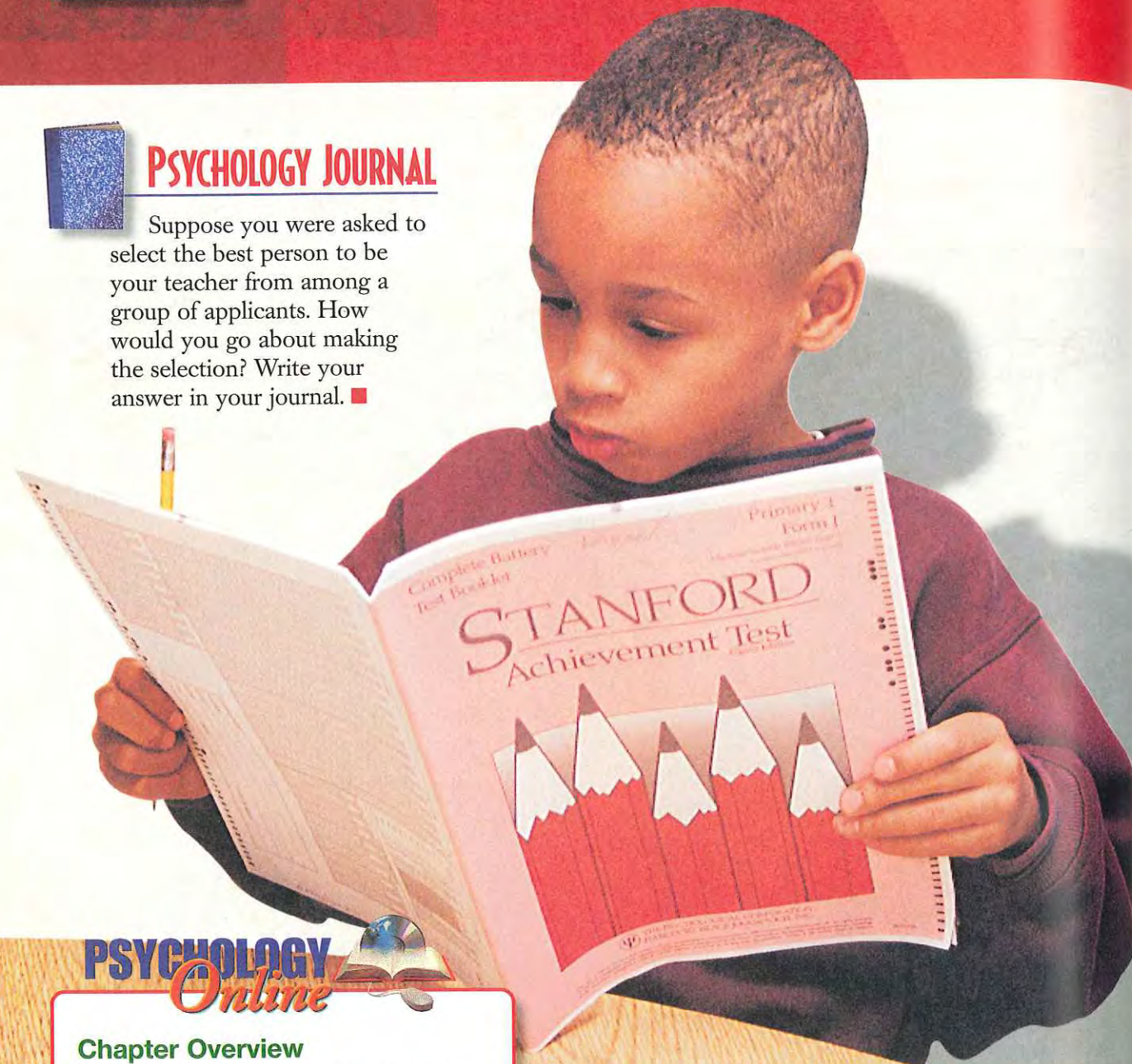


PSYCHOLOGY JOURNAL

Suppose you were asked to select the best person to be your teacher from among a group of applicants. How would you go about making the selection? Write your answer in your journal. ■



PSYCHOLOGY *Online*

Chapter Overview

Visit the *Understanding Psychology* Web site at glencoe.com and click on **Chapter 13—Chapter Overviews** to preview the chapter.

Characteristics of Psychological Tests

Reader's Guide

■ Main Idea

To be useful, tests have to be standardized and exhibit reliability and validity.

■ Vocabulary

- reliability
- validity
- percentile system
- norms

■ Objectives

- Identify three ways of measuring reliability.
- Explain test standardization and how test validity is assessed.

EXPLORING PSYCHOLOGY

Not Fair!

I vividly remember my first genuine IQ test. I was 17 at the time. The youth director at my church was in graduate school, working on an advanced degree in psychology, and as part of a course in intelligence testing, he was required to administer an IQ test to several subjects. I was one of his selected “volunteers,” although I was also a friend. I remember wondering later about whether or not he had given me an unfair advantage on the test. He often responded to my asking for clarification by going into great detail while explaining a particular kind of question. I wondered if my score would be comparable to that of another person who was tested by someone who was not so generous about clarifying items.

—from *Psychology: Science, Behavior, and Life* by Robert L. Crooks and Jean Stein, 1988

All psychological tests have one characteristic that makes them both fascinating and remarkably practical—they try to make it possible to find out a great deal about a person in a short time. Tests can be useful in predicting how well a person might do in a particular career; in assessing an individual's desires, interests, and attitudes; and in revealing psychological problems. One virtue of standardized tests is that they can provide comparable data about many individuals. Tests can show how an individual compares to others. Further,

psychologists can use some tests to help people understand things about themselves more clearly. Using tests to predict behavior can be controversial. It is important to keep in mind what the test is measuring.

One of the great dangers of testing is that we tend to forget that tests are merely tools for measuring and predicting human behavior. We start to think of test results (for example, an IQ) as an end in itself. The justification for using a test to make decisions about a person's future depends on whether a decision based on test scores would be fairer and more accurate than one based on other criteria. The fairness and usefulness of a test depend on reliability, validity, and standardization.

TEST RELIABILITY

reliability: the ability of a test to give the same results under similar conditions

The term **reliability** refers to a test's consistency—its ability to yield the same result under a variety of similar circumstances. There are three basic ways of determining a test's reliability. First, if a person retakes the test or takes a similar test within a short time after the first testing, does he or she receive approximately the same score? If, for example, you take a mechanical aptitude test three times in the space of six months and score 65 in January, a perfect score of 90 in March, and 70 in June, then the test is unreliable because it does not produce a measurement that is stable over time. The scores vary too much. This is assessing the measure's *test-retest* reliability (see Figure 13.2).

The second measure of reliability is whether the test yields the same results when scored at different times by different people. If both your teacher and another teacher critique an essay test that you have taken, and one gives you a B while the other gives you a D, then you have reason to complain about the test's reliability. The score you receive depends more on the grader than on you. This is called *interscorer* reliability. If the same teacher grades papers at different times, he or she may score the same essay differently. This is *scorer* reliability. On a reliable test, your score would be the same no matter who graded it and when it was graded.

One final way of determining a test's reliability is to randomly divide the test items in half and score each half separately. The two scores should be approximately the same. This is called *split-half* reliability. If a test is supposed to measure one quality in a person—for example, reading comprehension or mathematical ability—it should not have some sections on which the person scores high and others on which he or she scores low.

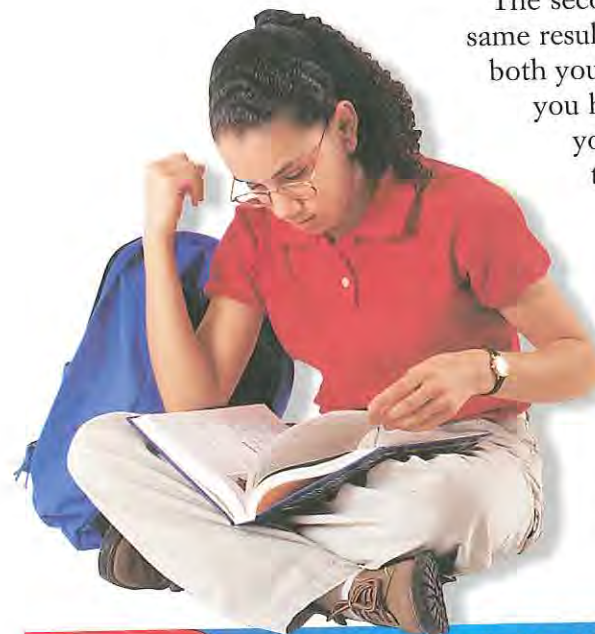


Figure 13.1 Taking Psychological Tests

Americans rely heavily on psychological testing because such tests promise to reveal a great deal about a person in a very short time. **How can you judge the fairness and usefulness of a test?**

In checking tests for reliability, psychologists try to prevent variables from influencing a person's score. All kinds of irrelevant matters can interfere with a test. No test can screen out all interferences, but a highly reliable test can eliminate a good part of them.

TEST VALIDITY

A test may be reliable but still not valid. **Validity** is the ability of a test to measure what it is intended to measure (see Figure 13.3). For example, a test that consists primarily of Spanish vocabulary lists will not measure ability for engineering. A history test will not measure general learning ability. A test you take in physical education class may not measure your knowledge of grammar, or a math test that asks questions that were not covered in class does not measure what you learned in class.

Determining the validity of a test is more complex than assessing its reliability. One of the chief methods for measuring validity is to find out how well a test predicts performance—its *predictive* validity. For example, a group of psychologists designs a test to measure management ability. They ask questions about management systems, attitudes toward employees, and other relevant information. Will the people who score high on this test really make good managers?

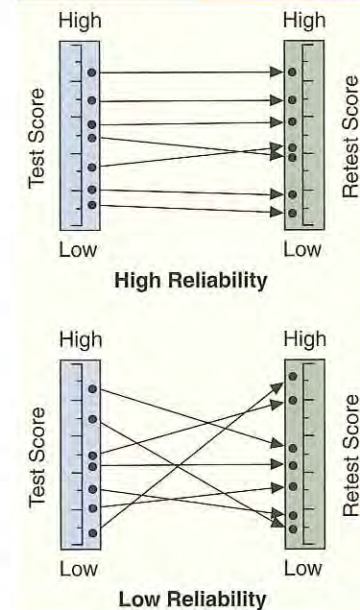
Suppose the test makers decide that a good way to check the validity of the test is to find out how much a manager's staff improves in productivity in one year. If the staffs of those equally skilled managers who scored high on the test improve more than the staffs of those managers who scored low on the test, the test may be considered valid. Corporations may then adopt it as one tool to use in deciding whom to hire as managers, assuming the test is also valid for their situations.

What if managers who are good at raising productivity are poor at decision making? It may be that this test measures talent for improving productivity, not general management ability. This is the kind of difficulty psychologists encounter in trying to assess the validity of a test. As the example shows, nothing can be said about a test's validity unless the purpose of the test is absolutely clear.

STANDARDIZATION

Tests must be *standardized*. Standardization refers to two things. First, standardized tests must be administered and scored the same way every time. Test administrators are trained to follow the same procedures and

Figure 13.2 Judging Reliability

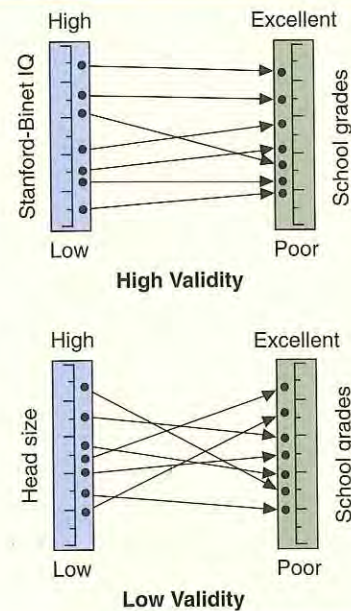


On the left, the test scores obtained by seven individuals are ordered on a scale. On the right, the corresponding scores on a second version of the same test, given at a later time, are ordered. In the upper diagram, the two sets of scores correspond very closely—meaning the test is highly reliable. **What is meant by saying a test is reliable?**

validity: the ability of a test to measure what it is intended to measure

Figure 13.3 Judging Validity

The upper diagram represents the result of comparing the Stanford-Binet Intelligence Scale scores with school grades. The lower diagram represents the comparison of scores on the head size test of intelligence with school grades. (The head size test is simply measuring the size of a student's head.) *What defines a valid test?*



to ask the same questions the same way. If test administrators give instructions in an inconsistent manner or provide hints, errors in assessing the test taker would result. Second, standardization refers to establishing the norm, or average score, made by a large group of people.

Establishing Norms

Once a test result is obtained, the examiner must translate the score into something useful. Suppose a child answers 32 of 50 questions on a vocabulary test correctly. What does this score mean? If the test is reliable and valid, it means that the child can be expected to understand a certain percentage of the words in a book at the reading level being tested. In other words, the score predicts how the child will perform at a given level.

Yet a raw score does not tell us where the child stands in relation to other children at his or her age and grade level. If most children answered 45 or more questions correctly, 32 is a low score. If most answered only 20 questions correctly, however, 32 is a very high score.

When psychologists design a test to be used in a variety of settings, they usually set up a scale for comparison by establishing norms. This is usually done by transforming raw test scores into a **percentile system**, which resembles what is called grading on the curve. In the percentile system, the scores actually achieved on the test are placed in order, ranging from the highest to the lowest. Each score is then compared with this list and assigned a percentile according to the percentage of scores that fall at or below this point. For example, if half the children in the above example scored 32 or below, then a score of 32 is at the 50th percentile. If 32 were the top score, it would be at the 100th percentile. In the example given in **Figure 13.4**, a score of 32 puts the child in the 75th percentile, because only 25 percent of the children tested achieved a higher score.

In order to make such comparisons, the test is given first to a large representative sample of the group to be measured—for example, sixth graders or army privates. Percentiles are then established on the basis of the scores achieved by this standardization group. These percentiles are called the test's **norms**. Most of the intelligence, aptitude, and personality tests you will encounter have been provided with norms in this way. Your percentile on an aptitude test, such as the Scholastic Assessment Test (SAT), reflects your standing among people of your age and grade who have taken these exams.

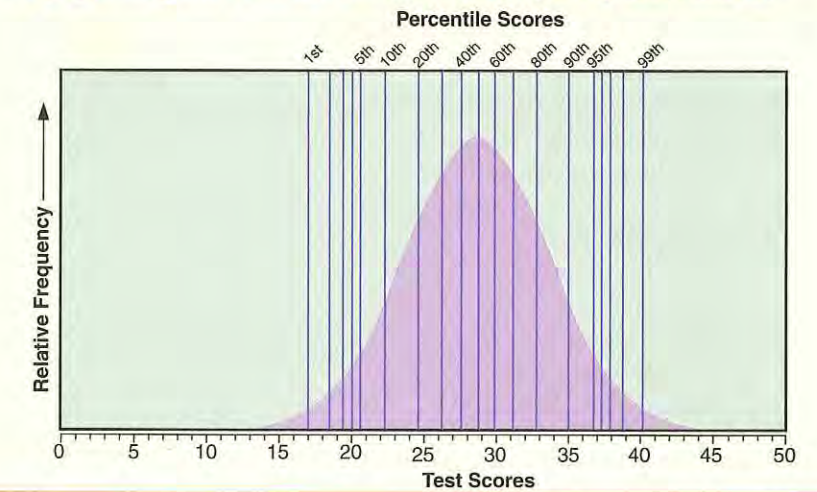
percentile system: ranking of test scores that indicates the ratio of scores lower and higher than a given score

Reading Check
Why must raw scores be transformed into percentiles?

norms: standard of comparison for test results developed by giving the test to large, well-defined groups of people

Figure 13.4 Establishing Percentiles

The range of possible raw scores on a test is shown in relation to an idealized curve that indicates the proportion of people who achieved each score. The vertical lines indicate percentiles, or proportions of the curve below certain points. Thus, the line indicated as the 1st percentile is the line below which only 1 percent of the curve lies. *How do psychologists establish a scale for comparing test results?*



You should remember, however, that norms are not really standards, although a norm group is sometimes misleadingly referred to as a standardization group. Norms refer only to what has been found to be average for a particular group. If John can read at the 50th percentile level, that does not mean that he has met some absolute standard for ability to read. It means only that he reads better than half the population and worse than the other half in his particular group.

In summary, when you take a test and obtain your score, you should consider the following questions in evaluating the results. (1) Do you think that if you took the same test again, you would receive a similar score? (2) Does your performance on this test reflect your usual performance in the subject? (3) If you were to compare your score with those of your classmates, would it reflect your general standing within that group?

SECTION I Assessment

- Review the Vocabulary** What is meant when we ask about the reliability or validity of a test?
- Visualize the Main Idea** Using a diagram similar to the one below, identify three measures of a test's reliability.
- Recall Information** What does it mean if a test is standardized? Why do we standardize tests?
- Think Critically** Do you think an intelligence test would be a valid test for measuring a person's knowledge of a foreign language? Explain.



5. Application Activity Ask a teacher for an anonymous listing of all the scores on a recent test. Using the information in this section, establish the percentiles for the test scores.

Reader's Guide

■ Main Idea

Several IQ tests are used to measure intelligence, although there are many views about what constitutes intelligence.

■ Vocabulary

- intelligence
- two-factor theory
- triarchic theory
- emotional intelligence
- intelligence quotient (IQ)
- heritability
- cultural bias

■ Objectives

- Explain the various views of intelligence.
- Identify two kinds of IQ tests.



Trukese intelligence

Trukese navigation abilities point out the difficulty in coming to grips with what is meant by intelligence. Some might say that the inability of the Trukese to explain their sailing techniques is a sign of unintelligent behavior. It is hard to accuse the Trukese of being unintelligent, though. They sail successfully through the open ocean waters every day.

VIEWS OF INTELLIGENCE

Psychologists do not agree on the meaning of the word *intelligence*. Most believe that **intelligence** is the ability to acquire new ideas and new behavior and to adapt to new situations. Others believe that

EXPLORING PSYCHOLOGY

Is This Intelligence?

It is typical for members of the Trukese, a small tribe in the South Pacific, to sail a hundred miles in open ocean waters. Although their destination may be just a small dot of land less than a mile wide, the Trukese are able to sail unerringly toward it without the aid of compass, chronometer, sextant, or any of the other sailing tools that are indispensable to modern western navigation. They are able to sail accurately, even when prevailing winds do not allow a direct approach. . . .

How are the Trukese able to navigate so effectively? If you ask them, they could not explain it.

—from *Understanding Psychology* by Robert S. Feldman, 2002

intelligence is what allows you to do well on intelligence tests and in school. The concept, however, continues to be difficult to pin down. Over the years, psychologists have presented several different views of intelligence.

Two-Factor Theory of Intelligence

British psychologist Charles Spearman proposed his **two-factor theory** of intelligence in 1904. According to Spearman's theory, two factors contribute to a person's intelligence. The first factor, *g*, represents a person's general intelligence. This involves a person's ability to perform complex mental work, such as problem solving. A second factor, *s*, represents a person's specific mental abilities, such as verbal or math skills. Spearman believed that every individual had a certain level of general intelligence.

Critics argue that *g* does not measure many other kinds of mental abilities such as motor, musical, or creative abilities. These critics argue that intelligence cannot be reduced to just *g* and expressed by a single IQ score.

Thurstone's Theory of Intelligence

A major opponent of Spearman's theory was L.L. Thurstone (1938). After testing a large number of people on more than 50 different ability tests, Thurstone concluded that there was no evidence for the general intelligence that Spearman had identified. Instead, Thurstone proposed that intelligence is composed of seven primary mental abilities (see Figure 13.5). He believed that a person's intelligence needed to be a measurement of all seven mental abilities and not just a measurement of one factor.

Gardner's Theory of Multiple Intelligences

Psychologist Howard Gardner (1983, 1999) rejected the traditional idea of intelligence as primarily the ability to think logically. He believes this view is inadequate because it omits many important skills. Gardner argues for a broader perspective that includes eight types of intelligence (see Figure 13.6). Seven types of intelligence are: (1) verbal ability;

Figure 13.5 Thurstone's Seven Primary Mental Abilities

Theory	Main Ideas
Verbal comprehension	ability to understand the meaning of words, concepts, and ideas
Numerical ability	ability to use numbers quickly to compute answers to problems
Spatial relations	ability to visualize and manipulate patterns and forms in space
Perceptual speed	ability to grasp perceptual details quickly and accurately and to determine similarities and differences between stimuli
Word fluency	ability to use words quickly and fluently in performing such tasks as rhyming, solving anagrams, and doing crossword puzzles
Memory	ability to recall information such as lists of words, mathematical formulas, and definitions
Inductive reasoning	ability to derive general rules and principles from presented information

Thurstone's theory of intelligence did not include the idea of a general intelligence. **How does Thurstone's theory compare to Gardner's theory?**

intelligence: the ability to acquire new ideas and new behavior, and to adapt to new situations

two-factor theory: proposes that a person's intelligence is composed of a general ability level and specific mental abilities

Reading Check
How did Thurstone's definition of intelligence differ from Spearman's?



Profiles In Psychology

Howard Gardner

1943–

“I’m sure there are lots of different intelligences. I’m sure an educational approach that pays attention to this is going to be more effective than one that denies it.”

Many parents and teachers have embraced Howard Gardner’s idea of multiple intelligences. Critics, though, doubt that the multiple intelligences theory should be implemented in the classroom. Critics argue that although Gardner’s theory has helped teachers appreciate the many talents of students, the theory is weak. The danger lies in wasting precious school time.

In the classroom, teachers usually implement Gardner’s theory by attacking a concept from many different perspectives or viewpoints. For example, to teach kids about the oceans, teachers have them write about cleaning a fish, draw a sea creature, role-play a sea creature, use diagrams to compare and contrast ships, and so forth (Collins, 1998).

Again, critics argue that although a teacher may tap into a child’s strongest intelligence by using various instructional approaches, that child must still rely on verbal and math skills to succeed in higher education and a career. Gardner’s theory has yet to be stringently tested. Gardner himself claims, “We are not yet certain of the goodness of the idea of multiple intelligences.”

(2) logical-mathematical reasoning skills; (3) spatial ability, or the ability to find your way around an environment and to form mental images of it; (4) musical ability, or the ability to create and perceive pitch and rhythm patterns; (5) body-kinesthetic ability, or skill at fine motor movements required for tasks such as gem cutting, surgery, and athletics; (6) interpersonal skills, involving understanding the feelings of others; and (7) intrapersonal skills, or knowledge of oneself. Gardner later added an eighth intelligence—naturalist intelligence. Naturalist intelligence is a person’s ability to identify and classify patterns in nature. Gardner (1999) has considered, but seems less certain about, a ninth intelligence, which concerns the experience of existence.

Gardner’s research on the results of brain disease convinced him that humans possess these eight different and often unrelated intellectual capacities, or intelligences. Moreover, he argues that the biological

organization of the brain affects one’s strength in each of the eight areas.

Critics of Gardner’s theory argue that some of what Gardner called “intelligence” are really skills. For instance, someone with exceptional musical abilities or body-kinesthetic abilities is really just talented. These critics claim that intelligence and talent (or skill) are two different things.

Sternberg’s Theory of Intelligence

Robert Sternberg (1985) proposed a **triarchic theory**, or three-part theory, of intelligence. Sternberg proposed that intelligence can be divided into three ways of processing information. The first way is using *analytical* thinking skills, or the ability to solve problems. These kinds of skills are the

triarchic theory: proposes that a person’s intelligence involves analytical, creative, and practical thinking skills

Figure 13.6 Gardner’s Multiple Intelligences

Gardner proposed that each person has numerous and unrelated intelligences. He points out that a person can be outstanding in some intelligences and not in others. *What is the difference between interpersonal and intrapersonal intelligence?*

Intelligence	Description	Example
Linguistic/Verbal	ability to utilize language	skill at learning, using, and understanding languages
Logical-Mathematical	ability to process and compute logical problems and equations	skill at solving algebra problems
Spatial	ability to comprehend shapes and images in three dimensions	skill at putting puzzles together or molding sculptures
Musical	ability to perform and compose music	skills at performing and comprehending music
Body-Kinesthetic	ability to perceive and control movement, balance, agility, grace	sense of how one’s body should act and react in a physically demanding situation
Interpersonal	ability to interact with and understand others and to interpret their behavior	skill at gauging others’ moods and motivations
Intrapersonal	ability to understand and sense oneself	skill at using self-esteem, self-enhancement, and strength of character to solve internal problems
Naturalist	ability to identify and classify patterns and relationships in natural surroundings	skill at distinguishing differences among large numbers of similar objects

ones that are traditionally measured on intelligence tests. The second way is applying *creative* thinking to solving problems and dealing with new situations. The third is using *practical* thinking skills to help adjust to and cope with one’s environment. Sternberg’s ideas stress the point that traditional intelligence tests do not measure and assess intelligences found in everyday life. Like Gardner’s theory, though, Sternberg’s theory makes it difficult to measure intelligence, at least with traditional types of measurements.

Emotional Intelligence

Another type of intelligence is called **emotional intelligence**. It is related to Gardner’s concepts of interpersonal and intrapersonal intelligences and has been discussed in the popular press. Emotional intelligence has four major aspects (Mayer & Salovey, 1997):

- The ability to perceive and express emotions accurately and appropriately
- The ability to use emotions while thinking
- The ability to understand emotions and use the knowledge effectively
- The ability to regulate one’s emotions to promote personal growth

emotional intelligence: interpersonal and intrapersonal abilities needed to understand and use knowledge of emotions effectively

This view of intelligence has intrigued many psychologists. Major proponents of this view have linked emotional intelligence to success in the workplace. Some psychologists, however, argue that emotional intelligence is simply a measurement of extraversion. More research needs to be done to confirm this theory of intelligence (see TIME Reports, p. 372).

THE DEVELOPMENT OF INTELLIGENCE TESTS

Among the most widely used and widely disputed tests in the United States and Canada today are those that are designed to measure intelligence in terms of an IQ score. Alfred Binet, a French psychologist, worked with Theodore Simon to develop a useful intelligence test. In 1904 Binet was asked by the Paris school authorities to devise a means of picking out “slow learners” so they could be placed in special classes from which they might better profit. Binet was unable to define intelligence, but he believed it was complex. He thought it was reflected in the things children do—making common-sense judgments, telling the meanings of words, and solving problems and puzzles. Binet also assumed that whatever intelligence was, it increased with age. That is, older children had more intelligence than younger children. Therefore, in selecting items for his test, he included only items on which older children did better than younger children.

By asking the same questions of many children, Binet determined the average age at which a particular question could be answered. For example, he discovered that certain questions could be answered by most 12-year-olds but not by most 11-year-olds. If a child of 11, or even 9, could answer these questions, he or she was said to have a mental age of 12. If a child of 12 could answer the 9-year-old-level questions but not the questions for 10-year-olds and 11-year-olds, he or she was said to have a mental age of 9. Thus a slow learner was one who had a mental age that was less than his or her chronological age.

The Stanford-Binet Intelligence Scale

Binet’s intelligence test has been revised many times since he developed it. The Binet test currently used in the United States is a revision created at Vanderbilt University—the Stanford-Binet Intelligence Scale (Roid, 2003). The Stanford-Binet, like the original test, groups test items by age level. Although used mainly with school-aged children and young adults, the test can now be used with participants from age 3 to 85+ and includes tasks from defining words to explaining events in daily life. Participants are tested one at a time. Examiners must carry out standardized instructions while putting the person at ease, getting him to pay attention, and encouraging him to try as hard as he can (see Figure 13.7).

The **IQ**, or **intelligence quotient**, was originally computed by dividing a child’s mental age (the average age of those who also received the same score as that child) by chronological (actual) age and multiplying by 100.

$$IQ = \frac{\text{Mental Age}}{\text{Chronological Age}} \times 100$$

PSYCHOLOGY Online

Student Web Activity
Visit the *Understanding Psychology* Web site at glencoe.com and click on **Chapter 13—Student Web Activities** for an activity on intelligence testing.

intelligence quotient (IQ): standardized measure of intelligence based on a scale in which 100 is average

So an 8-year-old child who scored at the mental age of 8 would have an IQ of 100. Although the basic principles behind the calculation of IQ remain, scores are figured in a slightly different manner today. Researchers assign a score of 100 to the average performance at any given age. Then, IQ values are assigned to all the other test scores for this age group. If you have an IQ of 100, for example, this means that 50 percent of the test takers who are your age performed worse than you. In addition, test scores for several abilities are now reported instead of one general score, but the test is no longer widely used (Vernon, 1987). Instead, the Otis-Lennon Ability Test is often used. This test seeks to measure the cognitive abilities that are related to a student’s ability to learn and succeed in school. It does this by assessing a student’s verbal and nonverbal reasoning abilities.

The Wechsler Tests

Three frequently used intelligence tests are the revised versions of the Wechsler Adult Intelligence Scale, or WAIS-III (Wechsler, 1997), for adults aged 16 to 89; the Wechsler Intelligence Scale for Children, or WISC-IV (Wechsler, 2003), for children 6 to 16+ years old; and the Wechsler Preschool and Primary Scale of Intelligence, or WPPSI-III, for children 2 to 6 years old.

In addition to yielding one overall score, the Wechsler tests yield percentile scores in several areas—vocabulary, information, arithmetic, picture arrangement, and so on (see Figure 13.8). These ratings are used to compute separate IQ scores for verbal and performance abilities. This type of scoring provides a more detailed picture of the individual’s strengths and weaknesses than a single score does.

THE USES AND MEANING OF IQ SCORES

In general, the norms for intelligence tests are established in such a way that most people score near 100 (see Figure 13.9). This means that about 95 percent of people score between 70 and 130. Only a little more than 2 percent score at or above 130. These people are in at least the 97th percentile. Those who score below 70 have traditionally been classified as mentally handicapped. More specific categories include mildly handicapped, but educable (55–69); moderately handicapped, but trainable (40–54); severely handicapped (25–39); and profoundly handicapped (below 25).

Figure 13.7 Typical Items on the Stanford-Binet Test



An examiner has built a tower of blocks (top) and has told the child, “You make one like this.” **Why is age important in administering and scoring the Stanford-Binet test?**

Age	Sample Test Item
4	“Why do people live in houses?” “Birds fly in the air; fish swim in the ____.”
8	“What should you do if you find a lost puppy?” “Stephanie can’t write today because she twisted her ankle. What is wrong with that?”
12	“What does <i>regret</i> mean?” “Here is a picture. Can you tell me what is wrong with it?”

Figure 13.8 Sample Items on the Wechsler Tests

These test items are similar to those included in the various Wechsler intelligence scales. (Not all test items and scales are included here.) *How do the Wechsler tests compare to the Stanford-Binet Intelligence test?*

VERBAL SCALE

- Information
- Arithmetic
- Vocabulary
- Similarities
- Digit Span

EXAMPLE

What day of the year is Independence Day?
 If eggs cost \$.60 a dozen, what does one egg cost?
 Tell me the meaning of *scoff*.
 In what way are hats and shoes alike?
 Listen carefully, and when I am through, say the numbers right after me.
 7 5 1 8 2 9

PERFORMANCE SCALE

- Picture Completion

EXAMPLE

What part is missing from this picture?



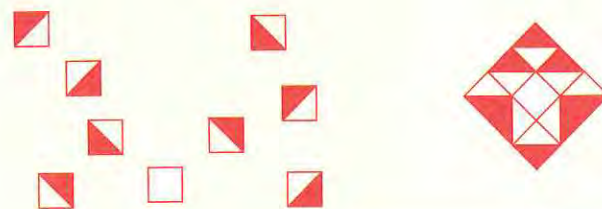
- Picture Arrangement

Arrange the panels to make a meaningful story.



- Block Design

Put the blocks together to make this picture.



What do these scores mean? What do the tests measure? IQ scores seem to be most useful when related to school achievement; they are quite accurate in predicting which people will do well in schools, colleges, and universities. Critics of IQ testing do not question this predictive ability. They do wonder, however, whether such tests actually measure intelligence. As stated earlier, most psychologists agree that intelligence is the ability to acquire new ideas and new behavior and to adapt to new situations. Is success in school or the ability to take a test a real indication of such ability? Generally, IQ tests measure the ability to solve certain types of problems. Yet they do not directly measure the ability to pose

those problems or to question the validity of problems posed by others (Hoffman, 1962). This is only part of the reason why IQ testing is so controversial.

CONTROVERSY OVER IQ TESTING

Much of the debate about IQ testing centers around the following issues: do genetic differences or environmental inequalities cause two people to receive different scores on intelligence tests? The question of cultural bias in intelligence tests has also been controversial.

Nature vs. Nurture

A technique researchers use to help determine whether genetics or environment affects scores on intelligence tests is studying the results of testing of people with varying degrees of genetic relationship. In regard to intelligence, researchers have found a high degree of **heritability**—

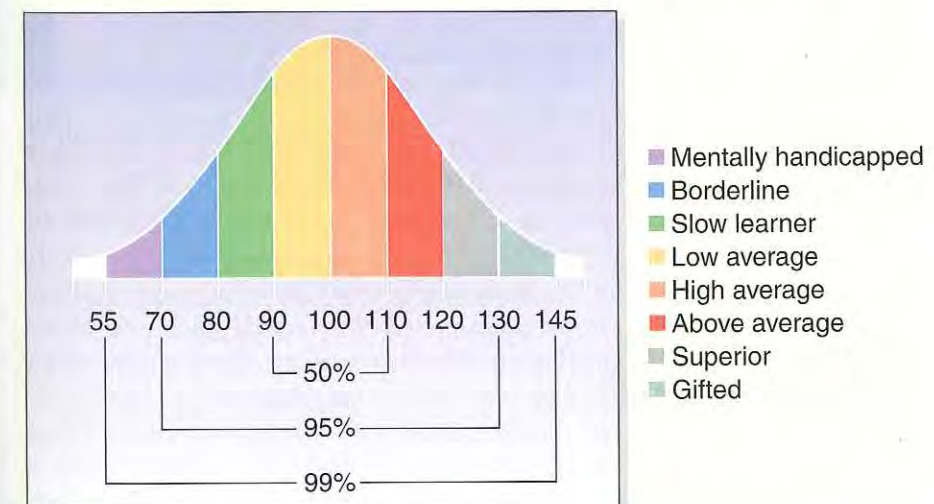
heritability: the degree to which a characteristic is related to inherited genetic factors

PSYCHOLOGY and You Your IQ

Can we say that you do well in school because you have a high IQ? Consider this: a baseball player has a low batting average. A fan explains that the player does not get a lot of hits because he has a low batting average. Is this statement true? No, that baseball player has a low batting average because he does not get a lot of hits. In the same way, we cannot say that a student does poorly in school because he has a low IQ score. IQ tests measure the same skills that schoolwork requires. An IQ score measures performance; it does not explain it.

Figure 13.9 Distribution of IQ Scores

This normal curve displays intelligence as measured by the Stanford-Binet and Wechsler tests. The mean IQ score is 100; the standard deviation is 15. *What percentage of people score at least 145 on IQ tests?*



a measure of the degree to which a characteristic is related to inherited genetic factors. They found that as genetic relationship increases, say, from parent and child to identical twins, the similarity of IQ also increases.

The best way to study the effects of nature and nurture is to study identical twins who have been separated at birth and raised in different environments. Dr. Tom Bouchard has studied more than 100 sets of twins who were raised apart from one another. Bouchard concluded that IQ is affected by genetic factors—a conclusion supported by the discovery of a specific gene for human intelligence (Plomin, 1997). Bouchard believes 70 percent of IQ variance can be attributed to heredity, but others (Plomin et al., 1994) found the hereditary estimate to be only 52 percent.

Regarding environment, studies show that brothers and/or sisters raised in the same environment are more likely to have similar IQs than siblings raised apart. Environment, therefore, does impact IQs.

Some researchers study the effects of the environment on IQ factors by focusing on preschool programs, such as Head Start, that expose economically disadvantaged youths to enriching experiences. Some studies show that quality preschool programs help raise IQs initially, but the increase begins to fade after some years. Participating children, however, are less likely to be in special education classes, less likely to be held back, and more likely to graduate from high school than are children without such preschool experiences (Zigler, Styfco, & Gilman, 1993). Each year of school missed may drop a person's IQ as much as 5 points (Ceci, 1991). The richness of the home environment, the quality of food, and the number of brothers and sisters in the family all affect IQ.

Both heredity and environment have an impact on intelligence. Advances in behavioral genetics research continue to refine results on the contributions that heredity and experience have on IQ. It remains clear that these two factors are both contributing and interact in their effects.

Both heredity and environment have an impact on intelligence. Advances in behavioral genetics research continue to refine results on the contributions that heredity and experience have on IQ. It remains clear that these two factors are both contributing and interact in their effects.

Cultural Bias

A major criticism of intelligence tests is that they have a **cultural bias**—that is, the wording used in questions may be more familiar to people of one social group than to another group. For example, on one intelligence test the correct response to the question, “What would you do if you were sent to buy a loaf of bread and the grocer said he did not have any more?” was “try another store.” A significant proportion of minority students, however, responded that they would go home. When questioned about the answer, many explained that there was no other store in their neighborhood.

Psychologists admit that some tests have been biased because they assess accumulated knowledge, which is dependent on a child's environment and opportunities in that environment. As a consequence, efforts have been

made to make the tests less biased (see Figure 13.10). However, it is unlikely that a test will ever be developed that will be completely free of cultural bias. All tests are based on the assumptions of a particular culture.

Figure 13.10 The Dove Counterbalance Intelligence Test

In the 1960s, psychologist Adrian Dove developed the Counterbalance Intelligence Test to stress that cultural background can influence performance on an intelligence test. *What characteristics would a test without cultural bias have?*

- “T-Bone Walker” got famous for playing what?
 - Trombone
 - Piano
 - “T-Flute”
 - Guitar
 - “Hambone”
- Who did “Stagger Lee” kill (in the famous blues legend)?
 - His mother
 - Frankie
 - Johnny
 - His girlfriend
 - Billy
- If you throw the dice and “7” is showing on top, what is facing down?
 - “seven”
 - “snake eyes”
 - “boxcars”
 - “little Joes”
 - “eleven”
- “You’ve got to get up early in the morning if you want to _____.”
 - catch the worms
 - be healthy, wealthy, and wise
 - try to fool me
 - fare well
 - be the first one on the street
- Many people say that “Juneteenth” (June 19) should be made a legal holiday because this was the day when _____.
 - the slaves were freed in the USA
 - the slaves were freed in Texas
 - the slaves were freed in Jamaica
 - the slaves were freed in California
 - Martin Luther King was born
 - Booker T. Washington died

cultural bias: an aspect of an intelligence test in which the wording used in questions may be more familiar to people of one social group than to another group

More About...

Family Size and IQ

The classic study of family size and IQ was conducted in the Netherlands. It was based on the military examinations of more than 386,000 Dutch people. Researchers found that the brightest children came from the smallest families and had few, if any, brothers and sisters when they were born. Thus, the first-born child in a family of two was usually brighter than the last child in a family of 10. The differences in IQ, however, from one birth-order position to another average only about one-quarter point.

The effects of family size on intelligence may be explained by the impact of a houseful of children on the home environment. Larger families increase the amount of time a child spends with other children and decrease the amount of parental attention he or she receives. When this happens, development of intelligence has been known to suffer (Zajonc & Markus, 1976), but interpersonal skills may improve.

SECTION 2 Assessment

- Review the Vocabulary** What are the two-factor and triarchic theories of intelligence?
- Visualize the Main Idea** Using a chart similar to the one below, describe how the two major tests of intelligence are scored.
- Recall Information** What are Gardner's eight types of intelligence?
- Think Critically** Which has the greatest effect on intelligence—nature or nurture? Explain.

Name of Test	How Scored
Stanford-Binet	
Wechsler tests	

- Application Activity** Develop a list of criteria that you think are essential in determining intelligence. Compare your list with your classmates' lists and together create a class list.

Case Studies

WAIS-R: Is It Reliable?

Period of Study: Withheld

Introduction: What happens when the results of psychological testing cross over into another field? This situation takes place numerous times within the judicial system. It is common for psychologists to be called in on a court case to assess the competency and ability of certain individuals to play key roles in the case. Psychologists, in most of these cases, use tests measuring intelligence levels. The judicial system correlates intelligence level with the ability of an individual to take part in a legal proceeding. In these instances, the validity of the tests used is assumed.

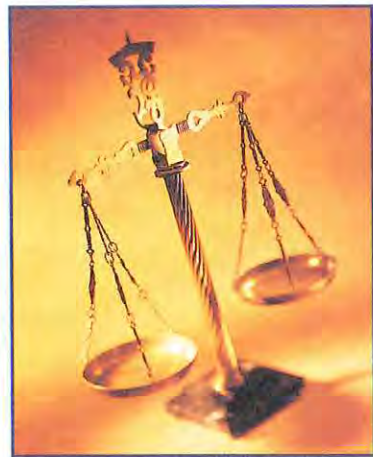
However, reliability is equally critical. Psychological tests can be administered to an individual to gain certain results. If these results are not consistent with a repeat testing, the original results are meaningless.

In a trial involving the alleged statutory rape of a 22-year-old woman, psychological testing played a vital role in the outcome. Even though the victim was of legal age, prosecutors filed charges of force or threatening of force to commit a sexual act, stating that the alleged victim was incapable of giving meaningful consent because of a mental disability. Prosecutors called in a psychologist to perform testing on the victim using the Wechsler-Adult Intelligence Scale-Revised test, or WAIS-R. This specific intelligence test is highly useful for measuring conditions of mental handicap in individuals.

The results of the first test indicated the woman had an IQ below 70, demonstrating significant, but not clear, signs of possible mental handicap. The defense attorney demanded a repeat test be performed.

Hypothesis: The prosecuting team expected the test results to prove the

reliability of the respected WAIS-R. They knew the test clearly measured what it is supposed to measure; thus, they wanted to see consistent results. The defending team, however, wanted to see inconsistencies in the test scores of the 22-year-old woman in the hopes the defendant would be set free. Because the WAIS-R holds much prestige within the psychological field, it seemed most likely that results would resemble that of the first test.



Method: The psychologist who administered the WAIS-R informed the court that the odds were against a substantial rise in the IQ of the woman. The psychologist, however, also informed the court that pressure and stress surrounding the trial could have played a major impact on how the woman scored on the first test. With this second scenario

weighing heavily on the minds of the prosecution, the psychologist presented the woman with the WAIS-R once again.

Results: On the second WAIS-R test, the woman scored only one point higher than her score the first time. The psychological test proved reliable.

As mentioned, the factors of validity and reliability are highly valuable in studying and testing psychological hypotheses. These two concepts proved equally important in deciding the fate of a man accused in a court of law. The concept of reliability paved the way for a man to be found guilty of rape and sentenced to 15 years in prison.

Analyzing the Case Study

1. Why was the WAIS-R used in this instance?
2. Why did the defense on this case want the alleged victim to retake the test?
3. **Critical Thinking** What might significantly different results on the WAIS-R have meant in this case?

SECTION 3

Measuring Achievement, Abilities, and Interests

Reader's Guide

■ Main Idea

Psychologists have developed tests to assess special abilities and experiences.

■ Vocabulary

- aptitude test
- achievement test
- interest inventory

■ Objectives

- Identify the most widely used aptitude tests, achievement tests, and interest inventories.
- Explain the application of aptitude tests, achievement tests, and interest inventories.

EXPLORING PSYCHOLOGY

What Are Your Interests?

Breathless, Vin dashed into the chemistry lab, "Sorry I'm late, Mrs. Baker," he told his instructor. "I was helping Mr. Eads plant marigolds around the flagpole."

Mrs. Baker sighed patiently. "I'm glad to give you extra help, Vin, but try to be on time."

"Sorry," Vin repeated. "I guess I have more fun in a garden than I do in chem lab."

Mrs. Baker smiled in surprise. "You like to garden? A garden *is* a chemistry lab."

Now Vin looked surprised. "It is?"

"Sure," Mrs. Baker replied. "Making food from sunlight, drawing nutrients from soil—these are chemical processes. . . ."

—from *Shaping Your Future* by Eddy Eubanks, Connie R. Sasse, and Linda R. Glosson, 2000

Vin views digging in the garden as fun, not work. What subject fascinates you? What career should you choose? What are your interests and aptitudes? Which subject most motivates you to learn more? Intelligence tests are designed to measure a person's overall ability to solve problems that involve symbols such as words, numbers, and pictures. Psychologists have developed other tests to assess special abilities and experiences. These include aptitude tests, achievement tests, and interest inventories.

Figure 13.11 The GATB

Samples of items from the GATB testing verbal skills, mathematical skills, and manual skills are shown here.

What is the purpose of an aptitude test?

- Which two words have the same meaning?
(a) open (b) happy
(c) glad (d) green
- Which two words have the opposite meaning?
(a) old (b) dry
(c) cold (d) young
- A man works 8 hours a day, 40 hours a week. He earns \$1.40 an hour. How much does he earn each week?
(a) \$40.00 (b) \$50.60
(c) \$44.60 (d) \$56.00
- At the left is a drawing of a flat piece of metal. Which object at the right can be made from this piece of metal?

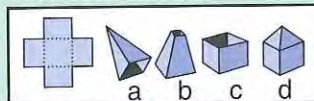


Figure 13.12 Medical Aptitude

The Law School Admissions Test (LSAT) and the Medical College Admissions Test (MCAT) help predict how well a student will do in law school and medical school. **How do tests like the SAT, LSAT, and MCAT also measure achievement?**

APTITUDE TESTS

Aptitude tests attempt to discover a person's talents and to predict how well he or she will be able to learn a new skill. They are assessed primarily in terms of their *predictive validity*. Two such tests are the Differential Aptitude Test (DATE) and the General Aptitude Test Battery (GATB). The GATB is the most widely used of these tests (see Figure 13.11). Actually, the GATB comprises nine different tests, ranging from vocabulary to manual dexterity. Test results are used to determine whether a person shows promise for each of a large number of occupations. In addition to the GATB, there are aptitude tests in music, language, art, mathematics, and other special fields.

The SAT and the American College Test (ACT) are general aptitude tests. These tests were designed to predict a student's success in college. The best predictor of how a student will do in college is how he or she did in high school. However, grading standards differ among high schools. So, combined with high school grades, the SAT is a fairly good predictor of student success in college.

ACHIEVEMENT TESTS

Whereas aptitude tests are designed to predict how well a person will be able to learn a new skill, **achievement tests** are designed to measure how much a person has already learned in a particular area. Such tests not only enable an instructor to assess a student's knowledge, but they also help students assess their progress for themselves. They are validated in terms of their *content validity*, or how well they measure students' mastery of a set of knowledge.

The distinction between achievement and aptitude tests has become somewhat blurred. What psychologists had thought were tests of aptitude—defined as *innate* ability or talent—turned out to measure experience as well, so that in part they were achievement tests. On the other hand, achievement tests often turned out to be the best predictors of many kinds of occupational abilities, so that they were in some sense aptitude tests. Because of this overlap, the distinction between the two types of tests rests more on purpose and validation than on

content. If a test is used to predict future ability, it is considered an aptitude test; if it is used to assess what a person already knows, it is an achievement test.

Computers are often used to administer achievement tests. One method is called *adaptive testing* (Van der Linden & Glas, 2000). In a standard test, everyone gets the same questions in the same order. With adaptive testing, however, the computer changes the question difficulty as it adapts the test to your performance. If you answer several problems correctly, the computer challenges you with harder problems. If you miss a question, the computer follows it with an easier problem.

This process enables the computer to identify your ability by finding the difficulty level where you answer most, but not all, of the problems correctly. Adaptive testing is more accurate than standard testing, especially when test takers are either very high or very low in ability.

Computers can also adapt tests to include more problems in areas where your answers are frequently wrong. This procedure is called *adaptive instruction* (Kasschau, 2000). By increasing the questions posed on topics you are missing, the computer reinforces more careful studying in areas least understood (Ray, 2004).

INTEREST INVENTORIES

The instruments for measuring interests are fundamentally different from the instruments for measuring abilities. Answers to questions on an intelligence test indicate whether a person can, in fact, do certain kinds of thinking and solve certain kinds of problems. There are right and wrong answers. The answers to questions on an interest or a personality test, however, are not scored as right or wrong. The question in this type of testing is not, "How much can you do?" or "How much do you know?" but, "What are you like?" or "What do you like?"

The essential purpose of an **interest inventory** is to determine a person's preferences, attitudes, and interests. Most interest inventories compare the person's responses to the responses given by people in clearly defined groups, such as professions or occupations. The more a person's interest patterns correspond to those of people in a particular occupation, the more likely that person is to enjoy and succeed in that profession.

For example, when constructing the widely used Campbell Interest and Skill Survey (Campbell, 1992), psychologists compared the responses of people who are successfully employed in different occupations to the responses of people in general. Suppose most engineers said they liked

Quick Lab

Do interest inventories help determine a career?

Interest inventories are used as predictors of how likely an individual completing the inventory will enjoy and succeed in a profession.

Procedure

- Choose a profession that you might be interested in pursuing and find information about its requirements and responsibilities.
- Develop a series of questions that would address and assess a person's interest in the particular profession.
- Administer the inventory to classmates.

Analysis

- Determine whether the responses indicate an interest in the profession you chose.
- After you make your determination, ask those who took the inventory if a career in the profession you chose is something they might enjoy.
- How would you evaluate your inventory in terms of its predictive value?



See the **Skills Handbook**, page 622, for an explanation of designing an experiment.

aptitude test: estimates the probability that a person will be successful in learning a specific new skill

achievement test: measures how much a person has learned in a given subject or area

interest inventory: measures a person's preferences and attitudes in a wide variety of activities to identify areas of likely success

Reading Check
Why is the SAT considered an aptitude test?

Figure 13.13 The KPR

Shown are items from the Kuder Preference Record (KPR). The individual taking the test chooses from among three possible activities the one he or she would most like to do and the one he or she would least like to do. *What is the Kuder Preference Record designed to measure?*

	Most		Least
G. Read a love story	<input type="radio"/>	G.	<input type="radio"/>
H. Read a mystery	<input type="radio"/>	H.	<input type="radio"/>
I. Read science fiction	<input type="radio"/>	I.	<input type="radio"/>
J. Visit an art gallery	<input type="radio"/>	J.	<input type="radio"/>
K. Browse in a library	<input type="radio"/>	K.	<input type="radio"/>
L. Visit a museum	<input type="radio"/>	L.	<input type="radio"/>
M. Collect autographs	<input type="radio"/>	M.	<input type="radio"/>
N. Collect coins	<input type="radio"/>	N.	<input type="radio"/>
O. Collect butterflies	<input type="radio"/>	O.	<input type="radio"/>
P. Watch television	<input type="radio"/>	P.	<input type="radio"/>
Q. Go for a walk	<input type="radio"/>	Q.	<input type="radio"/>
R. Listen to music	<input type="radio"/>	R.	<input type="radio"/>

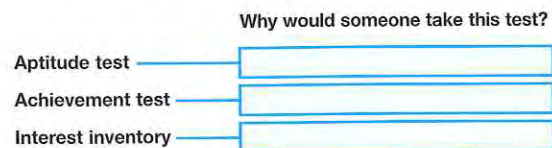
information. Along with interests, a student's abilities should be taken into account. A person should not make an important decision, such as that of career, on the basis of a single test or inventory.

the idea of becoming astronomers but would not be interested in a coaching job, whereas people in general were evenly divided on these (and other) questions. A person who responded as the engineers did would rank high on the scale of interest in engineering. The Kuder Preference Record, part of which is shown in **Figure 13.13**, is based on the same principle.

The purpose of these measures is to help people find the career that is right for them. It is important to note that although interest inventories can be of great value to people who are undecided about the career path they should take, they provide only one source of

SECTION 3 Assessment

- 1. Review the Vocabulary** Write a short paragraph explaining what aptitude, achievement tests, and interest inventories are designed to measure.
- 2. Visualize the Main Idea** Using a diagram similar to the one below, identify why an individual might take an aptitude, achievement, or interest inventory.



- 3. Recall Information** What is the content validity of a test? What is the predictive validity of a test?
- 4. Think Critically** Do you think a person should base his or her career choice on the results of an interest test? Explain your answer.

5. Application Activity Choose a favorite sport or hobby. Devise a short aptitude test that you think would help predict how well an individual would be able to learn the skills needed for the sport or hobby you chose.

SECTION 4 Personality Testing

Reader's Guide

■ Main Idea

Personality tests are used to assess an individual's characteristics and to identify problems.

■ Vocabulary

- personality test
- objective test
- projective test

■ Objectives

- Identify the most widely used personality tests.
- Describe the use of personality tests.

EXPLORING PSYCHOLOGY

Why Do You Have Your Personality?

What makes people different from one another? The ancient Greeks thought the answer had something to do with the four basic body fluids or humors: blood, phlegm, black bile, and yellow bile. According to the Greek physician Hippocrates (460–371 B.C.), there were four possible personality types. *Sanguine* individuals had an abundance of blood: they tended to be cheerful, optimistic, and active. *Phlegmatic* people were listless, sluggish, and tired because they had too much phlegm. Sad, brooding *melancholic* temperaments resulted from too much black bile, and *choleric* (easy to anger) personalities resulted from an excess of yellow bile.

—from *Psychology: Science, Behavior, and Life* by R.H. Ettinger, Robert L. Crooks, and Jean Stein, 1994

Hippocrates' adjectives survive today in the words we use to describe personality types. The explanations for what causes personality differences, though, have changed dramatically. Psychologists and psychiatrists use **personality tests** to assess an individual's characteristics and to identify problems and psychological disorders, as well as to predict how a person might behave in the future. Some of these tests are objective tests, while others are projective tests.

personality test: assesses an individual's characteristics and identifies problems

objective test: a limited- or forced-choice test in which a person must select one of several answers

OBJECTIVE PERSONALITY TESTS

Some of the most widely used personality tests are based on simple pencil-and-paper responses. **Objective tests** are usually constructed in a limited- or forced-choice format; that is, a person must select one of a small number of possible responses, and a specific scoring key is created.

The MMPI

One of the most widely used tests for general personality assessment is the Minnesota Multiphasic Personality Inventory (MMPI). (The MMPI was revised, updated, and published in 1990. The new version is called MMPI-2.) Like other personality tests, the MMPI-2 has no right or wrong answers. The test consists of 567 statements to which a person can respond *true*, *false*, or *cannot say*. Some examples of test statements are: I like tall women; I wake up tired most mornings; I am envied by most people; and I often feel a tingling in my fingers.

The items on the MMPI-2 reveal habits, fears, delusions, sexual attitudes, and symptoms of psychological disorders. Psychologists originally developed the test to help diagnose psychiatric disorders. Although the statements that relate to a given characteristic (such as depression) are scattered throughout the test, the answers can be pulled out and organized into a single depression scale or scoring key. There are 10 such clinical scales to the MMPI (see Figure 13.14). In scoring the MMPI, a psychologist looks for patterns of responses, not a high or low score on one or all of the scales. This is because the test items do not, by themselves, identify personality types; the pattern of scale scores does so.

In creating the original MMPI, the test makers did not try to think up statements that would identify depression, anxiety, and so forth. Rather, they invented a wide range of statements about all sorts of topics and gave the test to groups of people already known to be well adjusted, depressed, anxious, and so on. They retained for the test those questions that discriminated among these groups—questions, for example, that people suffering from depression almost always answered differently from other groups (Hathaway & McKinley, 1940). As a result, many of the items on the test may cause critics to question the test's face validity. For example, if you answer *false* to "I attend religious services frequently," you will score one point on the depression scale. This and other items like it were included simply because more depressed people than nondepressed people answer *false* to this item.

One of the ways in which the MMPI-2 identifies individuals who give inaccurate responses is that an untrue response to one statement may be caught by the rephrasing of the same question at a later point.

Did You Know?

The Validity of Horoscopes How can astrologers and horoscopes accurately describe you and your life? Horoscope writers and astrologers actually describe your personality traits in such a way that they apply to almost everyone. They use what is called the *Barnum principle*. Named after circus owner P.T. Barnum, it is a method of naming general traits, not specific traits. This means horoscopes lack validity, an essential factor in any good personality test. Because horoscopes are aimed at applying to everyone, they do not measure what they are supposed to measure—individual personality traits (Plotnik, 2005).

Figure 13.14 MMPI Scales

The MMPI is a true-false self-questionnaire that is designed to assess major patterns of personality and emotional disorders. Clinical scales identify the specific areas whose content includes references to a specific disorder. Validity scales assess whether the test taker was lying or faking answers. *Why is the MMPI considered an objective test?*

Clinical Scales	High score indicates that the test taker:
Hs-Hypochondriasis	expresses stress in physical terms
D-Depression	experiences depression and hopelessness
Hy-Conversion Hysteria	expresses emotion without insight
Pd-Psychopathic Deviate	is maladaptive and fights authority
Mf-Masculinity-Femininity	rejects, confuses, or questions traditional gender roles
Pa-Paranoia	has a tendency to misinterpret others' motives
Pt-Psychasthenia	worries obsessively
Sc-Schizophrenia	has a situational problem, not necessarily schizophrenia
Ma-Hypomania	has too much energy and is unable to get anything done
Si-Social Introversion	is withdrawn
Validity Scales	
?-Question	Corresponds with the number of items left unanswered
L-Lie	Some individuals fail to truthfully mark items and describe someone whom they envision as having a perfect personality
F-Infrequency	Some individuals are unwilling to cooperate with the test instructions and mark items in a random manner; others exaggerate their difficulties to get special attention
K-Correction	Some individuals deny certain characteristics about themselves and their families and so slant their answers to hide something

The subject of thousands of studies, the MMPI has been one of the most frequently used psychological tests (Lubin, Larsen, & Matarazzo, 1984). The MMPI-2 includes revisions aimed at modernizing the language, removing sexist terms or phrases, and adding items reflecting current issues such as Type A personalities, alcohol abuse, drug abuse, eating disorders, and suicide. The test can also differentiate common demeanors such as extraversion-introversion and assertiveness. Most psychologists believe that scores on the MMPI-2 should be supplemented and confirmed with interviews and observation for proper diagnosis. The test is best for diagnosing extreme cases of psychological disorders.

Reading Check
What is the purpose of the MMPI?

The CPI

The California Psychological Inventory (CPI) is similar to the MMPI but is developed for more general use. Even though it uses some of the same questions, it does not have any of the questions that reveal psychiatric illnesses (Gough, 1987). It measures traits such as responsibility, self-control, and tolerance. The CPI is used to predict things like adjustment to stress, leadership, and job success. Although it is known to be fairly valid and reliable, the CPI can prove faulty for an individual. The test results may point out that the individual has a problem when that individual really does not. Like all personality tests, the CPI is useful for general screening and in locating individuals who may need help. If an individual's scores indicate that a problem exists, though, the test should be followed by one-on-one discussion with a counselor or psychologist for further investigation.

The Myers-Briggs Test

Another popular personality test is the Myers-Briggs Test (MBTI). The test focuses on how a person takes in information, makes decisions, and approaches day-to-day tasks. This test characterizes personality on four different scales—extraversion vs. introversion, intuition vs. sensing, feeling vs. thinking, and judging vs. perceiving.

For example, an extravert prefers engaging in activities involving other people, whereas an introvert enjoys solitude. Sensing and intuition refer to the contrast between using senses primarily in a practical way (“I have to see it to believe it”) or believing something without knowing exactly why. In the thinking and feeling contrast, thinking is more logical, whereas feeling involves using a personal, values-oriented way of responding to events and people. Finally, in the judging vs. perceiving contrast, those who prefer judgment tend to have a more organized and structured manner, while those who prefer using perceptive abilities are more flexible.

The creators of the MBTI believe that each person's personality is a combination of these characteristics. Your personality type influences your communication style, how you carry out personal relationships, your work style, as well as other lifestyle choices. The purpose of the test is to offer test takers an evaluation of their personalities so that they may better understand how they relate to others and how others relate to them. With this knowledge, the creators of the test hope to help people live more productive, rewarding lives. Businesses may use this test to make better decisions about whom to hire and promote. Students can use this test to optimize the match between their learning style and the teaching style of their instructor.

PROJECTIVE PERSONALITY TESTS

Unlike objective tests, **projective tests** encourage test takers to respond freely, giving their own interpretations of various test stimuli. These tests are open-ended examinations that invite people to tell stories about pictures, diagrams, or objects. The idea is that the test material has no established meaning, so the story a person tells must say something

about his or her needs, wishes, fears, and other aspects of personality. In other words, the test taker will project his or her feelings, perspectives, and attitudes onto the test items.

The Rorschach Inkblot Test

Perhaps the best-known and most widely discussed projective measure is the Rorschach inkblot test, developed by Swiss psychiatrist Hermann Rorschach in 1921. Rorschach created 10 cards with inkblot designs and a system for interpreting responses (see Figure 13.15). After 10 years of researching responses to thousands of ink blots, he chose 10 specific ones that elicited emotional responses in people. Five of the blots are black and gray on a white background; two have red splotches plus black and gray; and three cards have a mixture of different colors.

To administer the test, a psychologist hands the ink blots one by one to the test taker, asking the person to say what he sees. The person might say that a certain area represents an airplane or an animal's head. In a second round, the psychologist asks certain general questions in an attempt to discover what aspects of the ink blot determined the person's response. There are no right or wrong answers. The psychologist may keep a record of things the test taker does, such as what he says he sees, where and how he holds the cards, and the length of time he pauses before answering.

The theory underlying the test is that anything that someone does or says will reveal an aspect of that person's personality. There are several systems for scoring Rorschach responses. Some are very specific; for example, according to one system, a person who mentions human movement more often than color in the ink blots is probably introverted, while an extrovert will mention color more than movement. Other systems are far more intuitive—for example, noting whether the test taker is open or hostile. Many researchers have criticized the Rorschach, charging that the scoring systems are neither reliable nor valid and that the results often depend on the psychologist's expectations. The test, though, continues to be used by therapists as an introduction to therapy.

The TAT

The second most widely used projective measure was developed by Henry Murray (1943). The Thematic Apperception Test (TAT) consists of a series of 20 cards containing pictures of vague but suggestive situations (see Figure 13.16). The individual is asked to tell a story about the picture, indicating how the situation shown on the card developed, what the characters are thinking and feeling, and how it will end. The TAT is used to urge clients to speak freely about their problems (see Chapter 12 for more on the TAT).

As with the Rorschach, there are many different scoring systems for the TAT. The interpreter usually focuses on the themes that emerge from the story and the needs of the main characters: Are they aggressive? Do they seem to have needs for achievement, love, or sex? Are they being attacked or criticized by another person, or are they receiving affection and comfort? The responses are used to assess the motivation and personality characteristics of the individual taking the test. The test can also be used to assess the personality problems of individuals.

Figure 13.15 Taking the Rorschach Test

In interpreting a person's responses to the ink blots on the Rorschach test, as much attention may be paid to the style of the responses as to their content. **What are projective tests?**



Figure 13.16 Taking the TAT

A person taking the TAT would be shown a picture such as this one and asked to make up a story about it. **What does the TAT assess?**



Figure 13.17 Approaches to Reducing Test Anxiety

Many people worry about taking any kind of test. When someone comes to a psychologist complaining of test anxiety, the psychologist may approach the problem in a variety of ways, depending on his or her theoretical orientation. *How would a behaviorist attempt to reduce testing anxiety?*

Approach	Solution
Biological (focus on physiological arousal, i.e. sweaty palms)	Reduce anxiety through stress-reducing activities
Cognitive (focus on thinking/excessive worrying)	Channel worry into studying
Behavioral (focus on actual behaviors)	Increase study time by selecting a good place to study, rewarding yourself for studying, keeping a record of your study time, establishing priorities, specifying time for specific tasks
Psychoanalytic (focus on personality problems that underlie bad study habits)	Work to change personality characteristics, such as procrastination
Humanistic (focus on conscious beliefs and perceptions)	Teachers work with students so that students develop feelings of competence and reach their full potential
Sociocultural (focus on influence of culture and ethnicity)	Students from different cultures have different values and resources; work to understand differences and similarities

Source: Adapted from Plotnik, 2005.

It is important to note that personality tests, as with aptitude, achievement, interest, and intelligence tests, are just one tool that a psychologist can use to evaluate a person's psychological state. A conscientious psychologist should pair testing with other evidence gained through interviews and observation before drawing any conclusions or making any diagnoses.

SECTION 4 Assessment

- Review the Vocabulary** What is the difference between objective and projective tests?
- Visualize the Main Idea** Using a chart similar to the one below, identify the characteristics of the Rorschach inkblot test and the Thematic Apperception Test (TAT).
- Recall Information** How does the CPI differ from the MMPI? How does the CPI differ from the Myers-Briggs test?
- Think Critically** What are the advantages and disadvantages of using objective personality tests versus projective personality tests?

Name of Test	Characteristics
Rorschach test	
Thematic Apperception Test	

5. Application Activity Choose two personality traits. Develop several test questions that you think would assess these traits. Discuss and evaluate your questions with your classmates.

Tests evaluate academic performance and measure mental abilities or personality characteristics. The usefulness of a test depends upon how well it is constructed and the extent to which scores are related to actual performance.

Section 1 Characteristics of Psychological Tests

Main Idea: To be useful, tests have to exhibit reliability, validity, and standardization.

- There are three basic ways of determining a test's reliability: test-retest, scorer or interscorer, and split-half reliability.
- One of the chief methods for measuring validity is to find out how well a test predicts performance.
- Tests have to be standardized; they must be administered and scored the same way every time, and they must have established norms.

Section 2 Intelligence Testing

Main Idea: Several IQ tests are used to measure intelligence, although there are many views about what constitutes intelligence.

- Charles Spearman proposed that two factors contributed to a person's intelligence.
- L.L. Thurstone proposed that intelligence is composed of seven primary mental abilities.
- Howard Gardner proposed that there are eight types of intelligence.
- Two major intelligence tests are the Stanford-Binet and the Wechsler tests.
- Much of the debate about IQ testing is over how genetic differences and environmental inequalities affect performance.

Section 3 Measuring Achievement, Abilities, and Interests

Main Idea: Psychologists have developed tests to assess special abilities and experiences.

- Aptitude tests are used to identify a person's talents and to predict how well he or she will be able to learn a new skill.
- Achievement tests are designed to measure how much a person has already learned in a particular area.
- Interest inventories are used to determine a person's preferences, attitudes, and interests.

Section 4 Personality Testing

Main Idea: Personality tests are used to assess personality characteristics and to identify problems.

- Personality tests can be objective or projective.
- One of the most widely used objective personality tests is the Minnesota Multiphasic Personality Inventory (MMPI-2).
- The two major projective personality tests are the Rorschach inkblot test and the Thematic Apperception Test (TAT).

Chapter Vocabulary

- reliability (p. 344)
- validity (p. 345)
- percentile system (p. 346)
- norms (p. 346)
- intelligence (p. 348)
- two-factor theory (p. 349)
- triarchic theory (p. 350)
- emotional intelligence (p. 351)
- intelligence quotient (IQ) (p. 352)
- heritability (p. 355)
- cultural bias (p. 356)
- aptitude test (p. 360)
- achievement test (p. 360)
- interest inventory (p. 361)
- personality test (p. 363)
- objective test (p. 364)
- projective test (p. 366)



Self-Check Quiz
Visit the *Understanding Psychology* Web site at glencoe.com and click on **Chapter 13—Self-Check Quizzes** to prepare for the Chapter Test.

Reviewing Vocabulary

Choose the letter of the correct term or concept below to complete the sentence.

- a. validity
- b. reliability
- c. norms
- d. intelligence
- e. triarchic theory
- f. emotional intelligence
- g. heritability
- h. cultural bias
- i. objective
- j. projective

1. A test's _____ are the percentiles established on the basis of the scores achieved by a standardization group.
2. The ability of a test to measure what it is intended to measure is its _____.
3. Researchers often investigate _____, a measure of the degree to which a characteristic is related to genetic factors.
4. The _____ of intelligence proposes that intelligence involves analytical, creative, and practical thinking skills.
5. In a(n) _____ test, a person is asked to give his or her own interpretations of various test stimuli.
6. _____ occurs when the wording used in questions may be more familiar to people of one cultural group than to another.
7. The ability of a test to yield the same result under a variety of different circumstances is its _____.
8. A person's _____ is related to concepts of interpersonal and intrapersonal intelligences.
9. _____ is the ability to acquire new ideas and new behavior and to adapt to new situations.
10. In a(n) _____ test, a person must select one of a small number of possible responses.

Recalling Facts

1. What is the validity of a test? How is the validity of a test determined?
2. Explain what norms are. How are norms established?
3. Using a chart similar to the one below, explain the following views of intelligence: Thurstone's, Gardner's, and Sternberg's.

Theory	View of Intelligence
L.L. Thurstone	
Howard Gardner	
Robert Sternberg	

4. Explain the difference between an aptitude test and an achievement test. Give an example of each type of test.
5. What are the two basic types of personality tests? What are some of the differences between the types? Give an example of each test.

Critical Thinking

1. **Demonstrating Reasoned Judgment** Which theory of intelligence discussed in the chapter do you agree with the most? Give reasons for your choice.
2. **Synthesizing Information** If you were asked to rate people on an intelligence scale of your own making, what criteria would you use and how would you make your decisions? What roles would memory, creativity, and emotional maturity play in your scale?
3. **Evaluating Information** Only a few tests have been used to predict how happy people will be with their lives or how successful they will be in their careers. Explain why you think this may be the case.
4. **Making Inferences** How accurate do you think the scoring for projective tests is? Can the scoring for these kinds of tests be standardized? Explain.
5. **Applying Concepts** Do you think personality tests should be used by employers to make decisions about hiring employees? Explain.

Psychology Projects

1. **Characteristics of Psychological Tests** Ask one of your academic teachers if you can spend some time after class talking about how he or she makes up a test. How does the teacher decide the number and type of questions? Does the teacher consider the validity or reliability of the test? How is the test scored? Present your findings in a written report.
2. **Intelligence Testing** Research various intelligence tests. Determine the criteria used to measure intelligence. Report your findings in a chart.
3. **Achievement and Personality Tests** In recent years, controversies have surrounded the use of achievement tests and personality tests. Research newspapers and magazines to find articles that explain these controversies. Summarize them in a short paper. Include your opinion of the arguments involved.
4. **Personality Testing** Contact the human resources department of a business in your community. Find out what criteria the company uses for hiring employees. Specifically, find out if the company uses personality tests or interviews to help in the hiring and what kinds of tests are used. Report your findings in a presentation.



Technology Activity

In recent years, take-at-home computerized IQ tests have become increasingly popular. Search the Internet to find examples of these kinds of tests. Also, find out about intelligence tests offered on CD-ROMs that parents can administer to their children. Evaluate the pros and cons of using these kinds of intelligence tests.



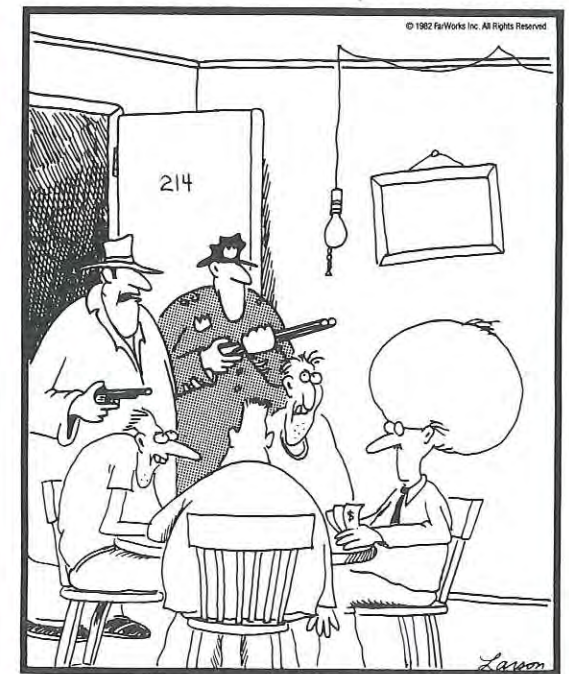
Psychology Journal

Reread your journal entry about selecting the best teaching prospect from among a group of applicants. Devise a test to use in your assessment. Consider and list in your journal the behaviors you most want to evaluate in the applicants.

Building Skills

Identifying Cause-and-Effect Relationships
Review the cartoon below, then answer the questions that follow.

THE FAR SIDE By GARY LARSON



"Freeze!... Okay, now... Whose the brains of this outfit?"

1. Which person shown in the cartoon is the "brains of this outfit"?
2. How does this cartoonist illustrate the characters' intellects?
3. What assumptions are being made by the cartoonist?



See the **Skills Handbook**, page 624, for an explanation of identifying cause-and-effect relationships.



Practice and assess key social studies skills with **Glencoe Skillbuilder Interactive Workbook CD-ROM, Level 2**.

TIME

REPORTS

The EQ Factor

New research suggests that emotions, not IQ, may be the true measure of human intelligence

By NANCY GIBBS

IT TURNS OUT THAT A SCIENTIST CAN see the future by watching four-year-olds interact with a marshmallow. The researcher invites the children, one by one, into a plain room and begins the gentle torment. You can have this marshmallow right now, he says. But if you wait while I run an errand, you can have two marshmallows when I get back. And then he leaves.

Some children grab for the treat the minute he's out the door. Some last a few minutes before they give in. But others are determined to wait. They cover their eyes; they put their heads down; they sing to themselves; they try to play games or even fall asleep. When the researcher returns, he gives these children their hard-earned marshmallows. And then, science waits for them to grow up.

By the time the children reach high school, something remarkable has happened. A survey of the children's parents and teachers found that those who as four-year-olds had the fortitude to hold out for the second marshmallow

generally grew up to be better adjusted, more popular, adventurous, confident and dependable teenagers. The children who gave in to temptation early on were more likely to be lonely, easily frustrated and stubborn. They buckled under stress and shied away from challenges. And when some of the students in the two groups took the Scholastic Aptitude Test, the kids who had held out longer scored an average of 210 points higher.

When we think of brilliance we see Einstein, deep-eyed, woolly haired, a thinking machine with skin and mismatched socks. High achievers, we imagine, were wired for greatness from birth. But then you have to wonder why, over time, natural talent seems to ignite in some people and dim in others. This is where the marshmallows come in. It seems that the ability to delay gratification is a master skill, a triumph of the reasoning brain over the impulsive one. It is a sign, in short, of emotional intelligence. And it doesn't show up on an IQ test.

For most of this century, scientists have worshipped the hardware of the brain and the software of the mind; the messy powers of the heart were left to the poets. But cognitive theory could simply not explain the questions we wonder about most: why some people just seem to have a gift for living well; why the smartest kid in the class will probably not end up the richest; why we like some people virtually on sight and distrust others; why some people remain buoyant in the face of troubles that would sink a less resilient soul. What qualities of the mind or spirit, in short, determine who succeeds?

The phrase "emotional intelligence" was coined by Yale psychologist Peter Salovey and the University of

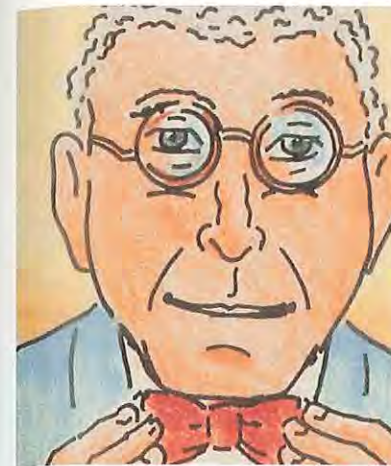
New Hampshire's John Mayer five years ago to describe qualities like understanding one's own feelings, empathy for the feelings of others and "the regulation of emotion in a way that enhances living." Their notion, handily shortened to EQ, is the subject of a new book, *Emotional Intelligence*. Author Daniel Goleman has brought together a decade's worth of behavioral research into how the mind processes feelings. His goal, he announces on the cover, is to redefine what it means to be smart. His thesis: when it comes to predicting people's success, brainpower as measured by IQ and standardized achievement tests may actually matter less than the qualities of mind once thought of as "character" before the word began to sound quaint.

"You don't want to take an average of your emotional skill," argues Harvard psychology professor Jerome Kagan, a pioneer in child-development research. "That's what's wrong with the concept of intelligence for



mental skills too. Some people handle anger well but can't handle fear. Some people can't take joy. So each emotion has to be viewed differently."

EQ is not the opposite of IQ. Some people are blessed with a lot of both, some with little of either. What researchers have been trying to understand is how they complement each other; how one's ability to handle stress, for instance, affects the ability to concentrate and put intelligence to use. Among the ingredients for success, researchers now generally agree



that IQ counts for about 20%; the rest depends on everything from class to luck to the neural pathways that have developed in the brain over millions of years of human evolution.

It is actually the neuroscientists and evolutionists who do the best job of explaining the reasons behind the most unreasonable behavior. In the past decade or so, scientists have learned enough about the brain to make judgments about where emotion comes from and why we need it. Primitive emotional responses held the keys to survival: fear drives the blood into the large muscles, making it easier to run; surprise triggers the eyebrows to rise, allowing the eyes to gather more information about an unexpected event. Disgust wrinkles up the face and closes the nostrils to keep out foul smells.

Emotional life grows out of an area of the brain called the limbic system, specifically the amygdala, whence come delight and disgust and fear and anger. Millions of years ago, the neocortex was added on, enabling humans to plan, learn and remember. Lust grows from the limbic system; love, from the neocortex. Animals like reptiles that have no neocortex cannot experience anything like maternal love; this is why baby snakes have to hide to avoid being eaten by their parents. Humans, with their capacity for love, will protect their offspring, allowing the brains of the young time to develop. The more connections between the limbic system and the neocortex, the more emotional responses are possible.

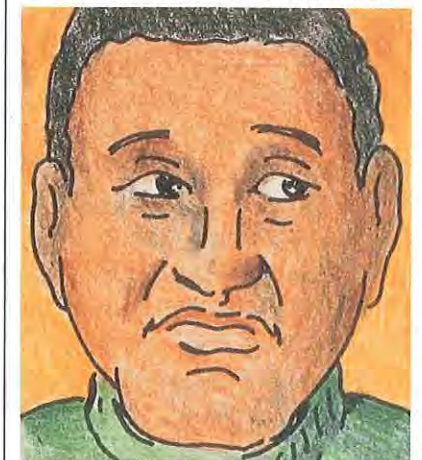
Without these emotional reflexes, rarely conscious but often terribly powerful, we would scarcely be able to function. "Most decisions we make have a vast number of possible outcomes, and any attempt to analyze all of them would never end," says University of Iowa neurologist Antonio Damasio, author of *Descartes' Error: Emotion, Reason and the Human Brain*. "I'd ask you to lunch tomorrow, and when the appointed time arrived, you'd still be thinking about whether you should come." What tips the balance, Damasio contends, is our unconscious assigning of emotional values to some of those choices. Whether we experience a somatic response—a gut feeling of dread or a giddy sense of elation—emotions are helping to limit the field in any choice we have to make. If the prospect of lunch with a neurologist is unnerving or distasteful, Damasio suggests, the invitee will conveniently remember a previous engagement.

When Damasio worked with patients in whom the connection between emotional brain and neocortex had been severed because of damage to the brain, he discovered how central that hidden pathway is to how we live our lives. People who had lost that linkage were just as smart, but their lives often fell apart nonetheless. They could not make decisions because they didn't know how they felt about their choices. They couldn't react to warnings or anger in other people. If they made a mistake, like a bad investment, they felt no regret or shame and so were bound to repeat it.

How much happier would we be, how much more successful as individuals and civil as a society, if we were more alert to the importance of emotional intelligence and more adept at teaching it? From kindergartens to

business schools to corporations across the country, people are taking seriously the idea that a little more time spent on the "touchy-feely" skills so often derided may in fact pay rich dividends.

The problem may be that there is an ingredient missing. Emotional skills are morally neutral. Just as a genius could use his intellect either to cure cancer or engineer a deadly virus, someone with great empathic insight could use it to inspire colleagues or exploit them. Without a moral compass to guide peo-



ple in how to employ their gifts, emotional intelligence can be used for good or evil. Columbia University psychologist Walter Mischel, who invented the marshmallow test, observes that the knack for delaying gratification that makes a child one marshmallow richer can help him become a better citizen or—just as easily—an even more brilliant criminal. Given the passionate arguments that are raging over moral instruction in this country, it is no wonder Goleman chose to focus more on neutral emotional skills than on the values that should govern their use. That's another book—and another debate. ■

—For the complete text of this article and related articles from TIME, please visit www.time.com/teach

ANALYZING THE ARTICLE

1. What is the purpose of the marshmallow test? How does it demonstrate EQ?
2. **CRITICAL THINKING** Is EQ the same as morality? How are they related? Do you think you can teach EQ to children?