

Intelligence, Testing and Individual Differences

Aptitude	Intelligence
Chronological age	Intelligence quotient (IQ)
Cretinism	Mental age
Crystallized intelligence	Microcephaly
Culture-fair test	Multiple aptitude test
Down Syndrome	Multiple intelligences
Familial intellectual disability	Normal curve
Fluid intelligence	Phenylketonuria
Fragile X syndrome	Reaction time
g-factor	Reliability
General intelligence test	Savant syndrome
Giftedness	Special aptitude test
Group intelligence test	Speed of processing
Hydrocephaly	Test standardization
Identical twins	Validity
Individual intelligence test	Verbal intelligence
Intellectual disability (formerly mental retardation)	

- 1: What arguments support intelligence as one general mental ability, and what arguments support the idea of multiple distinct abilities?**
- 2: How do Gardner's and Sternberg's theories of multiple intelligences differ?**
- 3: What makes up emotional intelligence?**
- 4: To what extent is intelligence related to brain anatomy and neural processing speed?**
- 5: When and why were intelligence tests created?**
- 6: What's the difference between aptitude and achievement tests, and how can we develop and evaluate them?**
- 7: How stable are intelligence scores over the life span?**
- 8: What are the traits of those at the low and high intelligence extremes?**
- 9: What does evidence reveal about hereditary and environmental influences on intelligence?**
- 10: How and why do gender and racial groups differ in mental ability scores?**
- 11: Are intelligence tests inappropriately biased?**

1: What arguments support intelligence as one general mental ability, and what arguments support the idea of multiple distinct abilities?

Factor analysis is a statistical procedure that has revealed some underlying commonalities in different mental abilities. Spearman named this common factor the *g* factor. Thurstone argued against defining *intelligence* so narrowly as just one score. He identified seven different clusters of mental abilities. Yet there remained a tendency for high scorers in one of his clusters to score high in other clusters as well. Our *g* scores seem most predictive in novel situations and do not much correlate with skills in evolutionarily familiar situations.

2: How do Gardner's and Sternberg's theories of multiple intelligences differ?

Gardner proposes eight independent intelligences: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, intrapersonal, interpersonal, and naturalist. Sternberg's theory has proposed three intelligence domains: analytical (academic problem-solving), creative, and practical.

3: What makes up emotional intelligence?

Emotional intelligence is the ability to perceive, understand, manage, and use emotions. Those with higher emotional intelligence tend to achieve greater personal and professional success. However, critics question whether we stretch the idea of intelligence too far when we apply it to emotions.

4: To what extent is intelligence related to brain anatomy and neural processing speed?

Recent studies indicate some correlation (about +.33) between brain size (adjusted for body size) and intelligence score. Highly educated or intelligent people exhibit an above-average volume of synapses and gray matter. People who score high on *intelligence tests* tend also to have speedy brains that retrieve information and perceive stimuli quickly.

5: When and why were intelligence tests created?

In France in 1904, Alfred Binet 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 part of the twentieth century, intelligence tests were sometimes used to "document" scientists' assumptions about the innate inferiority of certain ethnic and immigrant groups.

6: What's the difference between aptitude and achievement tests, and how can we develop and evaluate them?

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. Such tests must be *standardized*, by giving the test to a representative sample of future test-takers to establish a basis for meaningful score comparisons. The distribution of test scores often forms a *normal, bell-shaped curve*. Tests must also be *reliable*, by yielding consistent scores (on two halves of the test, or when people are retested). And they must be *valid*. 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).

7: How stable are 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.

8: What are the traits of those at the low and high intelligence extremes?

Those with intelligence test scores below 70, the cut-off mark for the diagnosis of an *intellectual disability* (formerly referred to as mental retardation), vary from near-normal to those requiring constant aid and supervision. *Down syndrome* is a form of intellectual disability with a physical cause—an extra copy of chromosome 21. High-scoring people, contrary to popular myths, tend to be healthy and well-adjusted, as well as 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.

9: What does evidence reveal about hereditary and environmental influences on intelligence?

Studies of twins, family members, and adoptees together point to a significant hereditary contribution to intelligence scores. The search is under way for genes that together contribute to intelligence. Yet research also provides evidence of environmental influence. 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 slightly 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 can significantly influence intelligence test performance.

10: How and why do gender and racial groups differ in mental ability scores?

Males and females average the same in overall intelligence. There are, however, some small but intriguing gender differences in specific abilities. Girls are better spellers, more verbally fluent, better at locating objects, better at detecting emotions, and more sensitive to touch, taste, and color. Boys outperform girls at spatial ability and related mathematics, though girls outperform boys in math computation. Boys also outnumber girls at the low and high extremes of mental abilities. Psychologists debate evolutionary, brain-based, and cultural explanations of such gender differences. As a group, Whites score higher than their Hispanic and Black counterparts, though the gap is not as great as it was half a century and more ago. The evidence suggests that environmental differences are largely, perhaps entirely, responsible for these group differences.

11: Are intelligence tests inappropriately biased?

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 test predicts less accurately for one group than for another. In this sense of the term, most experts consider the major aptitude tests unbiased. *Stereotype threat*, a self-confirming concern that one will be evaluated based on a negative stereotype, affects performance on all kinds of tests.