

CHAPTER 8: INTELLIGENCE

What is intelligence?

The ability to solve problems and to adapt to and learn from life's everyday experiences

- The ability to solve problems
- The capacity to adapt and learn from experiences
- Includes characteristics such as creativity and interpersonal skills
- The mental abilities that enable one to adapt to, shape, or select one's environment
- The ability to judge, comprehend, and reason
- The ability to understand and deal with people, objects, and symbols
- The ability to act purposefully, think rationally, and deal effectively with the environment

As you think about what intelligence is, you should ask the following questions:

- To what extent is intelligence genetic?
- To what extent is intelligence stable?
- How do cognitive abilities interact with other aspects of functioning?
- Are there true sex differences?
- Is intelligence a global capacity (similar to "good health") or can it be differentiated into various dimensions (called "factors" or "aptitudes")?
- Are there a number of "intelligences"?

How do you measure intelligence?

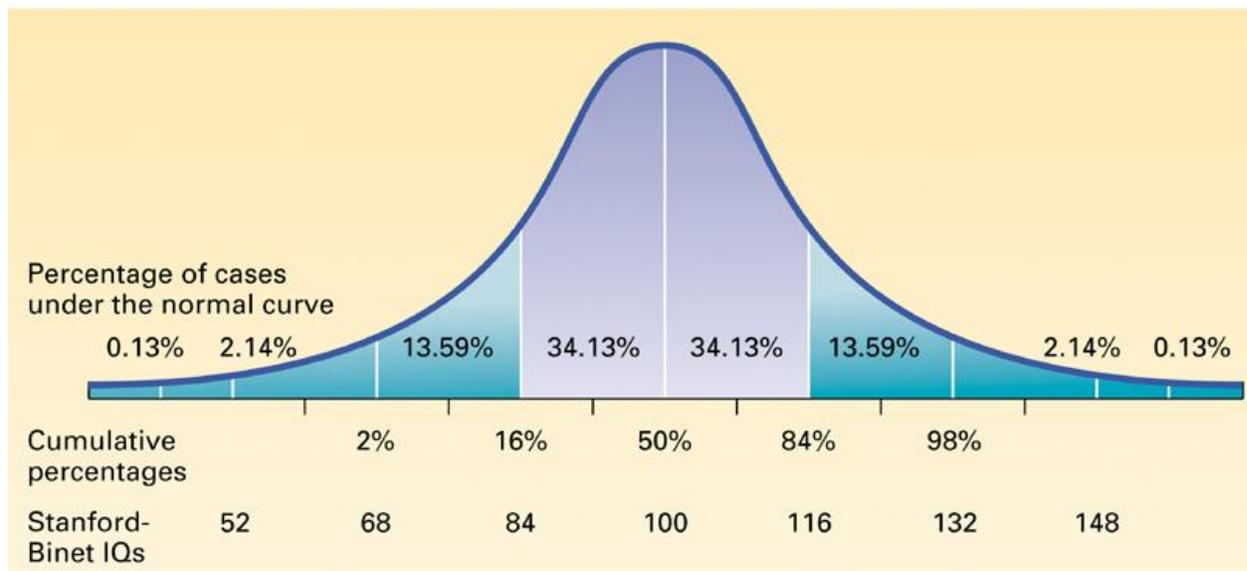
Intelligence Quotient (IQ): Measure of intelligence that takes into account a child's mental and chronological age

$$\text{IQ Score} = \text{MA} / \text{CA} \times 100$$

Mental age (MA): the typical intelligence level found for people at a given chronological age

Chronological age (CA): the actual age of the child taking the intelligence test

- People whose mental age is equal to their chronological age will always have an IQ of 100. If the chronological age exceeds mental age – below-average intelligence (below 100). If the mental age exceed the chronological age – above-average intelligence (above 100).



The normal distribution: most of the population falls in the middle range of scores between 84 and 116.

- Very Superior Intelligence (*gifted*) - Above 130
- Superior Intelligence - 120 to 129
- High Average Intelligence - 110 to 119
- Average Intelligence - 90 to 109
- Low Average Intelligence - 80 to 89
- Borderline Intellectual Functioning - 71 to 79
- Mild Mental Retardation - 55 to 70
- Moderate Retardation - 40 to 54
- Severe Mental Retardation - 25 to 39
- Profound Mental Retardation - Below 25

Intelligence tests were developed for the practical function of selecting students for admission or placement in schools. Originally these tests were not based on any theory of intelligence. They defined intelligence as the ability to do well in school.

Stanford-Binet

This test was developed to identify children who had serious intellectual difficulties -- such that they would not succeed in the public school system and who should not be placed in the same classes with other students. This test measured things that were necessary for school success such as understanding and using language, computational skills, memory, and the ability to follow instructions.

Individual responses in four content areas -

- Verbal reasoning
- Quantitative reasoning
- Abstract/visual reasoning
- Short-term memory

Wechsler Scales

- Wechsler Adult Intelligence Scale-Third Edition (WAIS-III): Used with people 17 and older
- Wechsler Intelligence Scale for Children-Third Edition (WISC-III): Used with children 6 to 16

Multiple Intelligences (Howard Gardner)

Gardner thinks there are eight types of intelligence. He believes each of us have all of the eight types of intelligence to varying degrees. These multiple intelligences are related to how an individual prefers to learn and process information.

- Verbal skills: The ability to think in words and use language to express meaning
 - Sensitivity to the meanings and sounds of words, mastery of syntax, appreciation of the ways language can be used (authors, journalists, speakers, poets, teachers)
- Mathematical skills: The ability to carry out mathematical operations
 - Understanding of objects and symbols and of actions that be performed on them and of the relations between these actions, ability for abstraction, ability to identify problems and seek explanations (scientists, engineers, accountants)
- Spatial skills: The ability to think three-dimensionally
 - Capacity to perceive the visual world accurately, to perform transformations upon perceptions and to re-create aspects of visual experience in the absence of physical stimuli, sensitivity to tension, balance, and composition, ability to detect similar patterns (architects, artists, sailors, chess masters)
- Bodily-kinesthetic skills: The ability to manipulate objects and be physically adept
 - Use of one's body in highly skilled ways for expressive or goal-directed purposes, capacity to handle objects skillfully (surgeons, craftspeople, dancers, athletes, actors)

- Musical skills: A sensitivity to pitch, melody, rhythm, and tone
 - Sensitivity to individual tones and phrases of music, an understanding of ways to combine tones and phrases into larger musical rhythms and structures, awareness of emotional aspects of music (musicians, composers, sensitive listeners)
- Interpersonal skills: The ability to understand and effectively interact with others
 - Ability to notice and make distinctions among the moods, temperaments, motivations, and intentions of other people and potentially to act on this knowledge (teachers, mental health professionals, parents, religious and political leaders)
- Intrapersonal skills: The ability to understand oneself
 - Access to one's own feelings, ability to draw on one's emotions to guide and understand one's behavior, recognition of personal strengths and weaknesses (theologians, novelists, psychologists, therapists)
- Naturalistic skills: The ability to observe patterns in nature and understand natural and human-made systems
 - Sensitivity and understanding of plants, animals, and other aspects of nature (farmers, botanists, ecologists, landscapers, environmentalists)

For fun – Figure out where you fall on the eight intelligences:

http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks3/ict/multiple_int/what.cfm

Triarchic Theory (Robert Sternberg)

Intelligence comes in three forms.

- Analytical intelligence: The ability to acquire and store information; to retain or retrieve information; to transfer information; to plan, make decisions, and solve problems; and to translate thoughts into performance
 - How efficiently people process information
 - How to solve problems, how to monitor solutions, and how to evaluate the results
 - The use of strategies, acquiring knowledge
 - Students high in analytical intelligence do well in class with lecture and objective tests. They are considered smart, get good grades, do well on traditional tests, and go to competitive colleges.
- Creative intelligence: The ability to solve new problems quickly; the ability to learn how to solve familiar problems in an automatic way so the mind is free to handle other problems that require insight and creativity
 - How people approach familiar or novel tasks
 - Compare new information with what they already know and to come up with new ways of putting facts together
 - To think originally
 - Students high in creative intelligence might not conform to traditional schools. They tend to give unique answers for which they might get reprimanded.
- Practical intelligence: The ability to get out of trouble; The ability to get along with other people
 - How people deal with their environment
 - How to size up a situation and decide what to do – to adapt to it, to change it, or to get out of it
 - Students high in practical intelligence don't relate well in traditional schools. They do well outside the classroom walls with good social skills and common sense.

Infant IQ Tests: Infant IQ tests are much less verbal than IQ tests for older children

Developmental Quotient (DQ): An overall developmental score that combines subscores on motor, language, adaptive, and personal-social domains in the Gesell assessment of infants

Bayley Scales of Infant Development: Scales that assess infant development – current version has three parts: a mental scale, a motor scale, and the infant behavior profile

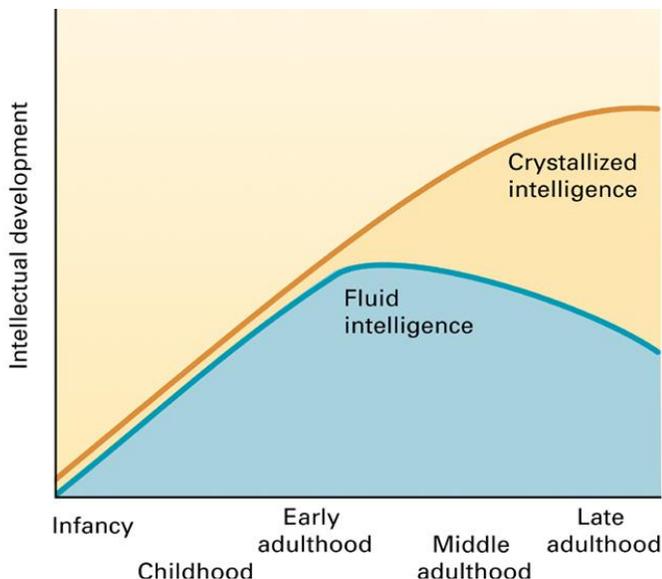
Fagan Test of Infant Intelligence: A test that focuses on the infant's ability to process information in such ways as encoding the attributes of objects, detecting similarities and differences between objects, forming mental representations, and retrieving these mental representations

The scores on the Gesell and Bayley tests *DO NOT* correlate highly with other IQ tests. The components of an infant IQ test are not the same as the components of other IQ tests. Unlike the other tests, the Fagan test is correlated with measures of IQ in older children (habituation and dishabituation in infancy predicts intelligence in childhood and adolescence - quicker habituation and greater amounts of looking in dishabituation reflect more efficient processing).

Intelligence through adolescence:

- There is a strong relationship between IQ scores obtained at ages 6, 8, and 9 and IQ scores obtained at 10.
- There is still a strong relationship between IQ scores obtained in preadolescent years and those obtained at age 18.
- However, individual intelligence scores can fluctuate dramatically over childhood and adolescence

Intelligence in adulthood:



Intellectual Development (John Horn):

Crystallized intelligence: accumulated information and verbal skills, which increase with age

Fluid intelligence: the ability to reason abstractly, which steadily declines from middle adulthood

Cognitive mechanics versus Cognitive pragmatics (Paul Bates): Cognitive mechanics decline during aging whereas cognitive pragmatics do not.

- Cognitive mechanic (hardware of the mind; speed and accuracy of processing; attention; visual and motor memory; discrimination; comparison; categorization) → have a biological/genetic foundation
- Cognitive pragmatics (culture-based software; reading and writing skills; language comprehension; educational qualifications; professional skills; knowledge of the self and coping skills) → have an experimental/cultural foundation

Factors Influencing Intelligence

The Child's Influence:

- Genetics
- Genotype–Environment Interaction
- Gender
 - Boys and girls tend to be equivalent in most aspects of intelligence
 - The average IQ scores of boys and girls is virtually identical
 - The extremes (both low and high ends) are over- represented by boys
 - Girls as a group:
 - Tend to be stronger in verbal fluency, in writing, in perceptual speed (starting as early as the toddler years)
 - Boys as a group:
 - Tend to be stronger in visual-spatial processing, in science, and in mathematical problem solving (starting as early as age 3)

The Immediate Environment's Influence

- Family Environment
- School Environment
 - Attending school makes children smarter
 - Children from families of low SES and those from families of high SES make comparable gains in school achievement during the school year
 - What about during summer break?
 - During the academic year -- schools provide children of all backgrounds with the same stimulating intellectual environment.
 - Over the summer, children from low-SES families are less likely to have the kinds of experiences that would maintain their academic achievement.

The Society's Influence

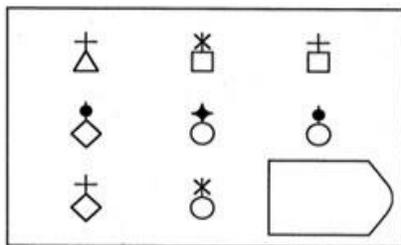
- Poverty
 - The more years children spend in poverty, the lower their IQs tend to be
 - Children from lower- and working-class homes average 10-15 points below their middle-class age mates on IQ tests
 - In many countries, children from wealthier homes score better on IQ test than children from poorer homes
 - The greater the gap in wealth in a country the greater the difference in IQ scores
 - Chronic inadequate diet can disrupt brain development
 - Chronic or short-term inadequate diet at any point in life can impair immediate intellectual functioning
 - Reduced access to health service, poor parenting, and insufficient stimulation and emotional support can impair intellectual growth
- Race/Ethnicity
 - Overall, differences in IQ scores of children from different racial and ethnic groups describe children's performance ONLY in the environments in which the children live. These findings do not indicate potential, nor do they tell us what these children would do if they live someplace else. The current group differences in IQ are due to environmental differences -- as discrimination and inequality decrease -- IQ differences decrease.
 - The average IQ score of Euro-American children is 10-15 points higher than that of African-American children
 - The average IQ score of Latino and American-Indian children fall somewhere in between those of Euro-American and African-American children

- The average IQ score of Asian-American children tend to be higher than any other group in the US
- American-Indian children: Better on the performance part than the verbal part of an IQ test
- Latino children: Better on the performance part than the verbal part of an IQ test
- Asian-American children: Better on the performance part than the verbal part of an IQ test
- African-American children: Better on the verbal part than the performance part of an IQ test

Are IQ tests culturally biased?

Culture-Free: Describing an intelligence test that, if it were possible to design, would have no culturally linked content

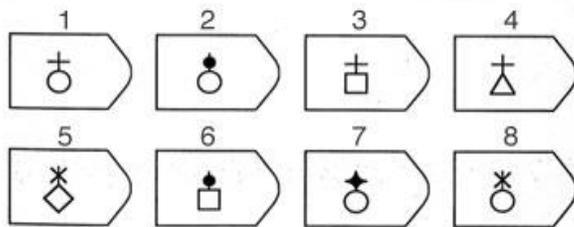
Culture-Fair: Describing an intelligence test that deals with experiences common to various cultures, in an attempt to avoid cultural bias



Raven's Progressive Matrices

A "culture-fair" or culture-reduced test that would make minimal use of language and not ask for any specific facts

These matrices progress from easy to difficult items -- measures abstract reasoning



Even on culture-fair tests, Euro-American and African-American children still differ → Culture can influence a child's familiarity with the entire testing situation

Even pictures can produce bias – some cultures have more experience with pictures than others

(K.H. Bearce, 2009, personal communication).