measurement
  - Scientific measurement assumes that any attribute has quantitative structure
  - Demonstration of quantitative structure is at the basis of scientific measurement
  - Scientific measurement requires: units of measurement, quantitative structure and ratio scales
- Measurement in Psychology:
  - Traits are sometimes defined by the tests that measure them
  - Demonstration of quantitative structure is either ignored or quantitative structure is assumed
  - Stevens (1946): Measurement is the assignment of numerals to objects or events
  - No units of measurement, no ratio scales, assignment of numbers by rules
  - Psychological measurement is not like measurement in the physical sciences.
  - We know that there is a literature based on psychometric testing; psychometric theories of abilities and personality are coherent, psychometric tests are useful.
  - Psychometric tests (perhaps) measure on an interval scale (there is no true zero)
  - Even though psychometrics is different from measurement in the natural sciences, it seems powerful in psychology
- Good psychometric tests – should measure only one trait (or state) **unidimensionality**
- Scores should be accurate – little influence of random errors **reliability**
- Inferences about the meaning of a score should be correct **validity**
- Should have discriminatory power **large scatter of scores**
- The true score model – classical model of test error:
  - Model assumes test scores comprise two sources of variance – true score variance and error variance.

    - Obtained score = true score + measurement error
    - True score is the score an individual would obtain if all possible test items in the relevant universe of test items were administered.
    - The items in a test are conceptualised as a random sample of the universe of relevant items.
- Reliability – a reliable measurement is one that is without variation regardless of when the measurement is made or who makes the measurement. In psychometrics, we concern ourselves with two types of reliability: Internal consistency reliability and test-retest reliability. Ultimately, these are closely related.
    - Internal Consistency Reliability - the extent to which each item in a test is measuring the same thing. We measure internal consistency reliability using Cronbach's Alpha. Internal consistency reliability should be high, (but not too high) a lower limit of 0.7 is usually given.
    - Cronbach's Alpha: increases as the intercorrelations among test items increase and indexes internal consistency reliability of test scores. Intercorrelations among test items are high when all items measure the same construct. All else being equal, the more items in the test the higher the Cronbach's alpha
    - Test-Retest Reliability: temporal stability of a test. The extent to which scores on a trait stay more or less constant over time. Measured by administering the test to the same group of people on two occasions. Should be as high as possible but this assumed that nothing relevant has happened between the two administrations. Will rarely be perfect, but can be as high as 0.9 for individually administered IQ tests.
- Validity: The assessment of validity tends to be more subjective than the assessment of reliability. Broad classes of validity.
    - Face Validity
    - Construct Validity (discriminant validity)
        - Convergent validity
        - Divergent validity
    - Criterion Validity: does it correlate with the criterion?
        - Predictive: test taken now predicts criterion assessed later; the most common type of criterion-related validity
        - Concurrent: test replaces another assessment; often the goal is to substitute a shorter or cheaper test
        - Postdictive: can I test you now and get a valid score for something that happened earlier? Least common type of criterion related validity.

Lecture 3:

Mean: summarises all the observations in the data set. It is the average of all the observations. Therefore the mean is sensitive to extreme observations. This disadvantage is outweighed by the fact that the mean is based on all observations.

Variance and Standard Deviation:

Sum of Squares SS is the sum of squared deviation scores. The variance of a set of observations if the averaged squared deviation of the data points from their mean. The standard deviation of a set of observations is the square root of the variance.

Covariance: is the degree to which they vary together; when the two variables vary from their means, do they do so together or independently?

Covariance and Correlation: covariance depends on the variances of both variables so the numerical value is hard to interpret as are any units of measurement it might have.

Correlation:

- Pearson correlation co-efficient
- A single numerical index of the degree to which two variables are related
- Interval or ratio scale of measurement
- Indicates magnitude and direction of the linear relationship between two variables
- Independent of units of measurement
- Varies between -1 and 1 (negative and positive correlation between linear relationship)

Latent variables: consider the personality characteristic extraversion – what do the variables have in common?

Nonformal Definitions:

- A variable that cannot be directly measured

- Hypothetical constructs that are real or created by researchers
- Realist vs. constructivist epistemologies
- A data reduction device
- Pragmatic approach.

Psychometrics: the true score model (classical test theory)

- Test scores have two sources of variance:
    - True score variance and error variance
    - Obtained score = true score + measurement error
- Measurement error is random
- True score is systematic. True score is the score an individual would obtain if all possible test items were administered – long run score.

Latent variables – general level (g) – primary test interpretation was focussed on variance associated with g (general intelligence).

Standard error of measurement:

- Follows from CTT
- Obtained score consists of true score and error
- How reliable is the obtained score?
- How much error?
- Are obtained scores reliably different?
- Standard deviation of scores of an individual tested repeatedly
- Estimated from test-re-test reliability (two testings)
- Higher reliability means smaller SEM
- Given one obtained score, we know 68% of scores for that person will be within one SEM of the obtained score.
- If we wish to conclude two scores are different, they need to be more than 2 SEM apart
- SEM for Neo-PI personality measures about 4 points

Factor Analysis: The goal d exploratory factor analysis is to reduce a large number of variables to a smaller number of factors.

- Understand the structure of a set of variables
- Questionnaire development
- Data reduction
- EPA works on covariance
- Shows the number of groups of items – number of distinct traits
- Shows which items belong to which groups
- Factor analysis can reveal causal influences – source traits.
- When we have more than two measurements on a sample of individuals the correlations between pairs of variables are presented as a correlation matrix

Interpreting factors: a factor is defined by its factor loadings.

- A factor is therefore interpreted by examining the variables that have high loadings on that factor
- What do the variables (items) have in common?