Chapter 9

Intelligence and Psychological Testing

Types of Psychology Tests

These tests are standardized measures of behaviour. Most tests fall under two categories, your mental ability tests and your personality scale.

- Mental ability tests
    - intelligence
    - aptitude
    - achievement

- Mental ability tests include intelligence tests, which are designed to measure general mental ability, and aptitude tests, which measure more specific mental abilities.

- *Personality* measures are usually called scales, rather than tests, as there are no right or wrong answers.

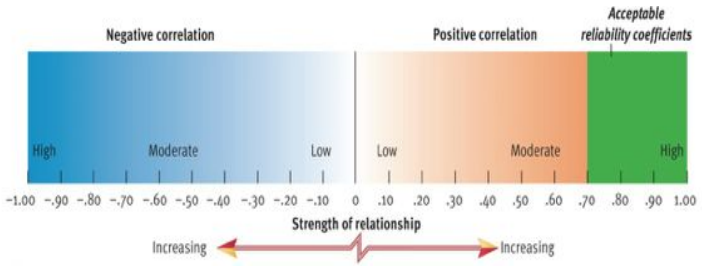
- *Personality tests* measure a variety of motives, interests, values, and attitudes.

Key concepts for psychological testing

- Standardization
    - This refers to the uniform procedures used in administering and scoring of a test.
    - Test norms - where an individual scores in relation to the rest of test scores.
    - The standardization group is the group of people the test norms are based off of

Principles of Validity & Reliability

- Reliability
    - correlation coefficient
        - Reliability refers to a test's consistency; that is, repeated measurements should yield reasonably similar results.
        - Reliability estimates are based on the correlation coefficient. Two sets of scores from two administrations of the same test are correlated; the closer the correlation comes to +1.00, the more reliable the test.
        - Positive correlation means that two variables co-vary in the *same* direction (variables increasing or decreases)
        - Negative correlation means that two variables co-vary in *opposite* directions.(One variable increasing while another variable decreases)
        - The closer the correlation coefficient gets to either –1.00 or +1.00, the stronger the relationship



- Validity (the ability of a test to measure what it was designed to measure)
    - content validity
        - Content validity is the degree to which the content of a test is representative of the domain it is supposed to cover; for example, physics questions appearing on a psychology test mean the test has poor content validity.
    - criterion-related validity
        - This is estimated by correlating subjects' scores on a test with their scores on an independent criterion—predictive ability (looking at test 1 and test 2. If similar score = high validity; if test 1 is high and test 2 is low = low validity)
    - construct validity
        - The extent to which there is evidence that a test measures a particular hypothetical construct: are we really measuring intelligence with an IQ test? (all questions relate to each other)

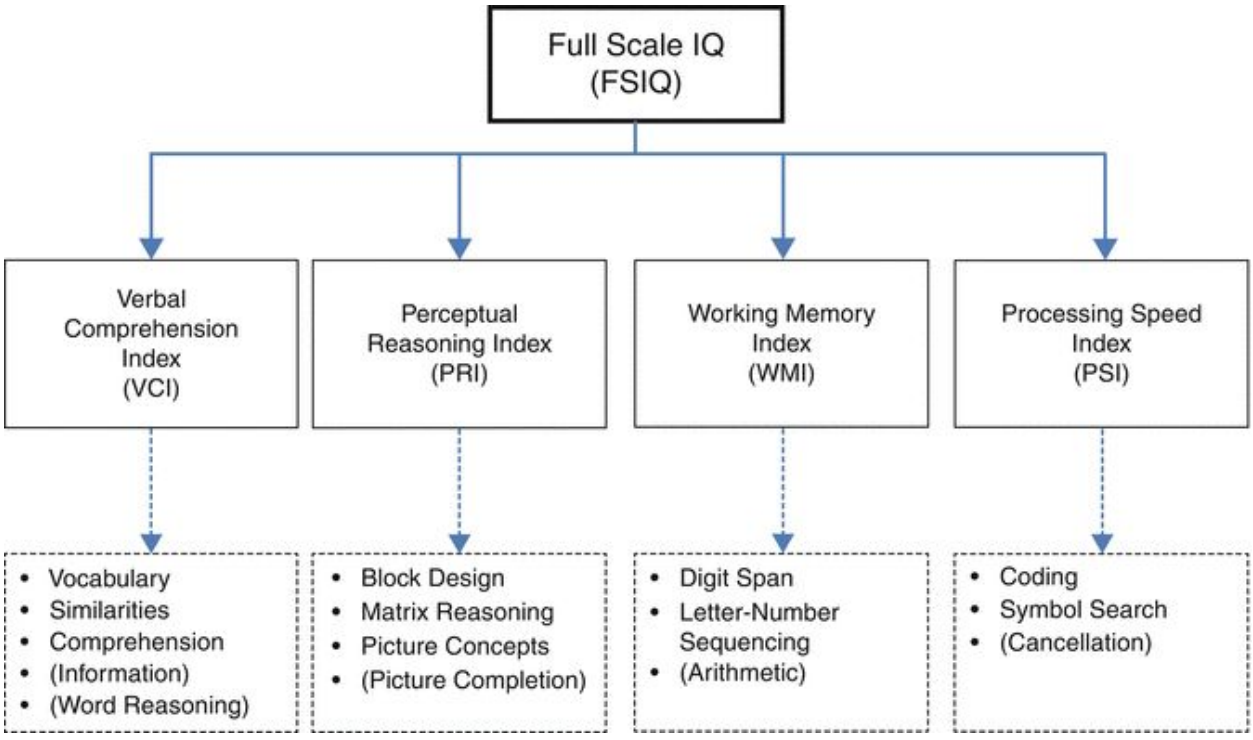
History of Intelligence Tests (Key Names)

Sir Francis Galton published *Hereditary Genius*, in which he put forth the notion that success runs in families because intelligence is inherited(Intelligence is genetic). He developed a crude mental abilities test based on sensory acuity.

Alfred Binet and Theodore Simon a test designed to single out youngsters in need of special training. The test expressed a child's score in terms of mental age; for example, a 4 year old child with a mental age of 6 performed like the average 6-year-old on the test.**Binet-Simon Intelligence Scale** is a cognitive ability and intelligence test that is used to diagnose developmental or intellectual deficiencies in young children. The test measures five weighted factors and consists of both verbal and nonverbal subtests. The five factors being tested are knowledge, quantitative reasoning, visual-spatial processing, working memory, and fluid reasoning. (chronological age compared to your actual mental age)

Lewis Terman Stanford University, revised Binet's test for use in the U.S: the Stanford-Binet.Terman used a new scoring scheme, the **intelligence quotient**: (Mental age / Chronological age) x100 ; this made it possible to compare children of different ages. (this gives you the intelligence percentage for any age)

David Wechsler - was the first to devise an instrument to measure intelligence in adults. He later devised downward extensions of his scale for children. Wechsler is credited with two innovations in intelligence testing. First, his scales give more emphasis to nonverbal reasoning, yielding a verbal IQ, a performance IQ, and a full-scale IQ.Second, Wechsler devised a new scoring system based on the normal distribution: the deviation IQ. The concept that intelligence involves the abilities necessary to succeed in life was one of Wechsler's major contributions to psychology. He promoted the idea that intelligence includes personality traits and emotional states, as well as mental abilities, and that all of these should be measured to assess intelligent behavior in one's environment. Wechsler also promoted the idea that educational, cultural, and socioeconomic factors must be considered when evaluating intelligence.



Extremes of Intelligence :

- Intellectual Disability & Giftedness

Intellectual Disability : Mental retardation is a diagnosis reserved for individuals with sub-average general mental ability accompanied by deficiencies in adaptive skills, originating before age 18.

4 Levels of intellectual disability

TABLE 9.2 Categories of Intellectual Disability

Category of Intellectual Disability	IQ Range	Education Possible	Life Adaptation Possible
Mild	55–70	Typically, Grade 6 by late teens; special education helpful; some graduate high school	Can be self-supporting in nearly normal fashion if environment is stable and supportive; may need help with stress
Moderate	40–55	Grade 2-4 by late teens; special education necessary	Can be semi-independent in sheltered environment; needs help with even mild stress
Severe	25–40	Limited speech, toilet habits, and so forth with systematic training	Can help contribute to self-support under total supervision
Profound	Below 25	Little or no speech; not toilet-trained; relatively unresponsive to training	Requires total care

Note: As explained in the text, diagnoses of intellectual disability should not be made on the basis of IQ scores alone.

2 causes : Biological & Environmental

- Biological : chromosome problems (more severe) less likely (Anything that alters the brain is biological)
- Environmental : Poverty, no nutrition,

-Giftedness :

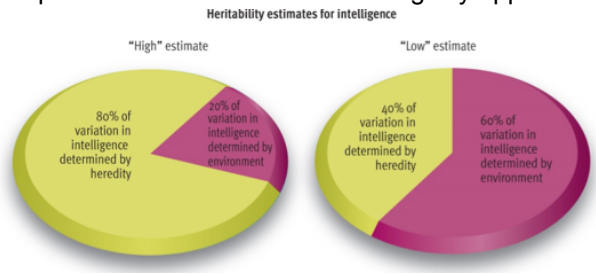
Often stereotyped as weak, sickly, socially inept, and emotionally troubled “bookworms.” , identification occurs based on IQ of 130 or higher, although creativity, leadership, and special talents are recommended for use in identification as well-

- Lewis Terman initiated a study of 1500 children with IQs of 150 or higher. These children were followed throughout their lives. As a group, these subjects exhibited better than average physical health, emotional stability, and social satisfaction through their adult years.
- Ellen Winner : Moderately(IQ = 130-150) vs Profoundly (IQ = 180+)
- Renzulli: 3 factors
    - High Intelligence
    - High creativity
    - High motivation
- Simonon : Undying motivation, (Drudge Theory)

Twin Studies

Heredity and environmental determinants of intelligence.

- Heredity :
  - family and twin studies
    - - Twin studies provide evidence regarding the role of genetic factors. The basic rationale is that identical and fraternal twins develop under similar environmental conditions, but identical twins share more genes; if identical twins end up more similar on a given
  - heritability estimates
    - A heritability ratio is an estimate of the proportion of trait variability in a population that is determined by variations in genetic inheritance. A heritability estimate is a group statistic and cannot be meaningfully applied to individuals.



- Environment
  - adoption studies
    - provide evidence that upbringing plays an important role in mental ability, as adopted children show some resemblance to their foster parents. Also, siblings reared together are more similar in IQ than siblings reared apart. In fact, entirely unrelated children who are reared together show resemblance in IQ
  - cumulative deprivation
    - hypothesis holds that children raised in deprived environments will experience a gradual decline in IQ as they grow older. Conversely, children removed from deprived environments and placed in homes that are more conducive for learning show IQ increases.
  - the flynn effect
    - is the trend, all over the developed world, for IQ scores to increase from one generation to the next. Hypotheses for why this occurs focus on environmental variables, as evolution does not operate in a generation.
  -
- Interaction
  - the concept of the reaction range
    - Theorists use the term “reaction range” to refer to genetically determined limits on IQ. The environment determines whether a person will fall at the upper or lower end of their genetically determined range.

Reaction Range : (sets limits on one’s intellectual potential)

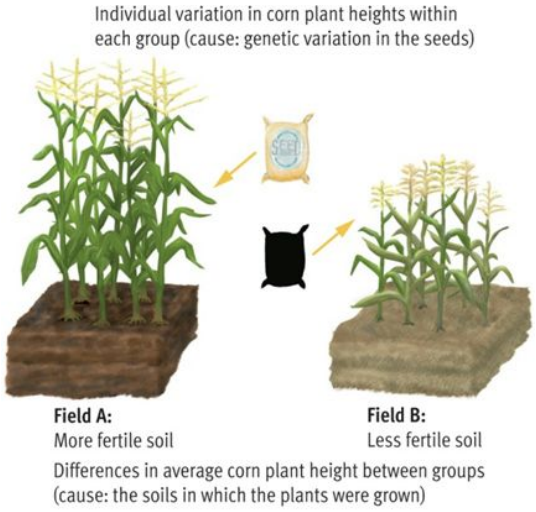
- Interaction between nature & nurture
- not born with set IQ - instead a range
- environment dictates where in that range

- range is bigger or smaller depending on genetics .

Results show that greater genetic similarity is associated with greater similarity in IQ, suggesting that intelligence is partly inherited (compare, for example, the correlations for identical and fraternal twins). However, the results also show that living together is associated with greater IQ similarity, suggesting that intelligence is partly governed by environment.

Cultural difference in IQ

- Heritability as an explanation
    - Arthur Jensen argued that cultural differences in average IQ are largely due to heredity
    - Herrnstein and Murray - authors of *The Bell Curve*, by implying that we are moving toward a meritocracy based on intellect, ignited the same controversy.These arguments have been challenged on a number of grounds. First, even if IQ is largely due to heredity, group differences may not be. Social class and socioeconomic disadvantage are correlated with ethnicity, so environmental variables are not equal between groups.
    - Philippe Rushton's book *Race, Evolution, and Behavior* - argued that genetics were the cause for intellectual and behavioural differences between cultural groups. His book was criticized as being based on bad science, sloppy reasoning, and inaccuracies.
- Environment as an explanation
    - Leon Kamins cornfield analogy - socioeconomic disadvantage - shows how between-group differences on a trait (the average height of corn plants) could be due to environment, even if the trait is largely inherited. The same reasoning presumably applies to ethnic-group differences in average intelligence.



    - Claude Steele - argues that derogatory stereotypes create feelings of vulnerability in the educational domain, undermining group members' achievement and performance on tests.
    - Cultural bias on IQ tests

Beyond Intelligence: New Directions

Moving beyond Spearman's *g*

- Increased emphasis is being placed on specific abilities rather than a general mental ability that Charles Spearman labelled *g*. Spearman used a statistical procedure called factor analysis to determine intercorrelated, specific mental talents (*s*) (concluding that all cognitive abilities share a common core). In contrast, **J.P. Guilford** asserts that intelligence is made up of as many as 150 distinct mental abilities.

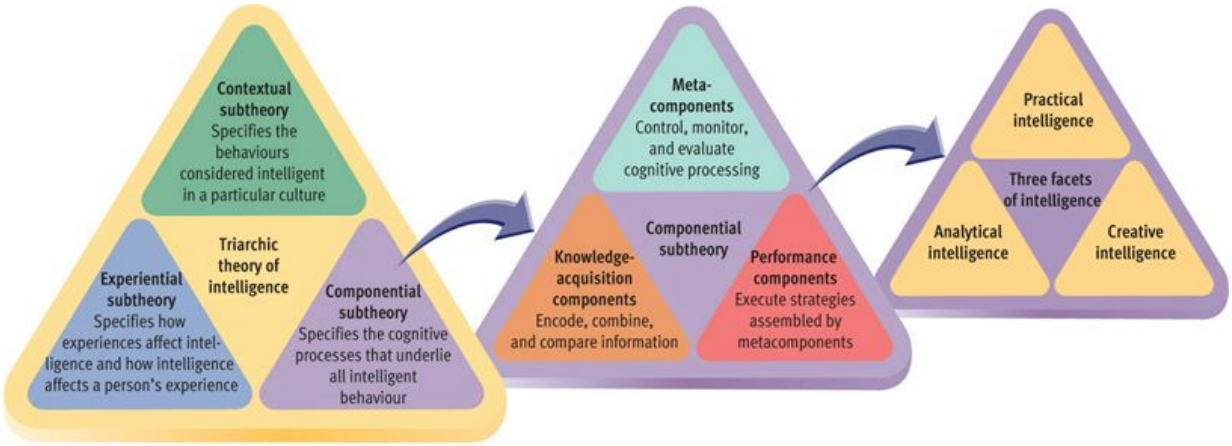
Fluid vs. crystallized intelligence

- Cattell and Horn suggest that *g* should be divided into fluid intelligence, which consists of reasoning ability, memory capacity, speed of information processing, and crystallized intelligence, which consists of the ability to apply acquired knowledge and skills in problem solving

TABLE 9.3 Gardner's Eight Intelligences

Intelligence	End-States	Core Components
Logical–mathematical	Scientist Mathematician	Sensitivity to, and capacity to discern, logical or numerical patterns; ability to handle long chains of reasoning
Linguistic	Poet Journalist	Sensitivity to sounds, rhythms, and meanings of words; sensitivity to the different functions of language
Musical	Composer Violinist	Abilities to produce and appreciate rhythm, pitch, and timbre; appreciation of the forms of musical expressiveness
Spatial	Navigator Sculptor	Capacities to perceive the visual–spatial world accurately and to perform transformations on one's initial perceptions
Bodily–kinesthetic	Dancer Athlete	Abilities to control one's body movements and to handle objects skillfully
Interpersonal	Therapist Salesperson	Capacities to discern and respond appropriately to the moods, temperaments, motivations, and desires of other people
Intrapersonal	Person with detailed, accurate self-knowledge	Access to one's own feelings and the ability to discriminate among them and draw upon them to guide behaviour; knowledge of one's own strengths, weaknesses, desires, and intelligences
Naturalist	Biologist Naturalist	Abilities to recognize and categorize objects and processes in nature

Adapted from Gardner, H., & Hatch, T. (1989). Multiple intelligences go to school: Educational implications of the theory of multiple intelligences. *Educational Researcher*, 18(8), 4–10. American Educational Research Association. Additional information from Gardner, 1998.


Contextual subtheory
Specifies the behaviours considered intelligent in a particular culture
Triarchic theory of intelligence
Experiential subtheory
Specifies how experiences affect intelligence and how intelligence affects a person's experience
Componential subtheory
Specifies the cognitive processes that underlie all intelligent behaviour
Meta-components
Control, monitor, and evaluate cognitive processing
Componential subtheory
Knowledge-acquisition components
Encode, combine, and compare information
Performance components
Execute strategies assembled by metacomponents
Practical intelligence
Three facets of intelligence
Analytical intelligence
Creative intelligence