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Twelfth Edition

Child Development

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Intelligence Chapter 8 Outline

The Concept of Intelligence

- What is Intelligence?
- Intelligence Tests
- Theories of Multiple Intelligences
- The Influence of Heredity and Environment
- Group Comparisons

The Development of Intelligence

- Tests of Infant Intelligence
- Childhood Stability and Change in Intelligence Through Adolescence

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Intelligence Chapter 8 Outline (continued)

The Extremes of Intelligence and Creativity

- Mental Retardation
- Giftedness
- Creativity

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Chapter 8 Preview

There is spirited debate about whether people have a general intelligence or a number of specific intelligences.

The concept of intelligence also has generated other controversies, including whether intelligence is more strongly influenced by heredity or by environment, whether there is cultural bias in intelligence testing, and whether intelligence tests are misused.

We will explore these controversies in this chapter. We will also explore the development of intelligence from infancy through adolescence and the extremes of intelligence and creativity.

The Concept of Intelligence

What is Intelligence?

- Some experts describe intelligence as:
 - the ability to solve problems
 - the capacity to adapt and learn from experience
 - creativity and interpersonal skills
- Intelligence cannot be directly measured.
- We can only evaluate intelligence *indirectly* by studying and comparing the intelligent acts that people perform.
- Because intelligence is such an abstract, broad concept, it is not surprising that there are so many different ways to define it.

The Concept of Intelligence (cont.)

Intelligence Tests

Main intelligence tests that are administered to children:

The Binet Tests

- 1904- French Ministry of Education asked psychologist Alfred Binet to devise method of identifying children who were unable to learn in school
- Binet and his student, Theophile Simon, developed an intelligence test to meet this request.

The Concept of Intelligence (cont.)

Intelligence Tests (continued)

The Binet Tests (continued)

- Binet developed concept of *mental age* (MA): individual's level of mental development relative to others
- 1912- William Stern created concept of *intelligence quotient* (IQ): refers to a person's mental age divided by chronological age (CA), multiplied by 100. (MA/CA X 100)
- Binet test has been revised many times.
 - called the *Stanford-Binet tests* (revisions were made at Stanford University)

The Concept of Intelligence (cont.)

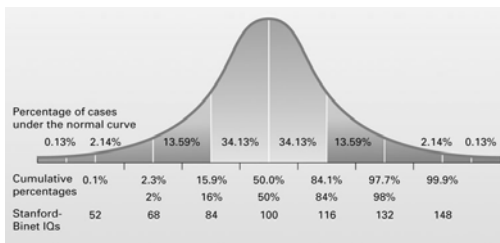
Intelligence Tests (continued)

The Stanford-Binet Tests

- Scores on a Stanford-Binet test approximate a **normal distribution**:
 - symmetrical, with a majority of the scores falling in the middle of the possible range of scores and few scores appearing toward the extremes of the range
- The current Stanford-Binet test is administered individually to people aged 2 through adult.
- The Stanford-Binet test includes a variety of items, some of which require verbal responses, others nonverbal responses.

The Concept of Intelligence (cont.)

The Normal Curve and Stanford-Binet IQ Scores



The Concept of Intelligence (cont.)

Intelligence Tests (continued)

The Stanford-Binet Tests (continued)

- 1985- 4th edition of the Stanford-Binet was published
 - added analysis of the individual's responses in terms of:
 - Verbal reasoning
 - Quantitative reasoning
 - Abstract visual reasoning
 - Short-term memory
- A general composite score is still obtained to reflect overall intelligence.
- The Stanford-Binet continues to be one of the most widely used tests to assess students' intelligence (Aiken, 2006).

The Concept of Intelligence (cont.)

Intelligence Tests (continued)

The Wechsler Scales

- Another set of tests widely used to assess students' intelligence.
- Developed by psychologist David Wechsler.
- The set of tests include:
 - The Wechsler Preschool and Primary Scale of Intelligence—3rd Edition (WPPSI-III) to test children from the ages of 2 years, 6 months to 7 years, 3months of age.
 - The Wechsler Intelligence Scale for Children—4th Edition (WISC-IV) for children and adolescents 6-16 years of age
 - The Wechsler Adult Intelligence Scale—3rd Edition (WAIS-III).

The Concept of Intelligence (cont.)

Intelligence Tests (continued)

The Wechsler Scales (continued)

- The Wechsler scales not only provide an overall IQ score and scores on a number of subtests, but also yield several composite indexes:
 - Verbal Comprehension Index
 - Working Memory Index
 - Processing Speed Index
- allows examiner to determine areas in which child is strong or weak
- Intelligence tests such as the Stanford-Binet and Wechsler Scales are given on an individual basis.

The Concept of Intelligence (cont.)

Sample Subscales of the Wechsler Intelligence Scale for Children (WISC-IV)

Verbal Subscales

Similarities
A child must think logically and abstractly to answer a number of questions about how things might be alike.

Example: "In what way are a lion and a tiger alike?"

Comprehension
This subscale is designed to measure an individual's judgment and common sense.

Example: "What is the advantage of keeping money in a bank?"

Nonverbal Subscales

Block Design
A child must assemble a set of multicolored blocks to match designs that the examiner shows. Visual-motor coordination, perceptual organization, and the ability to visualize spatially are assessed.

Example: "Use the four blocks on the left to make the pattern on the right."



The Wechsler includes 11 subscales, 6 verbal and 5 nonverbal. Three of the subscales are shown here.

The Concept of Intelligence (cont.)

Intelligence Tests (continued)

The Use and Misuse of Intelligence Tests

- Psychological tests are tools.
- The effectiveness of psychological tests depends on the knowledge, skill, and integrity of the user.
- Real-world applications: predict school and job success
 - Periodic assessment is required because they only measure current academic performance.
 - They are moderately correlated with work performance, but correlations decrease the longer people work at a job, and tests ignore motivation, physical and mental health, and social skills.

The Concept of Intelligence (cont.)

Intelligence Tests (continued)

The Use and Misuse of Intelligence Tests (continued)

- The single number provided by many IQ tests can easily lead to false expectations about an individual (Rosnow & Rosenthal, 1996).
- Sweeping generalizations are too often made on the basis of an IQ score.
- Even though they have limitations, tests of intelligence are among psychology's most widely used tools.
- To be effective, intelligence tests should be used in conjunction with other information about an individual.

The Concept of Intelligence (cont.)

Theories of Multiple Intelligence

Sternberg's Triarchic Theory

- 3 main types of intelligence:
 - **Analytical**
 - traditional concept of intelligence- analytical thinking and abstract reasoning
 - **Creative**
 - unique thinking that might not conform to teachers' expectations
 - **Practical**
 - social skills and common sense
- Most tasks require a combination of all 3 intelligences.

The Concept of Intelligence (cont.)

Theories of Multiple Intelligence (continued)

Howard Gardner's Eight Frames of Mind:

- **Verbal skills**
 - ability to think in words and to use language to express meaning (authors, journalists, speakers)
- **Mathematical skills**
 - ability to carry out mathematical operations (scientists, engineers, accountants)
- **Spatial skills**
 - ability to think three-dimensionally (architects, artists, sailors)
- **Bodily-kinesthetic skills**
 - ability to manipulate objects and be physically adept (surgeons, craftspeople, dancers, athletes)

The Concept of Intelligence (cont.)

Theories of Multiple Intelligence (continued)

Howard Gardner's Eight Frames of Mind (continued)

- **Musical skills**
 - sensitivity to pitch, melody, rhythm, and tone (composers, musicians, and music therapists)
- **Intrapersonal skills**
 - ability to understand oneself and effectively direct one's life (theologians, psychologists)
- **Interpersonal skills**
 - ability to understand and effectively interact with others (successful teachers, mental health professionals)
- **Naturalist skills**
 - ability to observe patterns in nature and understand - natural and human-made systems (farmers, botanists, ecologists, landscapers)

The Concept of Intelligence (cont.)

Theories of Multiple Intelligence (continued)

Howard Gardner's Eight Frames of Mind (continued)

- Everyone has varying degrees of all 8 intelligences.
- There is considerable interest in applying Gardner's theory of multiple intelligences to children's education to help them discover and explore their domains of natural curiosity and talent.
- Each day every student is exposed to materials that are designed to stimulate a whole range of human abilities.

The Concept of Intelligence (cont.)

Theories of Multiple Intelligence (continued)

Emotional Intelligence

- ability to perceive and express emotion accurately and adaptively
- ability to understand emotion and emotional knowledge
- ability to use feelings to facilitate and manage emotions in oneself and others
 - popularized by Daniel Goleman (1995)
 - concept of emotional intelligence initially developed by Peter Salovey and John Mayer (1990)

The Concept of Intelligence (cont.)

Theories of Multiple Intelligence (continued)

Do Children Have One Intelligence or Many?

- Although controversy exists over whether intelligence is a general ability, specific abilities, or both, multiple intelligence theories have stimulated us to think more broadly about what makes up people's intelligence and competence.
- Multiple intelligence theories have also motivated educators to develop programs that instruct students in different domains.

The Concept of Intelligence (cont.)

Comparison of Gardner's, Sternberg's, and Salovey/Mayer/Goleman's Views of Intelligence

Sternberg	Gardner	Salovey/Mayer
Analytical	Verbal Mathematical	
Creative	Spatial Movement Musical	
Practical	Interpersonal Intrapersonal	Emotional
	Naturalistic	

The Concept of Intelligence (cont.)

The Influence of Heredity and Environment

Genetic Influences

- A research review found that the difference in the average correlations for identical and fraternal twins was not very high, only .15 (Grigorenko, 2000).
- Adoption studies are also used in attempts to analyze the relative importance of heredity in intelligence (Plomin, DeFries, & Fulker, 2007).
- Studies of adoption also document the influence of environments (Lucurto, 1990).

The Concept of Intelligence (cont.)

The Influence of Heredity and Environment (continued)

Genetic Influences (continued)

- In most *adoption studies*, researchers determine whether the behavior of adopted children is more like that of their biological parents or their adopted parents.
- **Heritability**: the fraction of the variance within a population that is attributed to genetics
 - attempts to tease apart the effects of heredity and environment in a population
 - heritability index is computed using correlational techniques

The Concept of Intelligence (cont.)

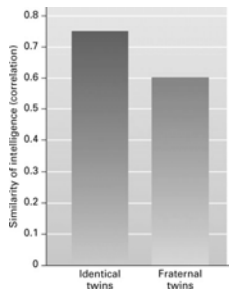
The Influence of Heredity and Environment (continued)

Genetic Influences (continued)

- Heritability refers to a specific group (population), *not* to individuals (Okagaki, 2000).
- Researchers use the concept of heritability to try to describe why people differ.
- Most research on heredity and environment does not include environments that differ radically.

The Concept of Intelligence (cont.)

Correlation between Intelligence Test Scores and Twin Status



The Concept of Intelligence (cont.)

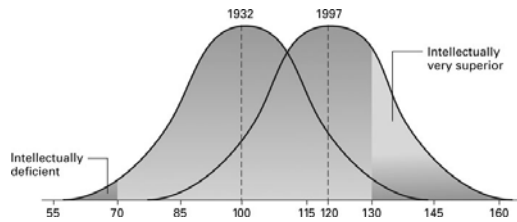
The Influence of Heredity and Environment (continued)

Environmental Influences

- Most experts today agree that the environment also plays an important role in intelligence (Campbell, 2007; Sternberg, Kaufman, & Grigorenko, 2008).
- For most people, modifications in environment can change their IQ scores considerably.
- Among the environmental factors that influence intelligence are socioeconomic status, parental communication with and support of children, quality of neighborhoods, and quality of schools.
- The rapid increase in IQ scores around the world suggests the effects of education rather than heredity.

The Concept of Intelligence (cont.)

The Increase in IQ Scores from 1932 to 1997



The Concept of Intelligence (cont.)

The Influence of Heredity and Environment (continued)

Group Comparisons

• Cross-Cultural Comparisons

- Cultures vary in the way they define intelligence.
 - Western cultures view intelligence in terms of reasoning and thinking skills.
 - Eastern cultures see intelligence as a way for members of a community to engage in social roles successfully.

The Concept of Intelligence (cont.)

The Influence of Heredity and Environment (continued)

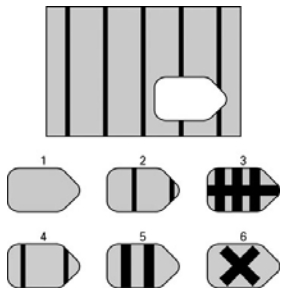
Group Comparisons (continued)

• Cultural Bias in Testing

- Early intelligence tests favored people from:
 - urban rather than rural environments
 - middle-socioeconomic status rather than low-socioeconomic status
 - whites rather than African Americans
- Culture-fair tests
 - intelligence tests that are intended not to be culturally biased
 - People with more education still score higher than those with less education because tests reflect what the dominant culture thinks is important.

The Concept of Intelligence (cont.)

Sample Item from the Ravens Progressive Matrices Test



The Concept of Intelligence (cont.)

The Influence of Heredity and Environment (continued)

Group Comparisons (continued)

• Ethnic Comparisons

- In the U.S., children from African American and Latino families score below children from white families on standardized intelligence tests.
- As African Americans have gained social, economic, and educational opportunities, the gap between African Americans and whites on standardized intelligence tests has begun to narrow.
- Stereotype threat
 - anxiety that one's behavior might confirm a negative stereotype about one's group

The Concept of Intelligence (cont.)

The Influence of Heredity and Environment (continued)

Group Comparisons (continued)

• Gender Comparisons

- The average scores of males and females do not differ on intelligence tests, but variability in their scores does differ with males showing greater extremes in range (Brody, 2000).
- Although there is extensive overlap in scores, gender differences exist in some intellectual areas:
 - Males score better on spatial reasoning tasks.
 - Females score better in some verbal areas.

The Development of Intelligence

Tests of Infant Intelligence

Arnold Gesell (1934)

- developed measure that served as clinical tool to help sort out potentially normal babies from abnormal ones
- current version of the Gesell test has 4 categories of behavior:
 - motor
 - language
 - adaptive
 - personal-social.
- The developmental quotient (DQ) combines subscores in these categories to provide an overall score.

The Development of Intelligence (cont.)

Tests of Infant Intelligence (continued)

The Bayley Scales of Infant Development

- widely used scales for assessing infants from 1-42 months of age to diagnose developmental delays and plan intervention strategies
- 3 main components:
 - Mental Scale
 - A Motor Scale
 - Infant Behavior Profile
- Scores on the Gesell Bayley scales do not correlate highly with IQ scores obtained later in childhood.

The Development of Intelligence (cont.)

Tests of Infant Intelligence (continued)

The Fagan Test of Infant Intelligence

- focuses on infant's ability to process information
- elicits similar performances from infants in different cultures
- correlates with measures of intelligence in older children
- Measures of habituation and dishabituation predict later intelligence.

The Extremes of Intelligence and Creativity

Mental Retardation

- condition of limited mental ability
 - individual has a low IQ, usually below 70
 - Individual has difficulty adapting to everyday life
 - exhibits the above characteristics by age 18
- several ways to classify degrees of mental retardation; the one adopted by most school systems uses IQ scores to categorize retardation as:
- Mild
 - Moderate
 - Severe
 - Profound
- Mental retardation may have an organic cause, or it may be social and cultural in origin.

The Extremes of Intelligence and Creativity (cont.)

Classification of Mental Retardation Based on IQ

Type of Mental Retardation	IQ Range	Percentage
Mild	55–70	89
Moderate	40–54	6
Severe	25–39	4
Profound	Below 25	1

The Extremes of Intelligence and Creativity (cont.)

Classification of Mental Retardation Based on Levels of Support Needed

Intermittent	Supports are provided "as needed." The individual may need episodic or short-term support during life-span transitions (such as job loss or acute medical crisis). Intermittent supports may be low or high intensity when provided.
Limited	Supports are intense and relatively consistent over time. They are time-limited but not intermittent. Require fewer staff members and cost less than more intense supports. These supports likely will be needed for adaptation to the changes involved in the school-to-adult period.
Extensive	Supports are characterized by regular involvement (for example, daily) in at least some setting (such as home or work) and are not time-limited (for example, extended home-living support).
Pervasive	Supports are constant, very intense, and are provided across settings. They may be of a life-sustaining nature. These supports typically involve more staff members and intrusiveness than the other support categories.

The Extremes of Intelligence and Creativity (cont.)

Mental Retardation (continued)

Organic retardation

- mental retardation caused by a genetic disorder or by brain damage
 - Down syndrome
 - Fragile X syndrome
 - abnormality in the X chromosome
- Most people who suffer from organic retardation have IQs between 0 and 50.

The Extremes of Intelligence and Creativity (cont.)

Mental Retardation (continued)

- When no evidence of organic brain damage can be found, cases of mental retardation are labeled *cultural-familial retardation*.
 - Individuals with this type of retardation have IQs between 55 and 70.
 - Psychologists suspect that these mental deficits often result from growing up in a below-average intellectual environment.

The Extremes of Intelligence and Creativity (cont.)

Giftedness

- People who are gifted:
 - have above-average intelligence (an IQ 130 or higher)
 - have a superior talent for something
- No relation between giftedness and mental disorder has been found.
- The idea that gifted children are maladjusted is a myth (Terman, 1925).

The Extremes of Intelligence and Creativity (cont.)

Giftedness (continued)

- Ellen Winner (1996) described 3 criteria that characterize gifted children, whether in art, music, or academic domains:

- **Precocity**
 - are extremely talented
- **Marching to their own drummer**
 - learn in a qualitatively different way than ordinary children
- **Passion to master**
 - are driven to understand the domain in which they have high ability

The Extremes of Intelligence and Creativity (cont.)

Giftedness (continued)

- Deliberate practice is an important characteristic of individuals who become experts in a particular domain.
- Researchers have also found that individuals with world-class status in the arts, mathematics, science, and sports all report strong family support and years of training and practice (Bloom, 1985).

The Extremes of Intelligence and Creativity (cont.)

Creativity

- the ability to think about something in novel and unusual ways and come up with unique solutions to problems
- Creativity and intelligence are not the same.
- Most creative people are quite intelligent, but the reverse is not necessarily true.

The Extremes of Intelligence and Creativity (cont.)

Creativity (continued)

Creativity requires *divergent thinking*:

- **Divergent thinking**
 - thinking that produces many answers to the same question;
- **Convergent thinking**
 - thinking that produces one correct answer.
 - characteristic of the type of thinking required on traditional intelligence tests

The Extremes of Intelligence and Creativity (cont.)

Creativity (continued)

Guiding Children's Creativity

- The best strategies to help children become more creative include:
 - encouraging creative thinking on a group and individual basis
 - having children engage in **brainstorming**
 - technique in which children are encouraged to come up with creative ideas in a group, play off each other's ideas, say practically whatever comes to mind, and come up with as many ideas as possible

The Extremes of Intelligence and Creativity (cont.)

Creativity (continued)

Guiding Children's Creativity (continued)

- Provide children with environments that stimulate creativity.
- Don't over-control students.
- Encourage internal motivation.
- Guide children to help them think in flexible ways.
- Build children's confidence.
- Guide children to be persistent and delay gratification.
- Encourage children to take intellectual risks.

E-LEARNING TOOLS

To help you master the material in this chapter, visit the Online Learning Center for Child Development, twelfth edition at:

<http://www.mhhe.com/santrockcd12>
