

Week 12

Intelligence



Measurement Of, History Of, Explaining
Group Differences, Culture & Intelligence

Definition of Intelligence

Sternberg et al., 1981

problem solving

- sees all aspects of a problem
- poses problems in an optimal way
- gets to the heart of problems
- makes good decisions

Verbal

- has good vocabulary
- reads with high comprehension
- is verbally fluent
- converses easily
- is well read

Definition: the capacities to acquire and retain knowledge and to understand concepts and relationships.

Factor-analysis Approach

Intelligence has various components referred to as **factors**.

E.g. Strong positive correlations (*vocabulary, sentence completion, paragraph comprehension*)

Underlying factor:
verbal ability

Question: Are different factors related to each other?

If so, a **general intelligence factor (g factor)** should account for such relationships (Spearman, 1927).

Opponent of G-factor Theory (Thurstone, 1938)

Ability	Measure
Verbal Comprehension	Test of vocabulary.
Verbal Fluency	Test that requires listing in a limited time as many words as possible that start with a given letter.
Inductive Reasoning	Test of analogies and number series
Spatial visualization	Tests requiring mental rotation of pictures and objects
Number	Tests of computation and simple mathematical problem solving.
Memory	Tests of pictures and word recall
Perceptual Speed	Tests that require finding small differences in pictures.

Alternative to Factor Analysis: The Information-processing View

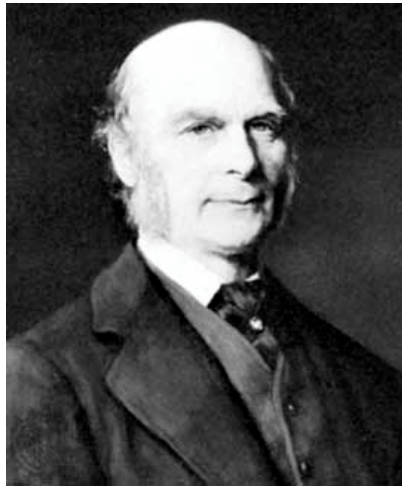
Goal: To understand the operations involved in 1) *planning a strategy*, 2) *monitoring its appropriateness*, and 3) *evaluating the quality of the solution that is reached*.

Example: Robert Sternberg (1984, 1985)

Good Test Taker vs. Poor Test Taker

Most intelligence tests today are still dominantly based on factor analysis.

Early History of Intelligence



Francis Galton
(1822-1911)

← Half Cousins →



Charles Darwin

Believed psychological traits
(intelligence and moral character)
are also genetically inherited.

Origin of Species (1859):
Evolution of physical traits

Eugenics

Intelligence testing for
selective breeding

History (cont).



Alfred Binet
(1857-1911)

They found that performance varied partly as a function of age

Mentally Retarded: Any child whose score was two years or more below the average for all children of that age .



William
Stern

Problem with Binet's formulation

Solution: Use the ratio between the between mental age and chronological age.

$$IQ = [\text{mental age} / \text{chronological age}] \times 100$$

Intelligence Quotient

Example: If a child has a mental age of twelve and a chronological age of ten, what is his/her IQ?

$$\text{IQ} = [12 / 10] \times 100 = 120$$



Lewis Terman

Brought Binet's test to America.

Stanford-Binet Test (1916)

New Directions in Intelligence Testing

- Howard Gardner (1986) observed how intelligence is defined in different cultures.
 - Criticized traditional IQ tests: tells only part of the story.
 - At best these tests measure only three components.
 - Language ability.
 - Mathematical-logical reasoning.
 - Spatial perceptual skills.

Gardner's theory includes: 1) musical ability; 2) bodily ability; 3) intrapersonal ability; and interpersonal ability.

Explaining Group Differences



Arthur Jensen

→ “It seems a not unreasonable hypothesis that genetic factors are strongly implicated in the average Negro-white intelligence difference.”

Problems With This Claim

- Relied on a theory that turned out to be based on “cooked” data.
- Flaw in the leap in logic between causes for individual differences and group differences.

Scarr & Weinberge (1976) demonstrated that origins of black-white intelligence differences are due to environmental factors.

Conclusions

- Intelligence involves the capacities to acquire and retain knowledge and to understand concepts and relationships.
- One approach to studying intelligence is **factor analysis**. Another approach is the **information-processing view**.

Conclusions (cont.)

- There are **individual tests** (e.g., Stanford-Binet, Wechsler scales) and **group test** (e.g., SAT). Group test, in particular, need to be complemented with other indicators to assess aptitude and/or intelligence.
- Even though there is a heritability factor to intelligence, there is an equally large influence from environment.

Conclusions (cont.)

- IQ Tests have been criticized as assessing mainly the knowledge and skills of the white middle class.
- Recent evidence pointing to qualitative differences in information processing across cultures suggest that ultimately intelligence indicates mental competencies that can only be judged in their appropriate environmental and cultural context.
- However, whether a truly culture-free IQ test can be developed and whether there is a need for such a test are still debated topics.