Intelligence and Creativity

Quick Intelligence Test

1. Some months have 30 days, some months have 31 days. How many months have 28 days?
2. If a doctor gives you 3 pills and tells you to take one pill every half hour, how long would it be before all the pills had been taken?
3. I went to bed at eight o'clock in the evening and wound up my clock and set the alarm to sound at nine o'clock in the morning. How many hours sleep would I get before being awoken by the alarm?
4. Divide 30 by half and add ten. What do you get?
5. A farmer had 17 sheep. All but 9 died. How many live sheep were left?
6. If you had only one match and entered a COLD and DARK room, where there was an oil heater, an oil lamp and a candle, which would you light first?
7. A man builds a house with four sides of rectangular construction, each side having a southern exposure. A big bear comes along. What color is the bear?
8. Take 2 apples from 3 apples. What do you have?
9. How many animals of each species did Moses take with him in the Ark?
10. If you drove a bus with 43 people on board from Chicago and stopped at Pittsburg to pick up 7 more people and drop off 5 passengers and at Cleveland to drop off 8 passengers and pick up 4 more and eventually arrive at Philadelphia 20 hours later, what's the name of the driver?
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
Older Theories

• 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
Newer Theories

- 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
Intelligence Tests

• 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.

\[
\frac{\text{mental age}}{\text{chronological age}} \times 100
\]

Intelligence Tests

• 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
Intelligence Tests

• 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

Intelligence Tests

• 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 is the sample of questions is large enough and representative enough to measure what it intends to measure

• criterion validity refers to that 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 (4/2x100) but that same person 6 years later and still advanced mentally 2 years has an IQ of 120 (10/8x100)
  – 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

Criticisms of Intelligence Tests

• *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
Criticisms of Intelligence Tests

- **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

Criticisms of Intelligence Tests

- **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
Criticisms of Intelligence Tests

- *environment*: environmentalists point out that, while individuals are born with certain innate capabilities, it is their environment that predominantly shapes their intellectual abilities

- 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
Extremes in Intelligence

- 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

References


This fact alone demonstrates intelligence’s relation to creativity, one that is vital for not only understanding creative thinking, but for improving it. Another important aspect of intelligence is the ability to filter solutions efficiently. If you’re great at acquiring knowledge (say, through reading or lectures or watching videos on YouTube) and you have the ability to put that knowledge to use effectively, but lack the ability to efficiently filter through solutions, you may come up with effective ideas, but it’s going to take you a long time.

Creativity vs. Intelligence. Creativity refers to active imaginations and talent. Intelligence refers to their abilities. Creativity usually used with innovations, expertise, ideas, and concepts, etc. Creativity is to apply your intelligence to find a solution to a problem. Intelligence is to understand knowledge and information to find a solution to a problem. It is possible that the origin of word creativity has been lost, or it also seems that this word is from the new linguistic advanced English language. Intelligence and creativity - friends or foes? Do you want to know whether the IQ is linked with creativity? Do you think that to invent something great, you need high intelligence? Or do you think that too high an IQ is an obstacle when creating things? Experts often asked themselves the same questions. The relationship between creativity and intelligence is a frequent topic of research and debate in the social sciences. In this chapter, we use Sternberg’s framework for examining the definitions of creativity and intelligence and how they may be related. Sternberg’s model suggests five possible relationships: Creativity as a subset of intelligence; intelligence as a subset of creativity; creativity and intelligence and creativity. According to author Michael Michalko, “Even if you’re not a genius, you can use the same strategies as Aristotle and Einstein to harness the power of your creative mind and better manage your future.” A set of common patterns of thinking were discovered and during the sixties, so many misconceptions about intelligence and creativity were addressed. Gardener presented