

Advanced Tests and Measurement

Test Design and Item Analysis



4/8/2003

PSY 721 Item Analysis

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What We Will Cover in This Section.

- **Test design.**
 - Planning.
 - Content.
 - Issues.
- **Item analysis.**
 - Distractor.
 - Difficulty.
 - Discrimination.
 - Item characteristic.



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Test Planning: How to Use the Test

SCREENING	Assessing competence to perform some activity.
DIAGNOSIS	Evaluate exceptionality.
EVALUATION	What can the person do?
PREDICTION	What will the person be able to do?

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What Capacity to Assess?

- Ability
- Achievement
- Personality
- Skill
- Opinion
- Affect
- Attitude

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Cognitive Testing: Response Types

- Recognition
- Recall
- Constructed response
- Selection

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Scoring: Correction for Guessing

$$SCORE = RIGHTS - \frac{WRONGS}{k - 1}$$

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Affective Testing

- Projective
- Behavioral
- Theoretical

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Issues: Response Sets

Social Desirability	Answering in a socially acceptable fashion rather than how you really feel.
Agreement Bias	Tendency to agree with items.
Positive or Negative Response Bias	Favorable or unfavorable response set.
Checking Bias	Marking items even when unsure or unclear as to the answer.

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Scoring: Errors

- Halo Effect
- Leniency Error
- Severity Error

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ITEM ANALYSIS

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What Is It?

A group of statistics used to assess whether a test item is doing a good job of measuring the same thing that is measured by other test items.

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Ideal

Everyone who knows the item gets it right/correct, and people who don't know the item will have responses equally distributed across the wrong answers.

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Example

Which of the following has been a professor in the Psychology Department at California University of Pennsylvania?

- A. Max Gonano
- B. Dee Stalvey
- C. Theresa Polensky
- D. Randy Bookshar
- E. Dorothy Switzer



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Goal of Item Analysis

Improve the test by...

1. Identifying the good items.
2. Identify the items that need to be revised or discarded.
3. Identify what people do and do not know.

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Types

1. Distractor Analysis
2. Item Difficulty Analysis
3. Item Discrimination Analysis
 - A. D
 - B. PHI Coefficient
 - C. Item-total correlation
 - D. Inter-item correlations
4. Item Characteristic Curves

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Distractor Analysis

1. Want wrong answers to be equally distributed across distractors.
2. Popular distractors.
3. Unpopular distractors.

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Item Difficulty

$$p = \frac{\text{Number correctly answering the item}}{\text{Number taking the test}}$$

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What Good Is It?

When p is low.	< .20	Difficult test
When p is moderate.	.20 to .80	Moderate test
When p is high.	> .80	Easy test

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Question?

- When would you want a test with a high p value?
- When would you want a test with a low p value?



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Item Discrimination

The extent to which an item differentiates people on the behavior that the test is designed to assess.

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Discrimination Index (D).

1. Divide the sample into a TOP group and BOTTOM group.
2. Compute Discrimination Index (D).

$$D = p_{\text{Top Group}} - p_{\text{Bottom Group}}$$

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PHI Coefficient (N)

	Pass (1)	Fail (0)
Get item Correct (1)	40	10
Get item Wrong (0)	12	38

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Item – Total Correlation

Correlation between each item and the total test score.

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Item Characteristic Curve

A graphic representation of the probability of choosing a correct answer to an item as a function of the level of the attribute being measured.

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