

Intelligence

Cognition (Van Selst)

INTELLIGENCE

What is intelligence?

- Mutli-component versus monolithic perspective
 - little g (monolithic [Spearman])
 - [Guilford, Catell, Gardner, ...]

Two distinct historical approaches

PSYCHOPHYSICAL/PHYSICAL ABILITY: Francis Galton (1883) describes intelligence as a function of psychophysical ability and perceptual sensitivity (weight discrimination, pitch sensitivity, physical strength, etc). Wissler (1901) was unable to detect links among the assorted tests (i.e., no unifying associations were found) and the tests did not predict college grades.

COGNITIVE ASPECTS: Alfred Binet (Binet & Simon, 1916) was interested in three aspects of intelligence: Direction, Adaptation, and Criticism. The original interest was in the assessment of mental age the average level of intelligence for a person of a given age. Note that the intent of Binet's work was to predict which children would benefit from which types of educational approach. Interestingly (in comparison to the head start program), the idea was that intelligence was stable and that educational opportunity could be tailored to intelligence (head start's stated goal is to increase intelligence).

- Lewis Terman (Terman & Merrill, 1937)'s Stanford-Binet Intelligence test and David Weschler's Weschler adult Intelligence Scales (WAIS-III) [and WISC-III] are widely used today.

Galton

- Believed that with scientific labor, anything can be measured and that measurement is the primary criterion of a scientific study.
- Proposed the inheritance of intelligence
- Established a lab at the International Exposition in 1884
 - his interest of measuring skulls and bodies peaked then

Broca

Believed in the relationship between size and volume of brain and degree of intelligence.

- “the study of the brains of human races would lose most of its interest and utility” if variation in size counted nothing for (Gould, p. 115)

Proposed that the brain is larger in men versus women, eminent men versus men of mediocre talent, adults versus elderly, superior races versus inferior races.

- Assumption: Human races could be ranked in a linear scale of mental worth

Broca's facts were reliable *but*

- He gathered these facts selectively and manipulated them unconsciously to support favored conclusions

Broca's numbers were not fudged *but*

- He selected among numbers or interpreted them to support his prior conclusions.

The Weschler Scales produce three values: verbal, performance and an overall score.

The verbal score depends on:

- Comprehension (social knowledge/sayings)
- vocabulary (definitions of words)
- information similarities (how are two concepts similar?)
- arithmetic (simple numeric problems such as amount of change)
- digit span

The performance score is based on:

- Object assembly (using block shapes)
- Block design (producing a pattern match)
- picture completion (what is missing from this picture?)
- picture arrangement (tell a story in chronological order)
- digit symbol (symbol-digit transcription)

Intelligence: beyond test scores

Weschler, like **Binet**, had a conception of intelligence beyond test scores and school performance.

Spearman's 'g' factor: the single common aspect that comes out as a shared element across many divergent measures of intelligence. originally conceived of as the central aspect or 'mental energy' of intelligence (as opposed to the specific abilities uniquely measured by each individual test).

Thurston: saw intelligence as composed of seven primary abilities (derived via factor analysis)

- Verbal Comprehension
- Verbal Fluency
- Inductive Reasoning
- Spatial Visualization
- Number
- Memory
- Perceptual Speed

More Intelligence

Guilford: extreme view of intelligence as composed of (up to) 150 abilities & factors the most valuable contribution is that we do explicitly consider various kinds of mental problems, contents, and products in our views and assessments of intelligence.

Cattell (Vernon): hierarchical model of intelligence. Cattell's model consists of two general subfactors for intelligence:

- Fluid ability (speed and accuracy of abstract reasoning of the type required for novel problems) and
- crystallized ability (accumulated knowledge and vocabulary). (Vernon divides between practical-mechanical and verbal-educational).

Gardner: multiple intelligences; another domain specific conceptualization of a variety of intelligences (rather than a Spearman's monolithic 'g')

Sternberg: Triarctic view of intelligence: three components (Analytic, Creative, Practical) intelligence aspects are used (typically conjointly) for problem solving, etc.

Jensen (RT prediction of intelligence)

WARNING NOTE ON INTELLIGENCE TESTS

- very susceptible to 'testing effects'
 - How you ask the questions can determine the answers you receive (e.g., U.S. Immigration testing that found more foreigners to be 'sub-intellectual' due to the use of biased testing procedures).
- Heritability: the allocated role of nature versus nurture depends on the range of genetic variation or the environments that the individuals developed in.
 - The summary is that heritability indexes do not generally accurately represent what they purport to.