Intelligence

Module 28

Intelligence and Intelligence Testing

The Nature of Intelligence

Intelligence

- Ability to learn from experience, solve problems, and use knowledge to adapt to a new situation
- Is intelligence one thing or are there multiple intelligences?

The Nature of Intelligence: Howard Gardner

Howard Gardner (1943-)

- Author of a contemporary theory of multiple intelligences consisting of eight separate kinds of intelligence

Gardner's Types of Intelligence

Intelligence	Examples
 Verbal-Linguistic	Reading comprehension Writing

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 Naturalistic	Appreciate nature Ability to work with plants and animals

Critics of Gardner

- Some critics argue that Gardner has moved well beyond what is normally considered to be intelligence, which is usually classified as *mental* ability.
- By adding things like musical ability and bodily-kinesthetic ability, these critics say, he is broadening the concept of intelligence to include areas that used to be considered *skills* or *talents*.

The Nature of Intelligence: Robert Sternberg

Robert Sternberg (1949-)

- Author of a contemporary theory of multiple intelligences consisting of:
  - analytic,
  - creative, and
  - practical intelligence

Analytic Intelligence

- Helps people do things like analyze, compare, and evaluate
- Most often stressed in schools
- Closely matches most people's traditional view of intelligence

Sternberg's Types of Intelligence

Intelligence	Examples
 Analytic	Analyzing Comparing Evaluating

Creative Intelligence

- Individuals high in creative intelligence can do things like create, invent, and design – they come up with new ideas and adapt to new situations.

Sternberg's Types of Intelligence

Intelligence	Examples
 Analytic	Analyzing Comparing Evaluating
 Creative	Inventing Designing

Practical Intelligence

- “Common Sense” intelligence
- Allows you to apply, use, and do

Sternberg's Types of Intelligence

Intelligence		Examples
	Analytic	Analyzing Comparing Evaluating
	Creative	Inventing Designing
	Practical	Applying Using

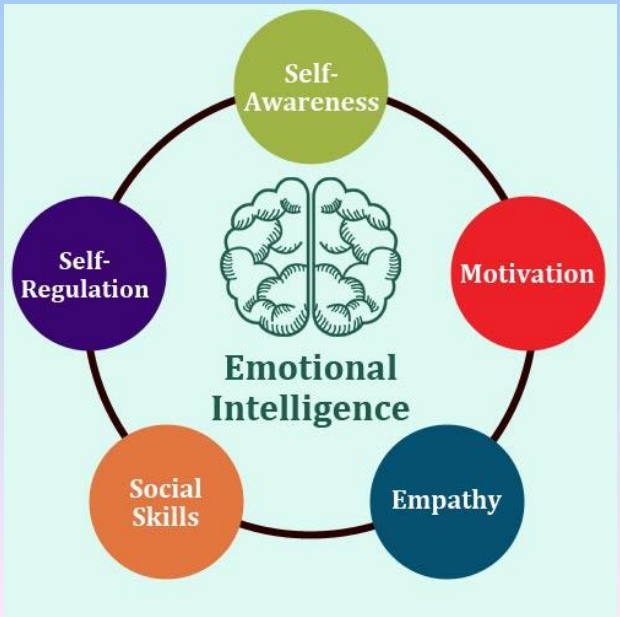
The Nature of Intelligence: Emotional Intelligence

Emotional Intelligence

- Different from academic intelligence, is something called emotional intelligence (EI) – the *ability to perceive, express, understand, and regulate emotions*
- People high in emotional intelligence are more in touch with their feelings and the feelings of others.

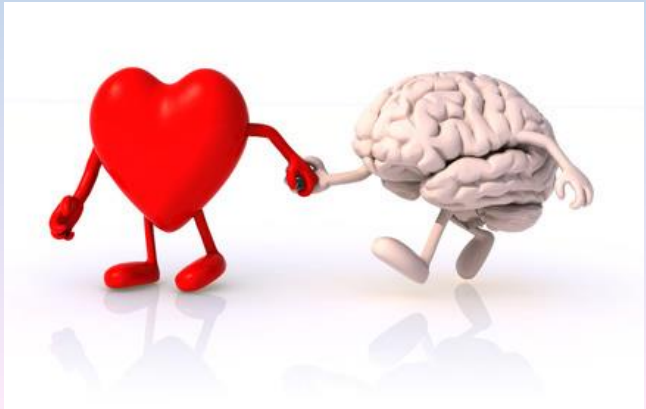
Are you emotionally intelligent?

- Emotionally intelligent people can face setbacks without losing their motivation and optimism, and they can manage their emotions in a way that allows them to get along well with others.



Straight A's doesn't = Emotionally Intelligent

- Academic skills don't predict emotional intelligence which relies more on social skills
- In fact, academically bright people are not much better than average people when it comes to success in marriage, child-rearing, and maintaining mental health.

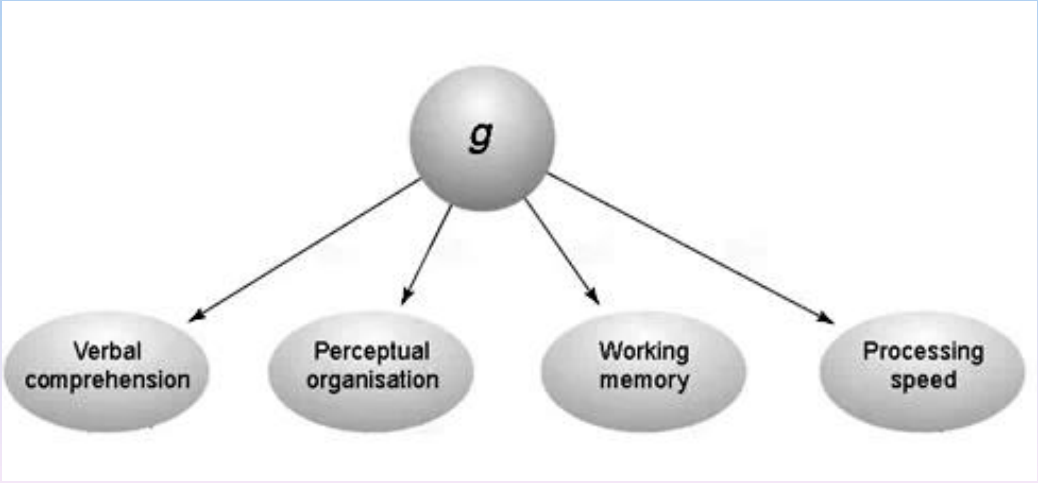


Charles Spearman (1863-1945)

- Psychologists have not yet reached an agreement, on what, exactly intelligence is.
- Is there, perhaps, one underlying factor that fuels all types of intelligence?
- Over a half-century ago, Charles Spearman, proposed just such a factor, that he called *general intelligence* or *g*, which he believed underlies all multiple intelligences.

General Intelligence (g)

- Factor that Spearman believed *underlies other, more specific aspects of intelligence*
- Spearman noticed the tendency of people who excelled in one area to also excel in others.



Intelligence Testing

Standardized Intelligence Testing

- Testing has been around for a long time, but the roots of modern standardized intelligence tests can be traced back to 19th century France.
- France had new laws requiring education for every child. With all these kids of varying mental abilities, they needed an efficient way to place children in the proper classes.
- Alfred Binet was asked to come up with a fast and fair test designed to help place students.

Alfred Binet (1857-1911)

- Along with Theodore Simon, developed the first test to classify children's abilities using the concept of *mental age*

We get smarter as we get older, right?

Binet and Simon started with the assumption that children's intellectual abilities grow year by year.

A typical 7-year-old should be able to answer harder questions than a typical 6-year-old and a typical 8-year-old should be able to answer harder questions than a 7-year-old.

Some kids are smarter than others

- An average 7-year-old child should have the mental age of 7 years.
- However, not every member of each age group is typical. Some kids who are 7 can answer questions that are usually appropriate for kids who are 8 or 9
- Likewise, some kids who are 7 may struggle with questions that most 6 or even 5-year-olds can answer.

Mental Age

- Knowing this, Binet and Simon came up with the concept of *mental age*, the chronological age that corresponds to the difficulty of the questions a child can answer.
- Thus, a child who can answer 7-year-old questions has a mental age of 7, no matter what the child's chronological age is.

Chronological Age

- The *actual* age of a person
- A kid's chronological age might be 7, but if he is *more* intelligent than the average kid then his *mental age* might be 8 or 9.
- If an 7-year-old is *less* intelligent than the average kid of the same age then his mental age might only be 5 or 6.

Dangers of Labeling

- Binet and Simon predicted that children who fell significantly behind their agemates in mental age were the ones who would struggle in an age-grouped classroom.
- Even back then they were concerned that, though the test was designed with good intentions, it *might be used to label* some children as “backward” and to limit their opportunities.

Nature Vs Nurture

- Binet believed that intelligence is determined mostly by *environment/nurture*, and felt that slow children could be provided exercises to help them increase their mental abilities.
- Those who came after Binet believed intelligence was largely determined by *genetics/nature* and was reasonably fixed.
- Lewis Terman believed this.

Lewis Terman (1877-1956)

- Adapted Binet's tests for use in the United States
- The test reported intelligence as a calculated IQ score
- Called the *Stanford-Binet Intelligence Test*

Intelligence Quotient (IQ)

- Terman used this test to devise a way to express a person's intelligence with a single, easy-to-interpret number, your *IQ*
- Your IQ is the number that results from dividing mental age by chronological age and multiplying by 100
- **IQ = (MA/CA) X 100**
- A score of 100 would be considered average
- Formula has been replaced with modern versions

Problems with the IQ Test

- One problem with this formula is the assumption that mental abilities increase a little every year.
- While this generally works well for kids, it doesn't work for adults.
- After about age 20 or so your *mental age will level off* and stay the same, yet your chronological age will continue to go up. You probably won't do any better at math at 40 than you did at 20.

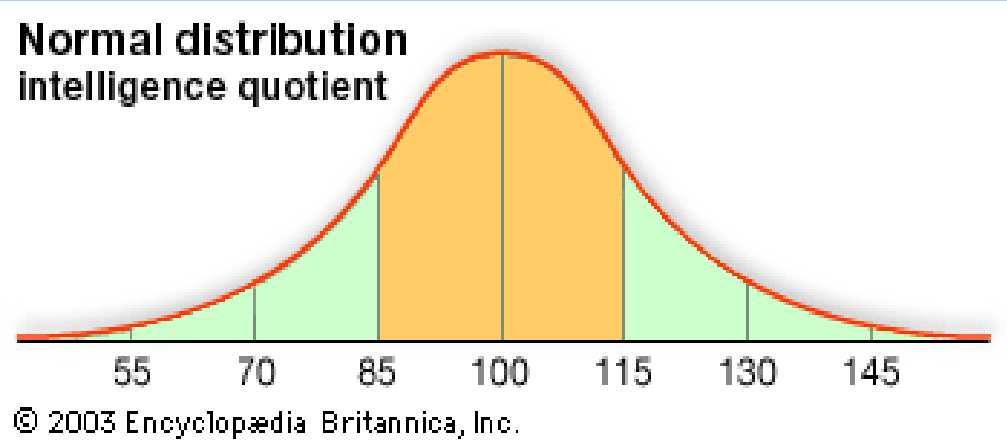
What does your IQ score mean?*

- Over 140 - Genius or near genius
- 120 - 140 - Very superior intelligence
- 110 - 119 - Superior intelligence
- 90 - 109 - Normal or average intelligence
- 80 - 89 - Dullness
- 70 - 79 - Borderline deficiency
- Under 70 - Definite feeble-mindedness

- *According to Lewis Terman

Normal Distribution of IQ scores

- 50% of IQ scores fall between 90 and 110
- 70% of IQ scores fall between 85 and 115
- 95% of IQ scores fall between 70 and 130
- 99.5% of IQ scores fall between 60 and 140



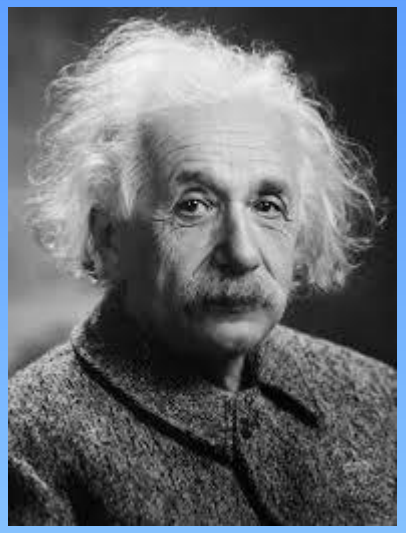
Low IQ & Intellectual Disability (formerly called mental retardation)

- About 2% of people have an IQ under 70
- Half of these 2% are considered to be *intellectually disabled*
- Those with Intellectual Disability (ID) are defined as having a score of less than 70 and difficulty adapting to the demands of independent living.

Severity of Intellectual Disability (ID)

- Severity of intellectual disability can be broken into 4 levels:
- 50-69 - Mild ID (85% of those with ID)
- 35-49 - Moderate ID (10%)
- 20-34 - Severe ID (4%)
- IQ < 20 - Profound ID (1%)

High IQ & Genius IQ



- Genius IQ is generally considered to begin around 140 to 145, representing .25% of the population (1 in 400).
- Einstein was considered to "only" have an IQ of about 160.
- *Mensa* is a society for people with high IQ, in the top 2% (1 in 50).

Levels of “Smart”:

* 115-124 - Above average (college students)
- * 125-134 - Gifted (post-graduate students)
- * 135-144 - Highly gifted (intellectuals)
- * 145-154 - Genius (professors)
- * 155-164 - Genius (Nobel Prize winners)
- * 165-179 - High genius
- * 180-200 - Highest genius
- * >200 - “Immeasurable genius"

David Wechsler (1896-1981)

- In the 1930s, David Weschler developed what have become the *most widely used* individual intelligence tests in America.

The WISC & WAIS Tests

- Wechsler developed *different tests for different age groups* – the Wechsler Adult Intelligent Scale (WAIS) and the Wechsler Intelligence Scale for Children (WISC)
- *Separate verbal and nonverbal scores* (tasks such as the assembly of objects)
- *Subtests* - about a dozen subtests of various abilities which are each scored separately to show the test-taker's strengths and weaknesses.

Wechsler Adult Intelligence Test

VERBAL

General Information
What day of the year is Independence Day?

Similarities
In what way are *wool* and *cotton* alike?

Arithmetic Reasoning
If eggs cost 60 cents a dozen, what does 1 egg cost?

Vocabulary
Tell me the meaning of corrupt.

Comprehension
Why do people buy fire insurance?

Digit Span
Listen carefully, and when I am through, say the numbers right after me.

7 3 4 1 8 6

Now I am going to say some more numbers, but I want you to say them backward.

3 8 4 1 6

PERFORMANCE

Picture Completion
I am going to show you a picture with an important part missing. Tell me what is missing.

Picture Arrangement
The pictures below tell a story. Put them in the right order to tell the story.

Block Design
Using the four blocks, make one just like this.

Object Assembly
If these pieces are put together correctly, they will make something. Go ahead and put them together as quickly as you can.

Digit-Symbol Substitution

Code

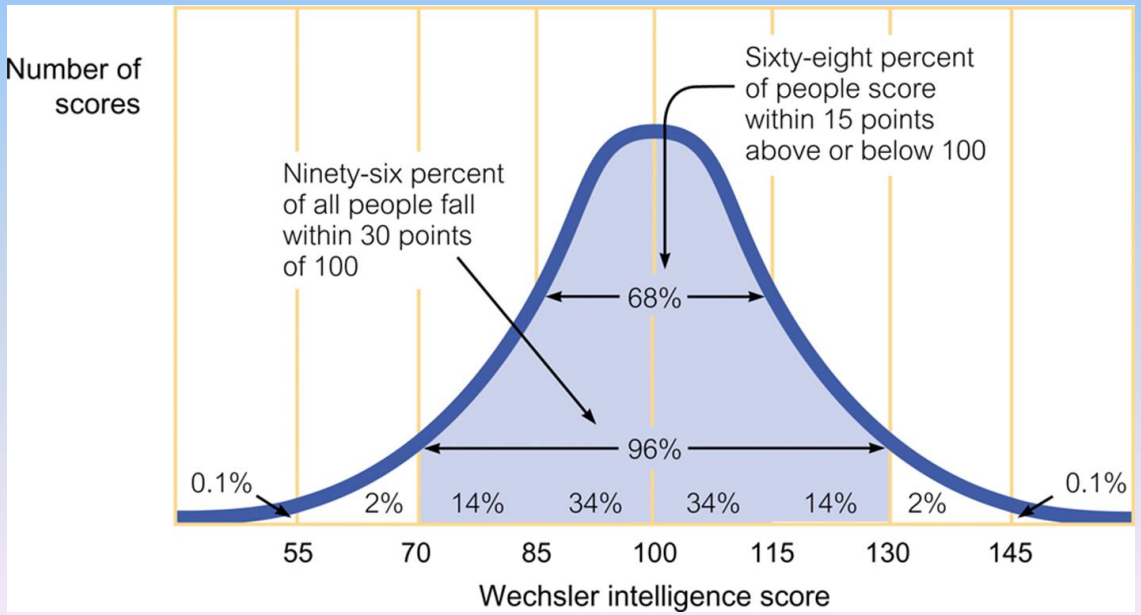
△	○	▱	×	8
1	2	3	4	5

Test

△	8	×	○	△	▱	8	×	△	8

Intelligence and the Normal Distribution

- This graph shows how often various intelligence test scores occur in the general population. The *average score is 100* and about two-thirds of the population score within 15 points of the average. The further from average you get, the fewer people achieve that score. It is rare to have scores below 55 or above 145.



Intelligence Testing: Group Tests

Individual Vs Group Tests

- The Stanford-Binet and Wechsler tests are individual intelligence tests given to one person at a time by a trained examiner.
- Most people never take either of them.
- Instead, you are more likely to take a *group* intelligence test.

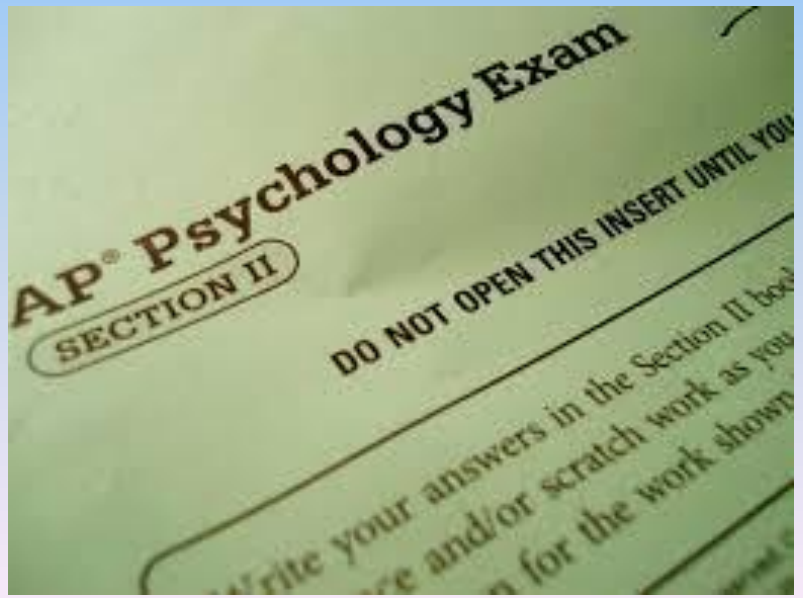
Group Intelligence Tests

- Originally designed for efficiency for the army in World War I
- Can be given to large numbers of people
- Those supervising the test do not need extensive training
- Are very easy to score
- Cheaper to administer
- But tradeoff is they are not the most reliable

Test Construction: Achievement and Aptitude Tests

Achievement Tests

- Tests that attempt to measure what the test-taker has *accomplished*
- i.e. classroom tests at the end of a unit



Aptitude Tests

- Tests that attempt to predict the test-taker's *future performance*
- Look more at your *ability to learn* rather than measure what you have already learned
- Examples: American College Test (ACT) and Scholastic Assessment Test (SAT)

Test Construction: Reliability and Validity

Test Reliability

- Extent to which a test yields *consistent* results
- Just as a reliable friend is one you *can always count on*, the same is true of a reliable test

Types of Reliability

- *Test-retest reliability* - taking the same test and receiving a similar score
- *Split-half* - the score on one half of a test's questions is similar to the score on the other half (i.e. odds and evens)
- *Scorer reliability* – the score of the test should be similar no matter which scorer is scoring the test (i.e. AP essays)

Test Validity

- Extent to which a test *measures or predicts what it is supposed to*
- Does an achievement test accurately measure accomplishments? (does measuring your head size measure your intelligence?)
- Does an aptitude test accurately measure the person's future performance? (most people who do well on the SAT do well in college)
- One needs to know the *purpose* of the test in order to determine if it is valid

Group Differences in Intelligence Test Scores

Are some groups of people smarter than others?

- A number of studies show scoring differences between different racial, ethnic, and gender groups.
- For example, minority groups often score lower than the dominant culture (both in and outside of America)
- Why is this?

Does environment/experience play a role?

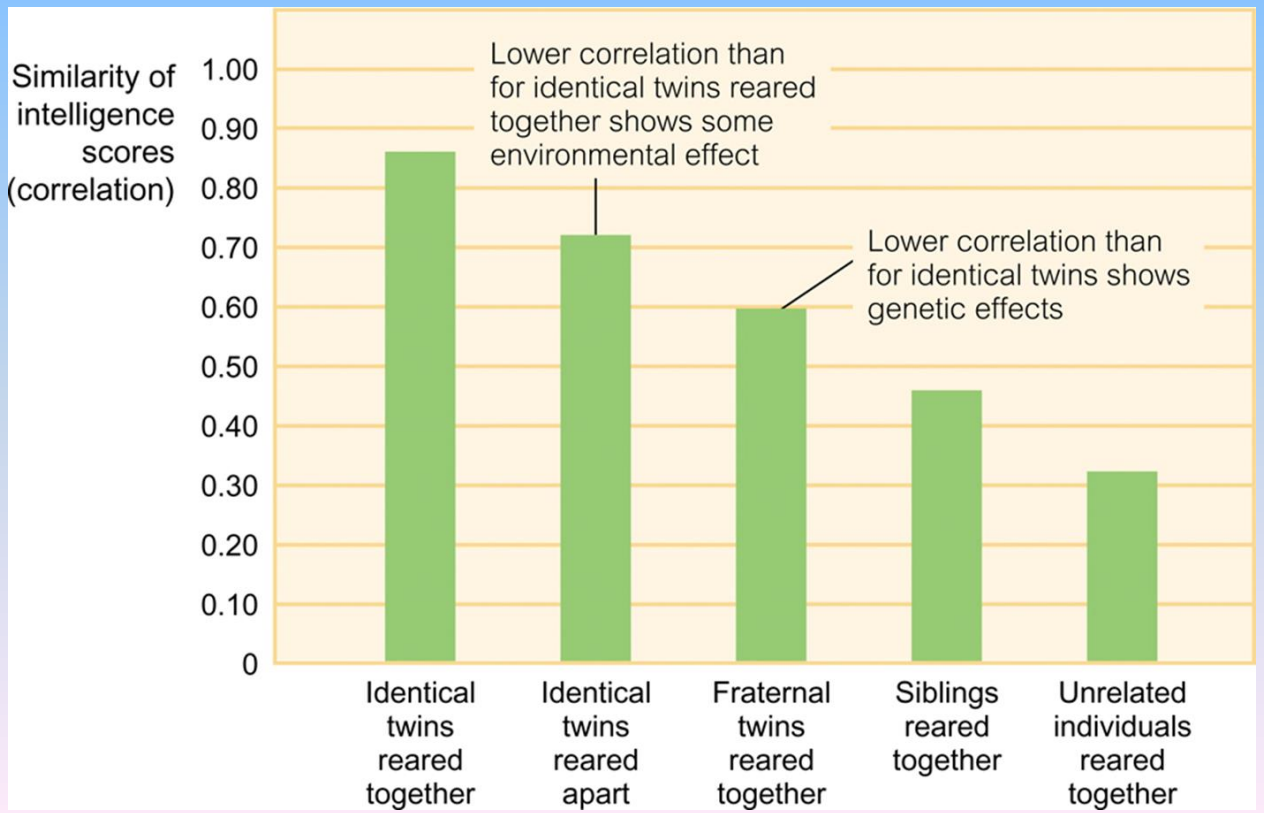
- Are these differences due to nature or to nurture? Studies suggest *environment* is playing a heavy role.
- Members of disadvantaged minority groups *don't have the same kinds of experiences* that the white, middle-class Americans who designed the tests have.
- Lower scores from some groups reflect the fact that those groups have not had the same kind of "preparation"

Does heredity play a role?

- Identical twin studies show that they are *more similar* in intelligence than are fraternal twins or nontwin siblings.
- Both nature *and* nurture play a role in shaping an individual's intelligence.

Group Similarities in Testing

- Environmental effects are apparent in the studies of identical twins raised apart. Heredity's role is apparent in studies of fraternal twins raised together.



The End