

Research Methods in Psychology

Variables in Research



What We Will Cover in This Section

- Nature of variables.
- Measuring variables.
 - Reliability.
 - Validity.
- Measurement Modes.
- Issues.



What Does Variable Mean?

- Experimental Research
 - Independent V.
 - Dependent V.
 - Confounding V.
- Correlational Research
 - Criterion V.
 - Predictor V.
 - Intervening V
- Measurement
 - Manifest V.
 - Hypothetical V.

• Definition

Any object or event that can take on more than one form or value.

Question?

Suppose you were asked to design a study to evaluate the impact of sleep deprivation on recall.

How would you assess recall?



9/20/2005

P767

bl

arch

4

Operational Definition

Defining a variable in terms of the techniques the researcher will use to measure or manipulate it.

9/20/2005

P767

bl

arch

5

Operationalizing

- **Benefits**
 - Removes vagueness
 - Aids in communication
 - Helps replication.
- **Issues.**
 - Rarely one way to define a variable.
 - Needs to be conceptually consistent with the underlying construct.
 - Leads to plethora of dissimilar research.

9/20/2005

P767

bl

arch

6

Problem of Reification

***Treating a construct
or its operational
measurement as a
thing that exists in
reality.***

9/20/2005

P767



arch

7

Psychological Measurement



9/20/2005

P767 Variables in Research

8

Subjective vs. Objective

- Subjective

*Person-specific
judgments of the
degree or amount of
something.*

- Objective

*Impartial judgment
of the degree or
amount of
something.*

Why would objective measurement be better?

9/20/2005

P767



arch

9

Phenomenonally Cool Demonstration



9/20/2005

P767

9/20

arch

10

Reliability

- Definition.

The consistency or stability in a behavioral measure.

- Measured by the correlation coefficient.
- Model

$$\text{Obtained Score} = \text{True Score} + \text{Error}$$

9/20/2005

P767

9/20

arch

11

1. Test-Retest Reliability

Index of the consistency of scores over time.

9/20/2005

P767

9/20

arch

12

2. Interrater Reliability

Index of the consistency between ratings given by two or more raters.



3. Alternate Forms

Demonstrating that two different forms of the same measure give the same score.



Sweeney's Measure of Verbal Fluency

Use each of the following words correctly in a sentence.

- | | |
|-----------------|----------------|
| 1. Cat | 6. Marble |
| 2. House | 7. Dog-flogger |
| 3. Automobile | 8. Variance |
| 4. Phrenologize | 9. Beetle |
| 5. Coat | 10. Crayon |



4. Internal Consistency

Index of how homogeneous (consistent) the individual items in a measure are.



Why Stability is Important

1. Compromises the conclusions that can be reached.
2. Compromises statistical analyses.
3. Sets limits on the validity.
 - Of the measure.
 - Of the study.



Validity

The extent to which the operational definition of a variable reflects the true meaning of the underlying construct.

Are we measuring what we say we are measuring?



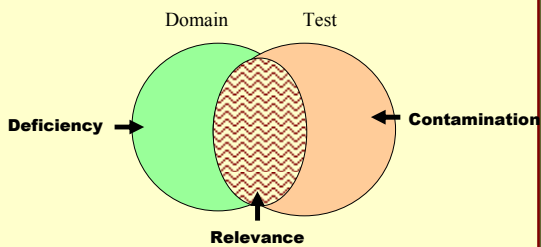
1. Face Validity

Does the measure look like it is measuring what you say it is measuring?.

2. Content Validity

Does the measure adequately assess the relevant content of the domain being sampled?

Model



What Good is It?

Does the measure cover a representative sample of the skills, abilities, knowledge, and/or behaviors relevant to the construct being measured?

9/20/2005

P767

bl

arch

22

Example: Ethics Quiz

1. Define and give an example of the term DEBRIEFING.
2. What group reviews human research to ensure that all risks to participants are minimized?
3. Recite the APA ethical standards for human research.

9/20/2005

P767

bl

arch

23

3. Criterion-Related Validity

Demonstrating that there is a relationship between a test (PREDICTOR) and some other measure (CRITERION).

9/20/2005

P767

bl

arch

24

Elements

Criterion	<i>A standard or measure of the accuracy of a decision or behavioral prediction.</i>
Predictor	<i>An assessment tool used to estimate a person's behavior.</i>
Validity Coefficient	<i>The correlation between test scores (predictor) and the criterion.</i>

9/20/2005

P767



25

3A. Predictive Validation

1. Test subjects (predictor).
2. Hire all subjects.
3. Wait.....
4. Collect criterion data.
5. Evaluate the relationship between the predictor and the criterion.

9/20/2005

P767



26

3B. Concurrent Validation

1. Get sample of incumbents.
2. Test sample (predictor).
3. Get performance data on sample (criterion).
4. Evaluate the relationship between the predictor and the criterion.

9/20/2005

P767



27

Comparison

Predictive	Concurrent
Uncontaminated Sample	Contaminated Sample
Positive Test Attitude	Negative Test Attitude
Full Range of Scores	Restricted Range of Scores
Strong Statistics	Weak Statistics
Takes Time	Little Time
Expensive	Thrifty

9/20/2005

P767

arch

28

4. Construct Validity

Demonstration that the test is measuring the hypothetical construct or trait that one claims it is measuring.

9/20/2005

P767

arch

29

Convergent vs. Discriminant Validity

- Convergent V. Evidence that the target measure is related to similar target measures.
- Discriminant V. Evidence that the target measure is NOT related to dissimilar measures.

9/20/2005

P767

arch

30

Correlations Between the Affect Scales and Measures of Emotion

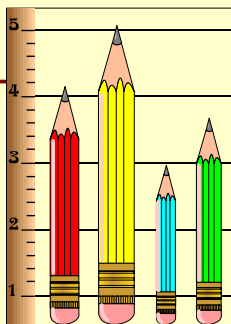
	Positive Affect	Calmness	Temperance	Tolerance	Emotionality
Negative Affect	.35*	-.48**	-.46**	-.28*	-.42**
Positive Affect		-.28	-.28*	-.09	.27

* = $p < .05$; ** = $p < .01$

Differential Validity

Situation that occurs when a measure is more valid for measuring one group than it is for another group.

Measurement Modes



Self-Report

- Advantages
 - Direct.
 - Easy.
- Issues.
 - Accuracy.
 - Reactivity.
 - Expertise.

9/20/2005

P767



arch

34

Behavioral Measures

- Advantages.
 - People may not be aware.
 - Automatic or unpremeditated behaviors.
- Issues.
 - Underlying causes.
 - Behavior may be situation specific.
 - Ethics.

9/20/2005

P767



arch

35

Physiological Measures

- Advantages
 - Best for biological variables.
 - Precision.
 - Non-reactive.
- Issues
 - Obtrusive.
 - Is there a relationship between physiological state and psychological state?

9/20/2005

P767



arch

36

General Measurement Issues



9/20/2005

P767: Methods of Research

37

Reactivity Problem

- Subject Reactivity.
A problem that occurs when the act of measuring changes a participant's response.
- Experimenter Reactivity.
A problem that results when an experimenter's knowledge of the research hypothesis influences his behavior toward the participant.

9/20/2005

P767: Methods of Research

38

Manipulating Variables

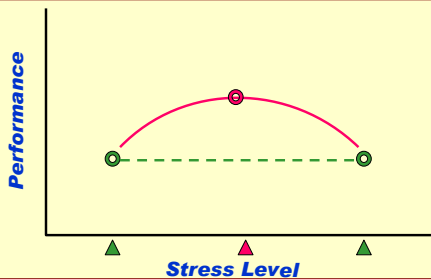
- Effective Range
 - Ceiling Effect
Measure is so easy that everyone does well.
 - Floor Effect
Measure is so difficult that everyone does poorly.

9/20/2005

P767: Methods of Research

39

Manipulating Variables How Many Levels?



9/20/2005

P767

BI-1

arch

40

Key Learning Points #1

1. Multiple operational definitions lead to diversity problems.
2. Understanding how variables are operationally defined is critical to understanding published research.
3. Assessing the reliability and validity of variables is important to assessing research.

9/20/2005

P767

BI-1

arch

41

Key Learning Points #2

4. It is better to have multiple measures of a variable from multiple modalities.
5. Understanding the potential for either subject or researcher reactivity is important for assessing the validity of research.

9/20/2005

P767

BI-1

arch

42

IMPORTANT

One key to the internal validity of a study is the extent to which the right variables have been measured in the right way.

9/20/2005

P767



arch

43

The End

9/20/2005

P767



arch

44
