Intelligence

Intelligence
Assessment
Individual Differences

Intelligence

- Theories of Intelligence
- Intelligence Testing
- Test Construction
- Extremes of Intelligence
- Differences in Intelligence
- Creativity

Theories of Intelligence

- General Intelligence (Charles Spearman)
  - There is a general intelligence factor which underlies all other specific abilities
  - Represented by *g*
  - Ex: people good at math will also often be good at other things
  - Factor Analysis: statistical method used to explain variability among observed variables in terms of fewer unobserved variables called factors (clusters of related items)

Theories of Intelligence

- Primary Mental Abilities (Louis Thurstone)
  - Inductive Reasoning
  - Word Fluency
  - Perceptual Speed
  - Verbal Comprehension
  - Spatial Visualization
  - Numerical Ability
  - Associative Memory

Theories of Intelligence

- Triarchic Theory of Intelligence (Robert Sternberg)
  - 3 different types of intelligence
    - Analytical
      - analyze, evaluate, compare, contrast, judge
    - Practical
      - apply, put into practice, use, implement
    - Creative
      - create, invent, discover, imagine, adapt to new situations

Theories of Intelligence

- Social Intelligence
  - person's ability to understand and manage other people, and to engage in adaptive social interactions
  - individual's knowledge about the social world
  - Nancy Cantor, John Kihlstrom

Theories of Intelligence

- Emotional Intelligence
  - ability, capacity, or skill to perceive, assess, and manage the emotions of one's self, of others, and of groups
  - Peter Salovey, John Mayer
  - Daniel Goleman

Theories of Intelligence

- Multiple Intelligences (Howard Gardner)
  - Linguistic
    - facility with words and languages
  - Logical-Mathematical
    - reasoning capabilities
  - Visual-Spatial
    - visualizing & mentally manipulating objects
  - Musical
    - sensitivity to sounds, rhythms, and tones

Theories of Intelligence

- Multiple Intelligences (Howard Gardner)
  - Bodily-Kinesthetic
    - adept at physical activities
  - Intrapersonal
    - self-reflective capacities
  - Interpersonal
    - sensitivity to others' moods, feelings
  - Naturalistic
    - nurturing and relating information to one's natural surroundings

Theories of Intelligence

- Fluid vs. Crystallized Intelligence (Raymond Cattell)
  - Fluid Intelligence
    - ability to reason quickly and abstractly
    - declines with age
  - Crystallized Intelligence
    - knowledge and skills that are accumulated over a lifetime
    - increases with age

Intelligence Testing

- Psychophysical Performance
  - Francis Galton measured psychomotor tasks to gauge intelligence
  - inspired by evolutionary theories: those who are physically successful are more adapted to survive and must be more intelligent

Intelligence Testing

- Binet-Simon Test (Mental Age)
  - France passed mandatory schooling law and developed a test to assess students and place them in classes conducive to learning
  - Developed an intelligence test to examine students' strengths and weaknesses
  - Measures attention, verbal skills, and memory
  - Mental Age: chronological age that corresponds to level of mental functioning
  - Alfred Binet, Theodore Simon

Intelligence Testing

- Stanford-Binet Test (Innate IQ)
  - Wanted to identify "feebleminded" individuals in order to separate them from the other children and control reproduction (Eugenics)
  - Helped to influence U.S. immigration in 1920s
  - Lewis Terman renormed the Binet-Simon for American children
  - Intelligence Quotient: $\frac{\text{mental age}}{\text{chronological age}} \times 100$
  - Lewis Terman developed test, William Stern developed formula for IQ

Intelligence Testing

- Wechsler Adult Intelligence Scale (WAIS)
  - Individual subtests which measure various verbal and performance abilities
  - David Wechsler
  - Also available:
    - Wechsler Intelligence Scale for Children (WISC) for ages 6-16
    - Wechsler Preschool & Primary Scale of Intelligence (WPPSI) for ages 2 ½ -7

Test Construction

- Reliability
  - consistency of a measuring instrument
  - Split-Half Reliability: consistency between two parts of test when test is evenly divided
  - Test-Retest Reliability: consistency of a measure from one time to another
  - Equivalent-Form/Alternate-Form Reliability: consistency of results of 2 tests constructed from same content domain

Test Construction

- Reliability
  - Internal Consistency: consistency of results across items within a test
  - Inter-Rater Reliability: degree to which different raters/observers give consistent estimates of the same phenomenon

Test Construction

- Validity
  - degree to which a test measures what it was designed to measure
  - Face Validity: "looks like" it measures what it's supposed to
  - Content Validity: extent to which a measure represents all facets of a given concept
  - Construct Validity: whether a scale measures or correlates with a theorized psychological construct

Test Construction

- Validity
  - Criterion-Related Validity: accuracy of a measure or procedure by comparing it with another measure or procedure which has been demonstrated to be valid
    - Concurrent Validity: reserved for demonstrations relating a measure to other concrete criteria assessed simultaneously
    - Predictive Validity: degree to which any measure can predict future concrete events

Test Construction

- Types of Assessments
  - Achievement Test: measures the outcome of past experiences
  - Aptitude Test: a testing instrument intended to predict the ability to do or learn something; predicts some future performance

Test Construction

- Types of Assessments
  - Individual Test: intelligence tests which require one-on-one consultation between the test-taker and examiner
  - Group Test: involve a series of different problems and are generally used in mass testing situations such as the military and schools

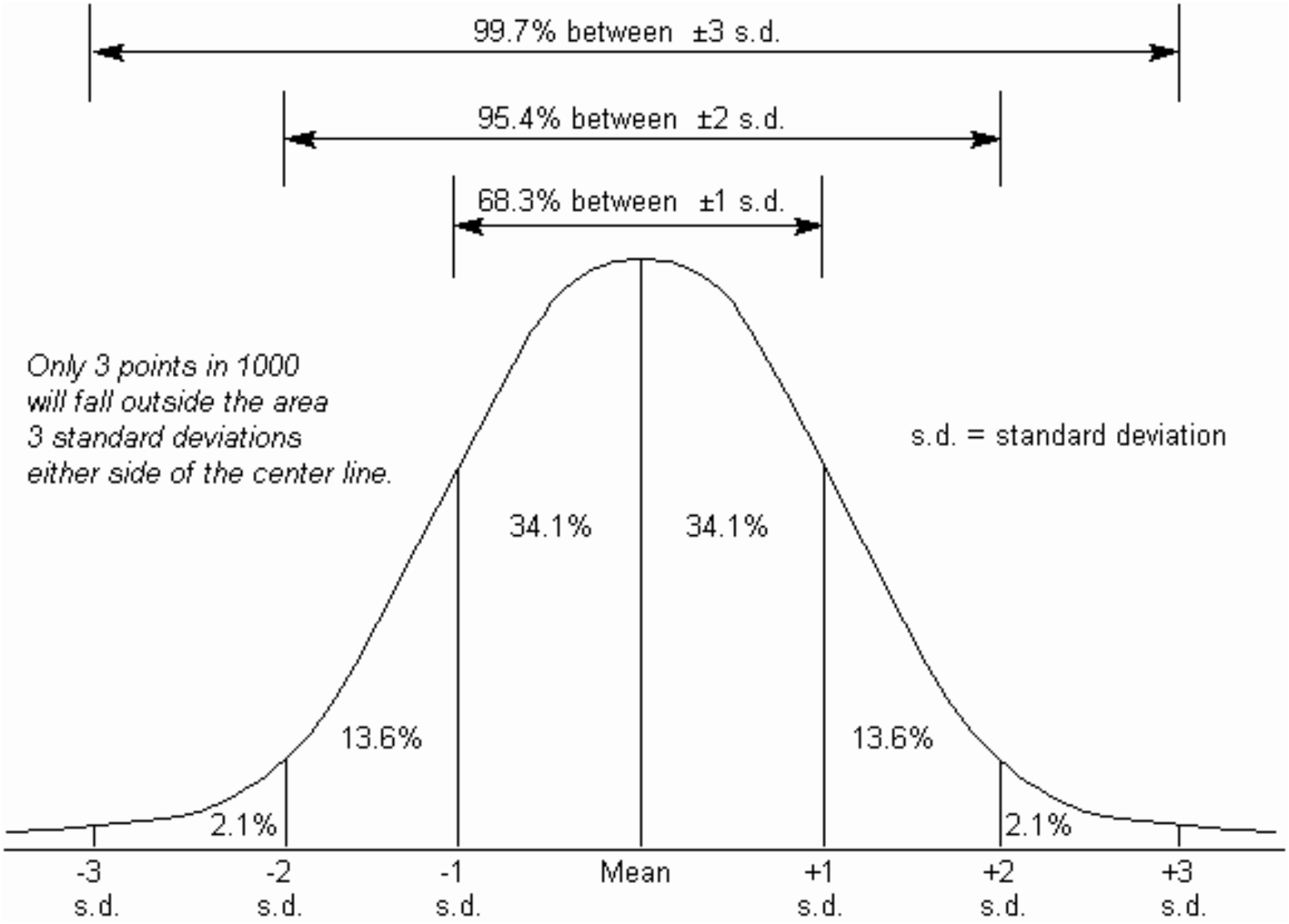
Test Construction

- Types of Assessments
  - Speed Test: tests how quickly tasks problems can be completed
  - Power Test: assigns tasks or problems of increasing difficulty to see at what level they become too difficult

Test Construction

- Standardization: finding of certain normal scores when the test is given to a pilot group who are similar to the people taking the test
- Normal Distribution: pattern for the distribution of a set of data which follows a bell shaped curve

Test Construction



Extremes of Intelligence

- Mental Retardation/Intellectual Disability
  - IQ of 70 or below and deficit in ability to cope with demands of independent living
    - Mild (85%; IQ of 50-70)
    - Moderate (10%, IQ of 35-50)
    - Severe (3-4%, IQ of 20-35)
    - Profound (1-2%, IQ below 20)
    - Ex: Down Syndrome, Savant Syndrome
- Giftedness
  - intellectual ability significantly higher than average; IQ score above 130

Differences in Intelligence

- Mean IQ score for whites is higher than mean IQ score for African Americans, Hispanics
- Gender differences in IQ exist
  - Mathematical problem-solving, spatial ability typically better in males
  - Males are more represented for IQ extremes
  - Mathematical computation, language, emotional ability typically better in females

Differences in Intelligence

- Group differences may be the result of nature or nurture *or both*
- Some tests may be culturally biased, causing one group to perform better simply on the basis of cultural familiarity
- Stereotype Threat: fear that one's behavior will confirm an existing stereotype of a group with which one identifies
  - Only happens when group membership made salient

Differences in Intelligence

- Heritability: the proportion of variation within a group that can be attributed to genetic factors
- Heritability for intelligence is somewhere between 50 and 70, but environment has an effect on intelligence also

Differences in Intelligence

- Within-Group Differences: range of scores *within* a particular group
- Between-Group Differences: difference between mean scores of different groups
- Within-Group Differences are wider than average between-group differences

Differences in Intelligence

- Flynn Effect: steady increase in performance on IQ tests over the last 80 years
  - Probably due to increases in education and nutrition
  - Tests have had to be renormed

Creativity

- Threshold Theory of Creativity
  - Certain level of intelligence is necessary, but not sufficient for creative work