Instruments and Data Collection

February 25, 2004

Key concepts & relationships

- Constructs
- Variables
- Instruments

Construct

- An abstract idea
- Not directly observed
- Invented to explain behavior
- Examples include intelligence, personality, teacher effectiveness, creativity, ability, achievement, and motivation

How do you measure a construct?

- This idea is not without controversy
- Operational definitions are required
  - "Personality" can have two types: introverts and extroverts
    - Measure scores on a questionnaire or observe some specified set of behaviors

Variables

- Can assume one of a range values
- Multiple variables might be examined in order to begin to paint a picture of a construct
- Can be dependent, independent, manipulated, confounding, etc.

Instrument

- Developed or selected to collect information about variables
- For those doing a research proposal, your instrument should be discussed in the Procedures section
- Thousands are available for such areas as achievement, personality, attitude, interest, and aptitude.

Types of instruments

- Cognitive
- Affective
- Projective

Cognitive tests

- Achievement - measures what one has been taught
- Aptitude - measures things not taught in school to attempt to predict future performance

Affective tests

- Attitude scales - beliefs or perceptions about self, others, variety of situations
  - Commonly uses Likert scales and rating scales
- Interest inventories - Asks for likes and dislikes and compares to known patterns
  - Vocational uses
- Personality inventories - Analyzes behaviors, e.g. Myers-Briggs

Projective tests

- Not obvious to test takers
  - E.g. inkblot test
  - Word association is common
  - Used by psychologists

Characteristics of instruments

- Validity
  - Concerned with appropriateness of the test score interpretations
  - Does it measure what it purports to measure?
- Reliability
  - Does the test measure reliably? Will results be generally consistent?

Types of validity

- Content validity
  - Often called “face” validity
  - Does it appear to measure what it should
  - Individual items must be relevant
  - Test items should cover the range of content appropriately

More on validity

- Criterion-related validity
  - Concurrent validity - compares instrument to other instruments that measure the same thing
  - Predictive validity - Attempts to predict future performance, e.g. GRE

Even more on validity

- Construct validity
  - Attempts to determine if the test validly represents the construct of interest

Recap of validity

- Content
- Criterion-related
  - Concurrent validity
  - Predictive validity
- Construct

Reliability

- Dependable or trustworthy
- Scores should be relatively consistent, called test-retest reliability
- Instruments can be reliable without being valid. For example, I would reliably score poorly on a test in molecular biology
- Instruments can not be valid if they aren't reliable

Ways to determine reliability

- Stability
  - Test-retest, stable over time
- Equivalence
  - Two forms of test should yield same results
- Internal consistency
  - Test items are similar to each other in content. E.g. split-half reliability
- Scorer/rater
  - Extent that different graders agree on the scoring

Gathering info on instruments

- Mental Measurements Yearbook
- Tests in Print (bibliography of commercially available tests)
- ETS Test Collection Database
  - http://www.ets.org/testcoll/index.html
- Review the literature