

Advanced Tests and Measurement

Cognitive/Aptitude Testing



What we Will Cover in This Section

- Theories
 - Early Theories
 - Contemporary
- Intelligence Tests
- Stanford Binet



What is it?

Capacity to deal with new and complex situations?

- A construct, not a thing.
- Not defined in terms of one type of behavior.
- Should be related to success in a variety of cognitively demanding activities.

Early Theories of Intelligence

General Intelligence
vs.
Specific Abilities

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Factor Analysis

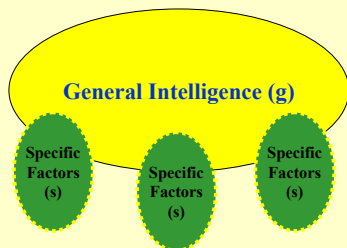
Test	Factor I	Factor II
Vocabulary	.91	-.06
Analogies	.75	.02
Sentence Completion	.80	.00
Disarranged Sentences	.39	-.02
Reading Comprehension	.86	-.04
Addition	-.09	.55
Multiplication	.07	.64
Arithmetic Problems	.18	.68
Equation Relations	.16	.54
Number Series Completion	.13	.38

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Spearman's Two Factor Theory



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Spearman's Test Score

$$\text{Test Score} = G + S + \text{error}$$

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Thurstone's *Primary Mental Abilities*

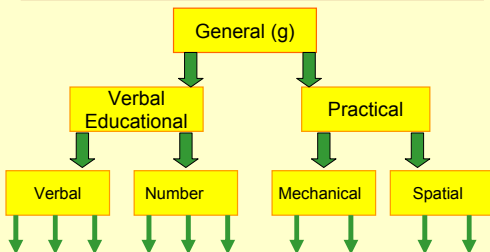
1. Verbal Comprehension
2. Word Fluency
3. Numbers
4. Space Visualization
5. Associative Memory
6. Reasoning
7. Perceptual Speed

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Vernon's *Hierarchical Model*



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Contemporary Theories



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Sternberg *Information Processing*

Intelligence is not the things you process, but how you process the things.

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Sternberg's Intelligences

1. COMPONENTIAL INTELLIGENCE
Capacity to learn and acquire information
2. EXPERIENTIAL INTELLIGENCE
Processing acquired information to solve problems.
3. CONTEXTUAL INTELLIGENCE
Practical problem solving. 'Street Smarts.'

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Gardner's *Multiple Intelligences*

Intelligence is the ability to solve problems and/or to create products which are valued in one or more cultural contexts.

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Gardner, cont.

1. Linguistic
2. Logical-Mathematical
3. Spatial
4. Musical
5. Bodily Kinesthetic
6. Intrapersonal
7. Interpersonal

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Characteristics of a Good Intelligence Test.

1. Broad sample of cognitively demanding tasks.
2. Broad sample of items.
3. Focus on aptitude, not achievement.
4. "Indifference of the indicator"

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Types of Intelligence Tests

- Individual vs. Group
- Speed vs. Power
- Child vs. Adult
- Broad vs. Limited

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Types of Intelligence Tests



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Stanford-Binet

- Publisher: Riverside Publishing
- Level C
- Edition: Fourth
- Costs
 - Examiner's Kit: \$744.00
 - Administration Guide: \$69.50
 - Technical Manual: \$31.50
 - Record books: \$78.50 (35)
- Training time: 45 hours

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Stanford-Binet: History

- 1905 Binet's first edition.
- 1916 Published in U.S. By Terman
 - Two parallel forms by 1937.
- 1960 Combined two forms but no major restandardization.
- 1972 Restandardized with little major change to content.
- 1986 Major technical revisions

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Stanford-Binet: Theory

- Basically atheoretical, no particular model.
- Implementation reflects Spearman two-factor theory.

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Stanford-Binet: What Measured

1. Verbal Reasoning
2. Quantitative Reasoning
3. Abstract/Visual Reasoning
4. Short Term Memory

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Stanford-Binet: Administration

Adaptive
Testing

*Modify the level of the items
based on the subject's prior
responses.*

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S-B: Administration, cont.

Step 1. Determine ENTRY LEVEL

Step 2. Administer sub-test.

- A. Establish BASAL LEVEL
- B. Establish CEILING LEVEL

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S-B: Scoring

RAW SCORE = $\frac{\text{Number of the highest item completed}}{\text{Number of attempted items that were failed.}}$

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S-B: Norms

Age Groups:

- 2 - 5 at four month intervals.
- 6 - 10 at six month intervals.
- 11 - 17 at 1 year intervals.
- 18 - 23.

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S-B: Norms, Cont.

Subtests: STANDARD AGE SCORE (SAS)

Mean = 50
Standard Deviation = 8

Area and Composite

Mean = 100
Standard Deviation = 15

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S-B : Standardization

- Approximately 5,000 cases, 2-23 years old.
- Based on 1980 census (gender, sex, ethnic group, region).
- Socio-economic level.

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S-B: Reliability

- Internal Consistency
 - .95 - .99
 - Standard Error: 2 to 3 points
- Test-Retest (2-8 months)
 - .90

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S-B: Validity

Factor Analysis

- Substantial intercorrelation (g)
- Other systematic variance (s)

Convergent validity

- Correlated with earlier versions of the test.

Exceptional groups.

- Correctly identified gifted, retarded, learning disabled people.

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Issues: Stability

- Time.
 - Swedish study $r = .72$ in 10 year interval.
 - Correlations tend to decrease over time.
- Environmental Stability
 - Family
 - Socio-economic status
 - Culture
- Prerequisite Skills

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Issues: Early Childhood

- What is intelligence at 6 months?
- Pre-school tests.
 - Infants: no relation to later performance.
- Intelligence is fluid
 - Developmental changes.
 - Rapid changes over time.

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Issues: Adults

- Most tests developed and standardized with people in school.
- Tests of school-ability, people who study more have greater increases.
- Different life demands.

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The End

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