

Chapter Nine

INTELLIGENCE AND PSYCHOLOGICAL TESTING

Review of Key Ideas

KEY CONCEPTS IN PSYCHOLOGICAL TESTING

1. List and describe the principle categories of psychological tests.

- 1-1. Most psychological tests can be placed into one of two very broad categories. These two categories are: _____ tests and _____ tests.
- 1-2. There are three categories of mental abilities tests. Below are examples of each of these categories. Identify them.
- (a) The ACT and SAT tests you may have taken before entering college are examples of _____ tests.
- (b) The exams you frequently take in your introductory psychology class are examples of _____ tests.
- (c) Tests used to demonstrate general intellectual giftedness are examples of _____ tests.
- 1-3. Personality tests allow an individual to compare himself or herself to other persons with respect to particular personality _____. Personality tests generally (**do/do not**) have right and wrong answers.

Answers: 1-1. mental ability, personality (in either order) 1-2. (a) aptitude (b) achievement (c) intelligence
1-3. characteristics or traits, do not.

2. Explain the concepts of standardization and test norms.

- 2-1. Developing test norms and uniform procedures for use in the administration and scoring of a test is the general idea behind test _____.

- 2-2. In order to interpret a particular score on a test, it is necessary to know how other persons score on this test. This is the purpose of test _____. An easy method for providing comparisons of test scores is to convert the raw scores into _____ scores.

Answers: 2-1. standardization 2-2. norms, percentile.

3. Explain the meaning of test reliability and how it is estimated.

- 3-1. The ability of a test to produce consistent results across subsequent measurements of the same persons, is known as its _____. Psychological tests (are/are not) perfectly reliable.
- 3-2. Readministering the same test to the same group of persons a week or two following the original testing (test-retest) allows one to estimate the _____ of a test. If a test is highly reliable, then a person's scores on the two different administrations will be very similar. The amount of similarity can be assessed by means of the _____ coefficient. The closer the correlation comes to 1.0 the (more/less) reliable the test is.
- 3-3. Another method for assessing reliability is to break the test into two halves and derive a correlation for the two halves. This method is called _____ - _____ reliability.

Answers: 3-1. reliability, are not 3-2. reliability, correlation, more 3-3. split-half.

4. Explain the three types of validity and how they are assessed.

- 4-1. The ability of a test to actually measure what it claims to measure is known as its _____. The term "validity" is also used to refer to the accuracy or usefulness of the _____ based on a test.
- 4-2. There are three general kinds of validity. Identify each of these kinds from the descriptions given below.
- (a) This kind of validity will tend to be high when, for example, scores on the ACT and SAT actually predict success in college. _____
- (b) This kind of validity will be of particular importance to you when taking your exams for this class. It will be high if the exam sticks closely to the explicitly assigned material. _____
- (c) This kind of validity is more vague than the other two kinds and refers to the ability of a test to measure abstract qualities, such as intelligence. _____
- 4-3. As with the estimation of reliability, the estimation of validity makes use of the _____.

Answers: 4-1. validity, inferences or decisions 4-2. (a) criterion-related validity, (b) content validity, (c) construct validity 4-3. correlation coefficient.

THE EVOLUTION OF INTELLIGENCE TESTING

5. Summarize the contributions of Galton and Binet to the evolution of intelligence testing.

- 5-1. Identify each of the above men from the descriptions of their contributions given on the next page.

- (a) This man developed the first useful intelligence test. His tests were used to predict success in school, and scores were expressed in terms of mental age. _____
- (b) This man began the quest to measure intelligence. He assumed that intelligence was mainly inherited and could be measured by assessing sensory acuity. He also invented correlation and percentile test scores. _____

Answers: 5-1. (a) Binet (b) Galton.

6. Summarize the contributions of Terman and Wechsler to the evolution of intelligence testing.

6-1. Identify each of the above men from the descriptions of their contributions given below.

- (a) This man revised Binet's tests to produce the Stanford-Binet Intelligence Scale, the standard for all future intelligence tests. He also introduced the intelligence quotient (IQ).

- (b) This man developed the first successful test of adult intelligence, the WAIS. He also developed new intelligence tests for children.

- (c) In developing his new intelligence tests, this man added many non-verbal items which allowed for the separate assessment of both verbal and non-verbal abilities. He also replaced the IQ score with one based on the normal distribution. _____

Answers: 6-1. (a) Terman (b) Wechsler (c) Wechsler.

BASIC QUESTIONS ABOUT INTELLIGENCE TESTING

7. Explain the meaning of an individual's score on a modern intelligence test.

7-1. Answer the following questions regarding intelligence test scores.

- (a) In what manner is human intelligence assumed to be distributed?
- (b) What percentage of people have an IQ score below 100?
- (c) What percentage of persons would score two or more standard deviations above the mean? (see Fig. 9.7 in the text)

Answers: 7-1. (a) It forms a normal distribution. (b) 50% (c) 2%.

8. Describe the reliability and validity of modern IQ test scores.

8-1. Answer the following questions about the reliability of modern intelligence tests.

- (a) What are reliability estimates (correlation coefficients) are found for most modern intelligence tests?
- (b) What might be a problem here with respect to an individual's test score?

8-2. Answer the following questions with respect to the validity of modern intelligence tests.

- (a) What is the correlation between IQ tests and grades in school?
- (b) What is the correlation between IQ tests and the number of years of schooling that people complete?
- (c) What might be a general problem with assuming intelligence tests are a valid measure of general mental ability?

Answers: 8-1. (a) They are in the low .90s. (b) Temporary conditions could lower the score. **8-2.** (a) .40s and .50s (b) .60 to .80 (c) They principally focus on mental abilities conducive to academic success and ignore other kinds of intelligence.

9. Discuss how well intelligence tests predict vocational success.

9-1. Is the ability of intelligence tests to predict vocational success much higher or much lower than their ability to predict academic success?

9-2. What do current court rulings and laws now require when using tests for purposes of hiring or promoting?

Answers: 9-1. much lower **9-2.** The tests must measure specific abilities that are related to job performance.

10. Discuss the use of IQ tests in non-Western cultures.

10-1. Which of the following statements best summarizes the history of IQ testing in non-Western cultures?

- (a) Most Western and non-Western cultures have successfully adapted the IQ tests to their own cultures.
- (b) Many non-Western cultures have different conceptions of what intelligence is and do not necessarily accept Western notions as to how it can be measured.

10-2. What did Cole and his colleagues conclude regarding the ingredients of intelligence across cultures?

Answers: 10-1. b 10-2. They are culture-specific.

EXTREMES OF INTELLIGENCE

11. Describe how mental retardation is defined and divided into various levels.

11-1. In addition to having subnormal mental abilities (IQ scores of less than 70 to 75), what else is included in the definition of mental retardation?

11-2. There are four levels of mental retardation: mild, moderate, severe, and profound. Identify each of these levels from the descriptions given below:

- (a) These persons have IQ scores below 20 and require total care.
- (b) These persons have IQ scores between 50 and 75 and may become self-supporting citizens after leaving school and becoming adults.
- (c) These persons have IQ scores between 35 and 50 and can be semi-independent in a sheltered environment.
- (d) These persons have IQ scores between 20 and 35 and can help to contribute to their self-support under total supervision.

Answers: 11-1. The individual must show deficiencies in adaptive (everyday living) skills originating before age 18.

11-2. (a) profound (b) mild (c) moderate (d) severe.

12. Discuss what is known about the causes of mental retardation.

12-1. Although there are over 350 organic syndromes associated with retardation, including Down's syndrome, phenylketonuria, and hydrocephaly, organic causes only account for about _____ percent of retardation cases.

12-2. There are two general hypotheses as to the causes of the remaining 75 percent of retardation cases, most of which are diagnosed as mild. One theory is that retardation results from subtle _____ defects that are difficult to detect. The other theory suggests that retardation is caused by a variety of unfavorable _____ conditions.

Answers: 12-1. 25 12-2. physiological, environmental.

13. Discuss the role of IQ tests in the identification of gifted children.

13-1. Answer the following questions regarding gifted children:

- (a) Although it is contrary to federal law, what method is used almost exclusively to identify gifted children?

- (b) What is the lowest IQ score that is generally needed to qualify children as gifted?

Answers: 13-1. (a) scores on IQ tests (b) 130.

14. Describe the characteristics of the gifted and factors relating to adult achievements of the gifted.

14-1. Answer the following questions regarding the characteristics of the gifted.

- (a) What did Terman's long-term study of gifted children show with respect to the physical, social, and emotional development of these children?

- (b) Ellen Winner took a special look at profoundly (IQ above 180) gifted children. What did she estimate to be the incidence of interpersonal and emotional problems in these children when compared to other children?

- (c) What three factors must interact and be present to an exceptional degree in order to produce the rarest form of giftedness, according to Renzulli?

- (d) In addition to intensive training and hard work, what other factor may be necessary to achieve extraordinary achievement?

Answers: 14-1. (a) They were above average in all three areas. (b) It's about twice as high in the profoundly gifted children. (c) intelligence, motivation, creativity (in any order). (d) Rare, innate talent.

HEREDITY AND ENVIRONMENT AS DETERMINANTS OF INTELLIGENCE

15. Summarize the empirical evidence that heredity affects intelligence.

15-1. Below are the mean correlations for the intelligence of four different groups of children: *siblings reared together, fraternal twins reared together, identical twins reared apart, and identical twins reared together*. Match the group with the appropriate correlation.

.86 _____ .60 _____

.72 _____ .44 _____

15-2. What do the above correlations tell us about the role of heredity on intelligence?

Answers: **15-1.** (.86) identical twins reared together (.72) identical twins reared apart (.60) fraternal twins reared together (.44) siblings reared together **15-2.** That heredity plays a significant role in intelligence.

16. Discuss estimates of the heritability of intelligence and their limitations.

16-1. The consensus estimate of experts is that the heritability ratio for human intelligence hovers around 60 percent. What does this mean?

16-2. Why can you not use a heritability ratio to explain a particular individual's intelligence?

Answers: **16-1.** The variation in intelligence in a particular group is estimated to be 60% due to heredity (leaving 40% for environmental factors). **16-2.** It is a group statistic and may give misleading results when applied to particular individuals.

17. Describe various lines of research that indicate that environment affects intelligence.

17-1. What cumulative effects on intelligence have been found among children reared in deprived environments?

17-2. What effects on intelligence have been found among children moved from deprived environments to more enriched environments?

17-3. What relationship has been found between the intellectual quality of home environment and the intelligence of children?

17-4. Answer the following questions regarding the “Flynn effect.”

(a) What did Flynn’s research show with respect to generational changes in IQ scores since 1930 in the industrialized world?

(b) Can these generational changes be attributed to heredity?

Answers: 17-1. There is a gradual decrease in intelligence (across time). 17-2. There is a gradual increase in intelligence (across time). 17-3. They are significantly correlated. 17-4. (a) Scores have been steadily rising. (b) no.

18. Explain how heredity and the environment interact to affect intelligence.

18-1. The notion behind the concept of reaction range is that heredity places an upper and lower _____ on how much an individual can vary, with respect to a characteristic such as intelligence. On the other hand, where an individual falls within these limits is determined by _____ factors.

18-2. The major point here is that the limits for intelligence are determined by _____ factors, and the movement within these limits is determined by _____ factors.

Answers: 18-1. limit, environmental 18-2. genetic or hereditary, environmental.

19. Discuss alternative explanations for cultural differences in average IQ.

19-1. One of these explanations for the cultural differences in IQ score is Jensen’s heritability argument that the differences are largely due to _____.

Another explanation is that the differences are due to _____ disadvantages.

Which of these two explanations is best supported by research?

19-2. Still another explanation is Steele’s theory of stereotype vulnerability which holds that a widely held stereotype, that certain racial groups are mentally inferior, acts on the members of these groups so as to make them (more/less) vulnerable (they tend to under perform) when confronted with tests assessing intellectual ability. Steele believes that this same vulnerability (does/does not) exist for women entering domains dominated by men. Research so far (does/does not) support the theory of stereotype vulnerability.

19-3. A fourth explanation for the differences is that the IQ tests are culturally biased. What does the text conclude about the possible effects of cultural bias with respect to ethnic differences in IQ scores?

Answers: 19-1. heredity, socioeconomic, socioeconomic disadvantages 19-2. more, does, does 19-3. It produces weak and inconsistent effects.

20. Discuss evidence on the biological correlates of intelligence.

- 21-1. Which biologically oriented approach to measuring intelligence, reaction time, or inspection time appears to be more promising?
- 22-2. What correlation has been found between brain volume (as measured by MRI scans) IQ scores?
- 22-3. There is a small (negative/positive) correlation between intelligence and longevity.

Answers: 20-1. inspection time 20-2. .35 20-3. positive.

NEW DIRECTIONS IN THE ASSESSMENT AND STUDY OF INTELLIGENCE

21. Describe Sternberg’s and Gardner’s theories of intelligence and the concept of emotional intelligence.

- 21-1. Sternberg’s triarchic theory proposes that intelligence is composed of three basic parts. Match these parts with their individual functions:

<u>SUBTHEORY</u>	<u>FUNCTION</u>
___ Contextual	(a) Emphasizes the role played by society.
___ Experiential	(b) Emphasizes the cognitive processes underlying intelligence.
___ Componential	(c) Emphasizes the interplay between intelligence and experience.

- 21-2. Which of these three sub-theories also contains three underlying subcomponents (metacomponents, performance components, and knowledge-acquisition components)?

- 21-3. In a recent addition to his theory, Sternberg has proposed three facets of what he calls, “successful intelligence.” Match these three facets with their respective descriptions.

<u>FACETS (INTELLIGENCE)</u>	<u>DESCRIPTIONS</u>
___ Analytical	(a) Ability to deal effectively with everyday problems.
___ Creative	(b) Ability to generate new ideas.
___ Practical	(c) Abstract reasoning, evaluation, and judgment.

- 21-4. Gardner has proposed eight relatively distinct human intelligences. What does his research show with respect to a “g” factor among these separate intelligences?

- 21-5. The ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion is the general idea behind _____ intelligence.

Answers: 21-1. a, c, b 21-2. Componential 21-3. c, b, a 21-4. There does not appear to be a “g” factor i.e., people display a mix of strong, weak, and intermediate abilities 21-5. emotional.

REFLECTIONS ON THE CHAPTER’S THEMES

22. Discuss how the chapter highlighted three of the text’s unifying themes.

22-1. Answer the following questions about the three unifying themes (cultural factors shape behavior, psychology evolves in a sociohistorical context, and heredity and environment jointly influence behavior).

- (a) What theme is exemplified by the controversy over the book *The Bell Curve*?

- (b) What theme is exemplified by the different views about the nature of intelligence held by Western and non-Western cultures?

- (c) What theme is exemplified by the extensive research using twin studies, adoption studies, and family studies?

Answers: 22-1. (a) Psychology evolves in a sociohistorical context. (b) Cultural factors shape behavior. (c) Heredity and environment jointly influence behavior.

APPLICATION: MEASURING AND UNDERSTANDING CREATIVITY

23. Discuss the role of insight and divergent thinking in creativity.

23-1. Which of the following statements best describes the role of insight in creativity?

- (a) Creativity usually involves sudden flashes of insight and great leaps of imagination.
- (b) Creativity usually involves logical extensions of existing ideas involving long, hard work, rather than insight.

23-2. Which of the following statements best describes the role of divergent thinking in creativity?

- (a) Research shows that divergent thinking contributed to creativity, but does not represent the true essence of creativity.
- (b) Research shows that divergent thinking is the essential ingredient of creativity.

Answers: 23-1. b 23-2. a.

24. Describe creativity tests, and summarize how well they predict creative achievement.

24-1. Most tests of creativity attempt to assess (conventional/divergent) thinking, such as: list as many uses as you can for a book. Creativity scores are based on the _____ of alternatives generated and the originality and _____ of the suggested alternatives.

- 24-2. Creativity tests are rather (good/mediocre) predictors of creativity in the real world. One reason for this is that they attempt to treat creativity as a (specific/general) trait, while research evidence seems to show it is related to quite _____ particular domains.

Answers: 24-1. divergent, number, usefulness (utility) 24-2. mediocre, general, specific.

25. Discuss associations between creativity and personality, intelligence, and mental illness.

- 25-1. What two traits appear to be at the core of the personality characteristics common to creative people?
- 25-2. What is the intelligence level of most highly creative people?
- 25-3. What form of mental illness appears to be associated with creative achievement?

Answers: 25-1. independence and nonconformity 25-2. average to above average 25-3. mood disorders.

CRITICAL THINKING APPLICATION

26. Explain how appeals to ignorance and reification have cropped up in numerous debates about intelligence.

- 26-1. Tell whether the following statements represent examples of appeals to ignorance or to reification.
- (a) He doesn't do very well in college because he's lacking in intelligence.
 - (b) If only 25% of the cases of mental retardation can be attributed to biological causes, the remaining 75% must be due to environmental factors.
 - (c) The down side to creativity is that it can lead to mood disorders.
 - (d) More money should be spent on research to find the accurate heritability co-efficient of intelligence.

Answers: 26-1. (a) reification (b) appeals to ignorance (c) appeals to ignorance (d) reification.

Review of Key Terms

Achievement tests
Aptitude tests
Construct validity
Content validity

Convergent thinking
Correlation coefficient
Creativity
Criterion-related validity

Deviation IQ scores
Divergent thinking
Emotional intelligence
Heritability ratio

Intelligence quotient (IQ)
Intelligence tests
Mental age
Mental retardation
Normal distribution

Percentile score
Personality tests
Psychological test
Reaction range
Reification

Reliability
Standardization
Test norms
Validity

- _____ 1. A standardized measure of a sample of a person's behavior.
- _____ 2. Tests that measure general mental ability.
- _____ 3. Tests that measure various personality traits.
- _____ 4. Tests that assess talent for specific kinds of learning.
- _____ 5. Tests that gauge the mastery and knowledge of various subject areas.
- _____ 6. The development of uniform procedures for administering and scoring tests, including the development of test norms.
- _____ 7. Data that provides information about the relative standing of a particular test score.
- _____ 8. Number indicating the percentage of people who score above or below a particular test score.
- _____ 9. The measurement consistency of a test.
- _____ 10. The ability of a test to measure what it was designed to measure.
- _____ 11. The degree to which the content of a test is representative of the domain it is supposed to measure.
- _____ 12. The degree to which the scores on a particular test correlate with scores on an independent criterion (test).
- _____ 13. The degree to which there is evidence that a test measures a hypothetical construct.
- _____ 14. A score indicating the mental ability typical of a chronological age group.
- _____ 15. Mental age divided by chronological age and multiplied by 100.
- _____ 16. A symmetrical, bell-shaped curve that describes the distribution of many physical and psychological attributes.
- _____ 17. Scores that translate raw scores into a precise location in the normal distribution.
- _____ 18. Subnormal, general mental ability accompanied by deficiencies in everyday living skills originating prior to age 18.
- _____ 19. An estimate of the percentage of variation in a trait determined by genetic inheritance.
- _____ 20. Genetically determined limits on intelligence.
- _____ 21. The generation of ideas that are original, novel, and useful.
- _____ 22. Thinking that attempts to narrow down a list of alternatives to a single best solution.
- _____ 23. Thinking that attempts to expand the range of alternatives by generating many possible solutions.
- _____ 24. A numerical index of the degree of relationship between two variables.
- _____ 25. Occurs when a hypothetical abstract concept is given a name and then treated as though it were a concrete, tangible object.
- _____ 26. The ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion.

Answers: 1. psychological tests 2. intelligence tests 3. personality tests 4. aptitude tests 5. achievement tests 6. standardization 7. test norms 8. percentile score 9. reliability 10. validity 11. content validity 12. criterion-related validity 13. construct validity 14. mental age 15. intelligence quotient 16. normal distribution 17. deviation IQ scores 18. mental retardation 19. heritability ratio 20. reaction range 21. creativity 22. convergent thinking 23. divergent thinking 24. correlation coefficient 25. reification 26. emotional intelligence.

Review of Key People

Alfred Binet
 Sir Francis Galton
 Howard Gardner
 Arthur Jensen

Sandra Scarr
 Claude Steele
 Robert Sternberg

Lewis Terman
 David Wechsler
 Ellen Winner

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|-------|--|
| _____ | 1. Developed the Stanford-Binet Intelligence Scale. |
| _____ | 2. Developed the first successful test of adult intelligence. |
| _____ | 3. Postulated a cognitive triarchic theory of intelligence. |
| _____ | 4. Proposed a reaction range model for human intelligence. |
| _____ | 5. Developed the first useful intelligence test. |
| _____ | 6. Postulated a heritability explanation for cultural differences in intelligence. |
| _____ | 7. Began the quest to measure intelligence. |
| _____ | 8. Proposed a stereotype vulnerability theory as an explanation for racial differences on IQ test scores. |
| _____ | 9. Has suggested the existence of a number of relatively autonomous human intelligences. |
| _____ | 10. Her research shows that profoundly gifted children suffer more emotional and social problems than do moderately gifted children. |

Answers: 1. Terman 2. Wechsler 3. Sternberg 4. Scarr 5. Binet 6. Jensen 7. Galton 8. Steele 9. Gardner 10. Winner.

Self-Quiz

1. This self-test you are now taking is an example of:
 - a. an aptitude test
 - b. an achievement test
 - c. an intelligence test
 - d. a criterion-related test

2. Which of the following statistics is generally used to estimate reliability and validity?
 - a. the correlation coefficient
 - b. the standard deviation
 - c. the percentile score
 - d. the median

3. What kind of validity do tests such as the SAT and ACT particularly strive for?
 - a. content validity
 - b. construct validity
 - c. absolute validity
 - d. criterion-related validity

4. With respect to modern intelligence tests:
 - a. validity is generally higher than reliability
 - b. reliability and validity are about the same
 - c. reliability is generally higher than validity
 - d. I have no idea what you're talking about.

5. Which of the following retarded groups can often pass for normal as adults?
 - a. mild
 - b. moderate
 - c. profound
 - d. both mild and moderate

6. What percentage of mental retardation cases have been definitely linked to organic causes?
 - a. approximately 25%
 - b. approximately 50%
 - c. approximately 75%
 - d. approximately 90%

7. Terman's long-term study of gifted children found that they tended to excel in:
 - a. physical development
 - b. social development
 - c. emotional development
 - d. they excelled in all three areas

8. Which of the following groups shows the lowest correlation with respect to intelligence?
 - a. fraternal twins reared together
 - b. fraternal twins reared apart
 - c. identical twins reared apart
 - d. siblings reared together

9. If the heritability ratio for intelligence is 80%, this means that for you, as an individual, heredity determines 80% of your intelligence and environment determines 20%. This statement is:
 - a. true
 - b. false

10. The "Flynn effect" arises from the observation that the general intelligence in industrialized societies:
 - a. has been rising across time
 - b. has been declining across time
 - c. has remained steady across time
 - d. is primarily effected by heredity and not environment

11. If the reaction range concept of human intelligence is correct, then a child with exactly normal intelligence will probably not get much higher than an IQ of:
 - a. 107
 - b. 112
 - c. 122
 - d. 130

12. Which of the following explanations for racial differences in intelligence is best supported by research evidence?
 - a. Jensen's heritability theory
 - b. cultural bias in IQ tests
 - c. cultural disadvantage
 - d. Watson's differential conditioning theory

13. Steele's theory of stereotype vulnerability is an attempt to explain:
- a. why Asian-Americans score higher than average on IQ tests
 - b. why African-Americans score lower than average on IQ tests
 - c. why cultural bias must necessarily be inherent in all intelligence tests
 - d. why the general intelligence in a population declines across time
14. Most tests of creativity emphasize:
- a. convergent thinking
 - b. divergent thinking
 - c. bursts of insight
 - d. getting at unconscious thought processes
15. What form of mental illness frequently has been found to be associated with outstanding creativity?
- a. anxiety disorders
 - b. antisocial personality
 - c. schizophrenia
 - d. mood disorders
16. Which of the following statements is an example of reification?
- a. Birds of a feather flock together.
 - b. Creative people are born, not raised.
 - c. She gets good grades in school because she is intelligent.
 - d. Intelligence tests are only moderate predictors of vocational success.

Answers: 1. b 2. a 3. d 4. c 5. a 6. a 7. d 8. d 9. b 10. a 11. b 12. c 13. b 14. b 15. d 16. c 17. c.

InfoTrac Keywords

Achievement Tests

Aptitude Tests

Intelligence Tests

