

## Unit 4 Notes: Intelligence and Mental Abilities

### **Intelligence**

- there are many definitions of intelligence
- the broadest definition of *intelligence*--the ability to profit from experience
  - this encompasses book learning and real-life skills
- to determine intelligence, *intelligence tests* are administered
  - these render a statistical score called the *intelligence quotient (IQ)*
- intelligence tests can be group tests or individual, written tests or oral
- the field of psychological testing is called *psychometrics*

### **Older Theories**

- Charles Spearman--believed that intelligence was like a well that flowed through every action
  - our special intellectual abilities "flowed like streams"
- Raymond Cattell--believed that there were two clusters of mental abilities:
  - *crystallized intelligence*: composed of reasoning, verbal and numerical abilities
  - *fluid intelligence*: spatial and visual imagery, and rote memory
- not quite so general as Spearman, L.L. and Thelma Thurstone believed that there were seven distinct factors to general intelligence:
  - spatial ability
  - perceptual speed
  - numerical ability
  - verbal meaning
  - memory
  - word fluency
  - reasoning

### **Newer Theories**

- Robert Sternberg--proposed the *triarchic theory of intelligence*
- intelligence is comprised of three kinds of intelligence:
  - *componential intelligence*: most of the abilities traditionally defined as intelligence, such as the Thurstones
  - *experiential intelligence*: the ability to adjust to new experiences, adapt and gain insights on new experiences
  - *contextual intelligence*: matching situations to accentuate your strengths and minimize your weaknesses
- perhaps the most influential modern theorist is Howard Gardner. Gardner believes in seven, distinct multiple intelligences:
  - *logical-mathematical intelligence* (math and science-oriented)
  - *linguistic intelligence* (language skills-oriented)
  - *spatial intelligence* (artists)
  - *musical intelligence* (musicians)

- *bodily-kinesthetic intelligence* (athletes and dancers)
- *interpersonal intelligence* (between two people)
- *intrapersonal intelligence* (understanding ourselves)

### Intelligence Tests

- the first test of intelligence was the Binet-Simon Scale in 1905
  - this was devised by Alfred Binet and Theodore Simon
  - it consisted of 30 tests arranged in order of increasing difficulty
  - Binet developed the concept of mental age
- this was later used in 1916 by L.M. Terman in devising the intelligence quotient or IQ
- Terman adapted the Binet-Simon scale while working at Stanford University
  - this became the now famous Stanford-Binet Intelligence Test, currently in its fourth edition

(insert the formula for IQ here)

- the formula for IQ is mental age divided by chronological age times 100
- average IQ is 100
  - if someone was 17 years old chronologically and had a mental age of 17, 17 divided by 17 is 1, times 100 would be 100
- this formula became somewhat problematic because a child's and, especially an adult's, intellectual growth is not orderly.
- David Weschler developed his own set of tests
  - one for adults (16 years and older) called the WAIS-III (Weschler Adult Intelligence Scale 3rd Edition)
  - one for children (ages 5-16) called the WISC-III (Weschler Intelligence Scale for Children 3rd Edition)
  - one for preschoolers called the WPPI-R (Weschler Preschool and Primary Scale of Intelligence Revised)
- both of these yield individual scores for verbal *and* performance information
- Weschler based his IQ scores on a normal distribution or bell-shaped curve
  - on his tests, the *standard deviation* is 15, meaning that 68% of the population will fall within 85 and 115, or 1 standard deviation; 95% will fall within 2 standard deviations, and 99.7% within 3 standard deviations
- for the WAIS-III and WISC-III
  - *verbal subscales* include vocabulary, general knowledge, comprehension, arithmetic, similarities and digit span
  - *performance subscales* include picture completion, block design, picture arrangement, object assembly, coding (WISC-III only), digit symbol (WAIS-III only) and mazes (WISC-III only)

### Validity

- in examining intelligence tests, it is important that they are both valid and reliable
- *validity* is the ability of a test to measure what it intends to measure
  - *face validity* refers to the test appearing to measure what it is designed to measure

- *content validity* asks if the sample of questions is large enough and representative enough to measure what it intends to measure
- *criterion validity* refers to the fact that scores on this measuring instrument are consistent with subjects' scores on other similar instruments (e.g. a subject scores roughly the same on two or more intelligence tests)
- *predictive validity* predicts how well an individual will do on a similar test of knowledge or skill
- *construct (or convergent) validity* asks how well performance on the test relates to what is being measured (e.g. if problem solving skills are related to intelligence, individuals who score high on this test should score high on intelligence tests as well)

### Reliability

- *reliability* is the ability of a test to provide consistent and stable scores over time
- *test-retest* is commonly used, where a subject takes a test on two different occasions
  - it is expected they will score consistently
- *split-half reliability* involves dividing the test questions in half, say odds and evens, and consistency is compared
- *alternate-form method* involves giving two different forms of the same test to the same individual at two different times

### Standardization

- intelligence tests are *standardized*, that is they have been piloted and achievement norms have been established
- a *standardization sample* is the group used to standardize tests
  - the score of these individuals helps to determine the difficulty level of the questions
  - this is called a *norm*, or a shared ideal or expectation about how to behave
  - *norm referenced tests* assess how an individual's performance compares to others
- the goal of standardization is to yield equivalent exams among groups allowing for a fair comparison

### Criticisms of Intelligence Tests

- *age*--a 2 year-old who is 2 years advanced mentally has an IQ of 200 ( $4/2 \times 100$ ) but that same person 6 years later and still advanced mentally 2 years has an IQ of 120 ( $10/8 \times 100$ )
  - because chronological age is so ingrained in the IQ formula, it throws off relative scores
- *culture*--Dr. Adrian Dove, a sociologist, developed a culture-based intelligence test to illustrate the point that many standardized tests are culturally-biased
  - to counteract this, tests should be *culture-fair* and attempt to eliminate cultural and gender biases
- *motivation*--an individual's motivation, physiological and mental state can influence their performance on an intelligence test
- *labeling*--there is tremendous power in labeling
  - individuals can fall prey to a *self-fulfilling prophecy* or others can bias their

attitudes toward the individual

- multiple measures are now used for placement—results on individual tests and combined with other information such as grades and behaviors
- *heredity*--there are two key studies to promote the idea that intelligence is inherited
- twin studies show a tremendous correlation in IQ scores
  - identical twins reared together show about a .86 correlation
  - identical twins reared apart show an amazing .74 correlation, even higher than same-sexed (.55) and opposite-sexed (.49) fraternal twins
- Robert Tryon's studies on selective breeding indicate further proof of a genetic link to intelligence
  - when maze-bright and maze-dull rats grow up in a stimulating environment, both groups of rats will run a maze well
  - when the environment is not stimulating, the maze-bright rats and their offspring will run the maze much better than the maze-dull rats and their offspring
- *environment*: environmentalists point out that, while individuals are born with certain innate capabilities, it is their environment that predominantly shapes their intellectual abilities
- early research focuses on *stimulus effects* (sights, sounds that stimulate intellectual growth)
- Wayne Dennis' studies in the 1950s indicate that infants left unattended for extended periods of time showed deficits in motor and intellectual development, and rarely improved beyond normal intelligence
- research on *social interaction* by Mary Ainsworth showed that responsive caregiving (talking and playing with child) results in more confident, curious and exploring children
- the success of Project Head Start, a program of pre-education for 3-5 year olds, provides support for the environmental argument
- long-range research on this and other similar projects indicated better intellectual functioning in children who participate compared to those who do not

### **Extremes in Intelligence**

- there are four levels of retardation:
  - *mild retardation* involves IQ scores of 55-70; these individuals can learn basic cognitive and vocational skills, and function independently in society
  - *moderate retardation* involves IQ scores of 40-55; these individuals can learn only limited language and self-help behaviors, some simple vocational skills but need help in their daily living
  - *severe retardation* involves IQ scores of 25-40; these individuals have only minimum capabilities to learn and function, and require constant supervision
  - *profound retardation* involves IQ scores below 25; these individuals also have only minimum capabilities to learn and function, and require constant supervision

- *giftedness* involves IQ scores of 130 or above
- gifted students account for 2% of the population and display:
  - a high achievement motive
  - strong initiative
  - excellence in academic work
  - creativity