**Chapter 11**

**Objective 1|** **Discuss the difficulty of defining intelligence, and explain what it means to “reify intelligence.”**Intelligence is a socially constructed concept that differs from culture to culture. The two big controversies in current research on intelligence are (1) whether it is one overall ability or many, and (2) whether neuroscientists can locate and measure intelligence within the brain. To reify intelligence is to treat it as though it were a real object, not an abstract concept. Most psychologists now define intelligence as the ability to learn from experience, solve problems, and adapt to new situations.

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**Objective 2|** **Present arguments for and against considering intelligence as one general mental ability.** Arguments for considering intelligence as a general mental ability underlying all specific mental abilities are based in part on factor analysis. This statistical procedure has been used to show that mental abilities tend to form clusters, and that people tend to show about the same level of competence in all abilities in the cluster. In the mid-twentieth century, Charles Spearman (a developer of factor analysis) named this common level of intelligence the g factor. Some psychologists today agree with Spear-man’s idea that we have a common level of intelligence that can predict our abilities in all other academic areas.

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**Objective 3|** **Compare Gardner’s and Sternberg’s theories of intelligence.**Howard Gardner disputes the idea of one general intelligence. He proposes eight independent intelligences: linguistic (word smarts), logical-mathematical (number smarts), musical (music smarts), spatial (space smarts), bodily-kinesthetic (body smarts), intrapersonal (self smarts), interpersonal (people smarts), and natural (nature smarts). Robert Sternberg’s triarchic theory proposes only three intelligences: analytical (academic problem solving), creative, and practical intelligences. (For more on the single-intelligence/multiple intelligences debate, see Table 11.2 on page 436.)

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**Objective 4|** **Describe the four aspects of emotional intelligence, and discuss criticisms of this concept.**The four components of emotional intelligence are the ability to perceive emotions (to recognize them in faces, music, and stories), to understand emotions (to predict them and how they change and blend), to manage emotions (to know how to express them in varied situations), and to use emotions. Critics of the idea of emotional intelligence question whether we stretch the idea of intelligence too far when we apply it to emotions.

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**Objective 5|** **Identify the factors associated with creativity, and describe the relationship between creativity and intelligence.** Creativity is the ability to produce novel and valuable ideas. It correlates somewhat with intelligence, but beyond a score of120, that correlation dwindles. It also correlates with expertise, imaginative thinking skills, a venturesome personality, intrinsic motivation, and the support offered by a creative environment. Different brain areas are active when we engage in convergent thinking (the type required for intelligence test solutions) and divergent thinking (the type required for multiple imaginative solutions).

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**Objective 6| Describe the relationship between intelligence and brain anatomy.**Recent studies indicate some correlation (about +.40) between brain size (adjusted for body size) and intelligence score. The brain’s tendency to decrease in size during late adulthood, as nonverbal intelligence test scores also decrease, supports this idea to some extent. And autopsies of some highly educated people revealed above-average volumes of synapses and gray matter. But the direction of the relationship is not clear. Larger brain size may enable greater intelligence; greater intelligence may lead to experiences that exercise the brain and build more connections, thus increasing its size; or some third factor may be at work.

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**Objective 7|** **Discuss findings on the correlations between perceptual speed, neural processing speed, and intelligence.** Studies of brain functioning show that people who score high on intelligence tests tend also to retrieve information from memory more quickly, and to perceive stimuli faster than others. These differences are reflected in neurological studies that show faster brain response times.

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**Objective 8|** **Define intelligence test and discuss the history of intelligence testing.**Psychologists define intelligence test as a method for assessing an individual’s mental aptitudes and comparing them with those of others, using numerical scores. More than a century ago in France, Alfred Binet and his collaborator Theodore Simon started the modern intelligence-testing movement by developing questions that helped predict children’s future progress in the Paris school system. Lewis Terman of Stanford University revised Binet’s work for use in the United States. Terman believed his Stanford-Binet could help guide people toward appropriate opportunities, but more than Binet, he believed intelligence is inherited. During the early twentieth century, intelligence tests were, regrettably, sometimes used to “document” assumptions about the innate inferiority of certain ethnic and immigrant groups. Intelligence test scores have been expressed as an intelligence quotient (IQ), established by dividing mental age by chronological age times 100.

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**Objective 9|** **Distinguish between aptitude and achievement tests, and describe modern tests of mental abilities, such as the WAIS.**Aptitude tests are designed to predict what you can learn. Achievement tests are designed to assess what you have learned. The WAIS (Wechsler Adult Intelligence Scale), an aptitude test, is the most widely used intelligence test for adults. Two similar Wechsler scales are designed to test intelligence in preschool and older children. The SAT is an aptitude test, and in one study, test-takers’ total SAT scores and their score on a test of general intelligence correlated at a very high level: +.82.

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**Objective 10|** **Discuss the importance of standardizing psychological tests, and describe the distribution of scores in a normal curve.**Standardizing a test is the process of administering the test to a representative sample of future test-takers in order to establish a basis for meaningful comparisons of scores. The distribution of many physical and psychological attributes forms a normal curve (also known as a bell-shaped curve)—a roughly symmetrical shape in which most scores cluster around an average, and increasingly fewer are distributed at the extremes. Intelligence test scores form such a curve, but in the past six decades, the average score has risen 27 points—a phenomenon known as the Flynn effect.

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**Objective 11|** **Explain what it means to say that a test is reliable. A test is reliable when it yields consistent results.** To establish reliability, researchers compare the consistency of test-takers’ scores on two halves of the test, alternate forms of the test, or retests on the same test. A test can be reliable but not valid.

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**Objective 12|** **Explain what it means to say a test is valid, and describe two types of validity.** A valid test measures or predicts what it is supposed to. Content validity is the extent to which a test samples the pertinent behavior (as a driving test measures driving ability). Predictive validity is the extent to which the test predicts a behavior it is designed to predict (aptitude tests have predictive ability if they can predict future achievements).

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**Objective 13| Discuss the stability of intelligence scores over the life span.** The stability of intelligence test scores increases with age. By age 4, scores fluctuate somewhat but begin to predict adolescent and adult scores. At about age 7, scores become fairly stable and consistent.

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**Objective 14|** Discuss the two extremes of the normal distribution of intelligence. If an intelligence test is valid, the two groups of people falling at the extremes of the normal curve should be significantly different, and they are. Those with scores below70, the cut-off mark for the diagnosis of mental retardation, vary in their abilities, from near-normal, to (at the very lowest scoring levels) requiring constant aid and supervision. Down syndrome is a form of retardation with a physical cause—an extra copy of chromosome 21. High-scoring people, contrary to popular myths, tend to be healthy, well-adjusted, and unusually successful academically. Schools sometimes “track” such children, separating them from those with lower scores. Such programs can become self-fulfilling prophecies as children live up to—or down to—others’ perceptions of their ability.

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**Objective 15|** Discuss the evidence for the genetic contribution to individual intelligence, and explain what psychologists mean by the heritability of intelligence. Studies of twins, family members, and adopted children together support the idea that there is a significant genetic contribution to intelligence scores. The most genetically similar people have the most similar scores, ranging from about +.85for identical twins raised together, to about +.33 for unrelated individuals raised together. No “genius gene” has been discovered yet, but the search is under way. Heritability of intelligence refers to the extent to which variation in intelligence test scores in a group of people being studied is attributable to genetic factors. Heritability never applies to an individual’s intelligence, but only to differences among people.

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**Objective 16|** **Discuss the evidence for environmental influences on individual intelligence.** Studies of twins, family members, and adopted children also provide evidence of environmental influence on intelligence. The intelligence test scores of fraternal twins raised together are more similar than those of other siblings, and the scores of identical twins raised apart are less similar (though still very highly correlated) than the scores of identical twins raised together. Other studies, of children reared in extremely impoverished, enriched, or culturally different environments, indicate that life experiences significantly influence intelligence test performance.

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**Objective 17**| **Describe ethnic similarities and differences in intelligence test scores, and discuss some genetic and environmental factors that might explain them.**As a group, white Americans tend to have an average intelligence test score about 8 to 15 points higher than their Hispanic or African-American counterparts. This gap has dropped recently among children. The evidence suggests that environmental differences are largely responsible for these group differences. Six points were considered in this chapter. (1) The races are remarkably alike genetically. (2) Race is a socially, not biologically, defined category. (3) Asian students outperform North American students on math achievement and aptitude tests. (4) Intelligence test performance of today’s better-fed, better-educated, and more test-prepared population exceeds that of the 1930s population, by the same margin that the score of the average White today exceeds that of the average Black. (5) White and black infants tend to score equally well on tests predicting future intelligence. (6) In different eras, different ethnic groups have experienced periods of remarkable achievement.

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**Objective 18**| **Describe gender differences in abilities.**This chapter considered seven ways that males and females differ in their abilities. (1) Girls are better spellers. (2) Girls are more verbally fluent and can remember more words. (3) Girls are better at locating objects. (4) Girls are more sensitive to touch, taste, and color. (5) Boys outnumber girls in counts of underachievement. (6) Boys outperform girls at math problem solving, though girls outperform boys in math computation. (7) Women detect emotions more easily than men do.

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**Objective 19| Discuss whether intelligence tests are biased, and describe the stereotype threat phenomenon.** Aptitude tests aim to predict how well a test-taker will perform in a given situation. So they are necessarily biased in the sense that they are sensitive to performance differences caused by cultural experience. But bias can also mean what psychologists commonly mean by the term—that a biased test predicts less accurately for one group than for another. In this sense of the term, most experts do not consider the major aptitude tests to be significantly biased. Stereotype threat is a self confirming concern that one will be evaluated based on a negative stereotype. This phenomenon appears in some instances in intelligence testing among African-Americans and among women of all colors.

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