Genetic and Environmental Influences on Intelligence

Module Preview

Studies of twins, family members, and adopted children point to significant genetic determinants of intelligence test scores. These and other studies also indicate that environment significantly influences intelligence test scores. Psychologists debate evolutionary and cultural explanations of gender differences in aptitudes and abilities. Environmental differences are perhaps entirely responsible for racial gaps in intelligence.

Aptitude tests, which predict performance in a given situation, are necessarily “biased” in the sense that they are sensitive to performance differences caused by cultural experiences. However, the major tests are not biased in that they predict as accurately for one group as for another. Stereotype threat can adversely affect performance and sometimes appears in intelligence testing among African-Americans and women.

Module Guide

Twin and Adoption Studies and Heritability

Lectures: Genes and Intelligence; Misunderstanding Heritability

35-1. 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 point to a significant genetic contribution to intelligence scores. For example, the test scores of identical twins reared separately are similar enough to lead one researcher to estimate that about 70 percent of intelligence score variation can be attributed to genetic variation. Furthermore, the most genetically similar people have the most similar scores ranging from +.85 for identical twins raised together to about +.33 for unrelated individuals raised together. As noted in Module 11, heritability refers to the extent to which differences among people are attributable to genes. To say that the heritability of intelligence is 50 percent does not mean that half of an individual’s intelligence is inherited. Rather, it means that we can attribute to heredity 50 percent of the variation of intelligence among those studied.
Environmental Influences

- Lecture: Teaching Intelligence
- Exercise: Incremental Versus Entity Theories of Intelligence
- ActivePsych: Digital Media Archive, 2nd ed.: Hothouse Babies: Mother Tries to Teach Her Two-Year-Old
  Multiplication

35-2. Discuss the evidence for environmental influences on individual intelligence.

Studies of twins, family members, and adopted children also provide evidence for environmental influences 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 than the scores of identical twins raised together. Studies of children reared in extremely neglectful or enriched environments also indicate that life experiences significantly influence intelligence test scores. For example, research indicates that schooling and intelligence contribute to each other (and that both enhance later income). Programs such as Head Start increase school readiness and provide at least a small boost to emotional intelligence.

Group Differences in Intelligence Test Scores

- Lecture: Environmental Explanation of Group Differences
- Exercise: Blacks as a “Castelike” Minority


Although gender similarities far outnumber gender differences, we find the differences in abilities more interesting. Research indicates that, compared with boys, girls are better spellers; are more verbally fluent; are better at remembering and locating objects; are more sensitive to touch, taste, and color; and are better emotion detectors. Males’ mental ability scores vary more than females’, and thus boys outnumber girls at both the low extreme and the high extreme. Boys outperform girls in spatial ability tests and at math problem solving, but they underperform them in math computation. According to different perspectives, these differences may be explained as evolutionarily adaptive for each gender or the result of social expectations and divergent opportunities.

35-4. Describe ethnic similarities and differences in intelligence test scores, and discuss some genetic and environmental factors that might explain them.

American Blacks average about 10 points lower than White Americans on intelligence tests. European New Zealanders outscore native Maori New Zealanders, Israeli Jews outscore Israeli Arabs, and most Japanese outscore the stigmatized Japanese minority. Research suggests that environmental differences are largely responsible for these group differences. Consider: (1) genetics research indicates that the races are remarkably alike under the skin; (2) race is not a neatly defined biological 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 measuring preferences for looking at novel stimuli—a predictor of future intelligence; and (6) in different eras, different ethnic groups have experienced periods of remarkable achievement.
The Question of Bias

- Lectures: Intelligence as Culturally Defined; The SAT: A Case Study in Testing; Unanswered Questions About Intelligence
- Exercise: Culture-Biased and Culture-Fair Tests
- Video: Module 4 of The Brain series, 2nd ed.: Intelligence and Culture

35-5. Discuss whether intelligence tests are biased, and describe the stereotype threat phenomenon.

Intelligence tests are “biased” in the sense that they are sensitive to performance differences caused by cultural experience. However, tests are not biased in that they predict as accurately for one group as they do for another. For example, the predictive validity is roughly the same for men and women, for Blacks and Whites, and for rich and poor. Stereotype threat is a self-confirming concern that one will be evaluated based on a negative stereotype. The phenomenon sometimes appears in intelligence testing among African-Americans and among women of all colors.