

Chapter 7

“Higher” Cognitive Processes

Outline

I. Some Thoughts about Thinking

- A. **Thinking** is a general term used to encompass such cognitive processes as reasoning and problem-solving that use or extend upon existing cognitions.
 - 1. The so-called “lower” cognitive processes include perception, learning, and memory.
 - 2. The “higher” cognitive processes, then, work with existing, already-formed cognitions.
- B. **Concepts** are mental representations of classes, or categories, of events or objects of experience.
 - 1. In a sense, concepts are “ideas,” or the units of thinking.
 - 2. They seldom represent just one, specific instance, but rather represent one’s stored awareness of a set of events or objects.
 - 3. Most concepts in our experience are “fuzzy,” without specific definition.
 - 4. The best example of a concept is called a **prototype**.
- C. **Reasoning** is a higher cognitive process in which one comes to a conclusion based on either a set of general principles or on the basis of an assortment of accumulated facts and observations.
 - 1. Such a manipulation of cognitions qualifies as a “higher” cognitive process.
 - 2. **Inductive reasoning** leads one to come to a conclusion that follows from separate, specific facts, and observations.
 - 3. **Deductive reasoning** leads one to come to a conclusion about a specific event based on the application of a few general principles (stored concepts).

II. Problem-Solving

- A. A **problem** exists when there is a discrepancy between one’s present state and one’s perceived goal state and there is no readily apparent way to get from one to the other.
- B. A problem has three major components.
 - 1. An initial state—the situation as it is, or is perceived to exist, at the moment
 - 2. A goal state, or end product
 - 3. Possible routes or strategies for getting from the initial state to the goal state
- C. Well-defined problems are those in which both the initial state and the goal state are clearly defined.
- D. With an ill-defined problem one has no clear idea of what one is starting with or what an ideal solution would be.

III. Problem Representation

- A. One should try to understand the nature of a problem, and try to make it meaningful by relating it to information available in memory.
- B. Useful problem representation often involves the sorting out of what is important and what isn’t.

IV. Problem-Solving Strategies

- A. A **strategy** is a systematic plan for generating possible solutions that can be tested to see if they are correct.
- B. An **algorithm** is a strategy that guarantees that eventually one will arrive at a solution if the strategy is correctly applied.
 - 1. Algorithms systematically explore and evaluate all possible solutions until the correct one is found.
 - 2. This is sometimes referred to as a generate-test strategy.
- C. A **heuristic** is an informal, rule-of-thumb strategy of generating and testing problem solutions.
 - 1. Heuristics are more economical for solving problems than are algorithms, but there is no guarantee of success.
 - 2. With a means-end analysis the final goal is kept in mind, but sub-goals are used to reach the final goal.

V. Barriers to Effective Problem-Solving

- A. Mental set and functional fixedness can interfere with problem solving.
 - 1. A **mental set** is a tendency to perceive or respond to something in a given, or set, way.
 - a. An inappropriate mental set can interfere with problem-solving
 - b. An appropriate mental set can speed problem-solving
 - 2. **Functional fixedness** is an inability to discover an appropriate new use for an object because of experience using the object in some other function.
- B. Biased heuristics can interfere with effective problem solving and decision-making.
 - 1. The **availability heuristic** is the assumption that whatever comes to mind must be more common, or probable, than things difficult to recall.
 - 2. The **representativeness heuristic** is the assumption that any judgments made about the most prototypic member of a category will hold for all members of the category.
 - 3. The **positive test strategy** claims that if something works, don't drop it to try something else.
- C. To solve problems successfully, one must break out of the constraints of improper mental sets, functional fixedness, and some heuristic strategies.

VI. Creativity

- A. **Creativity** is the potential to produce novel ideas that are task-appropriate and of high quality.
 - 1. Creativity is often a matter of learning not to do something or doing something in a different way.
 - 2. Just being different or unique is not to be creative.
 - 3. Creativity is seldom found to be correlated with "general intelligence."
 - a. One must have knowledge of the area in which he or she is working.
 - b. What is perceived as a creative outcome often takes considerable time, effort, and practice.
- B. Creative problem solving often involves **divergent thinking**; that is, the creation of many ideas or possible solutions from one idea.
- C. With **convergent thinking**, one takes many ideas or bits of information and tries to reduce them to just one possible solution
- D. Creative problem solving can be divided into four interrelated stages (Wallas, 1926).
 - 1. Preparation
 - 2. Incubation
 - 3. Illumination
 - 4. Verification
- E. Good problem solvers show more awareness of what they are doing during the course of problem solving than do poor problem solvers.

VII. Let's Talk: What is Language?

- A. **Language** is a large collection of arbitrary symbols that have a shared significance for a language-using community and that follow certain rules of combination (Morris, 1946).
- B. Communication is the act of transferring information from one point to another.
- C. One property of all true languages is **arbitrary symbolic reference**, which means that there need be no resemblance between a word and its referent.
- D. **Semanticity** refers to the meaning that words take on in a language.
- E. **Productivity** refers to the property of language that with a limited number of language symbols, we can express an infinite number of ideas.
- F. Another property of language is **displacement**, the ability to communicate about the “not here and not now.”

VIII. Describing the Structure in Language

- A. *Psycholinguistics* is a discipline consisting of scientists trained in psychology and linguistics who analyze language.
- B. Individual speech sounds of a language are called **phonemes**.
 - 1. How phonemes are combined to form words and phrases is governed by phonological rules.
 - 2. There are approximately 45 phonemes in English.
- C. The study of meaning in language is called **semantics**.
 - 1. A **morpheme** is the smallest unit of meaning in a spoken language.
 - 2. A *free morpheme* has a meaning and can stand alone.
 - 3. Prefixes and suffixes are examples of *bound morphemes*.
 - 4. The use of morphemes is governed by morphological rules.
- D. The rules that govern how sentences are formed in a language are referred to as the **syntax** of a language.
 - 1. The formal expression of the syntax of a language is its grammar.
 - 2. People have a competence for rules that govern language use.

IX. Language Use as a Social Process

- A. **Pragmatics** is the study of how social contexts affect the meaning of linguistic events.
- B. The rules of conversation are part of the pragmatics of speech.
- C. Pragmatics involves decisions based on the perception of the social situation at the moment.

X. Just What *Is* Intelligence?

- A. Wechsler (1975) defined **intelligence** as, “The capacity of an individual to understand the world about him (or her) and his (or her) resourcefulness to cope with its challenges.”
- B. Boring's (1923) operational definition states, “Intelligence is what the intelligence tests measure.”

XI. Classic Models of Intelligence

- A. Spearman (1904) proposed that intelligence consisted of a general intelligence or **g-factor**, and a collection of specific cognitive skills, or **s-factors**.
- B. L.L. Thurstone (1938) believed that intelligence consisted of seven **primary mental abilities**.
- C. J.P. Guilford (1967) claimed that intelligence could be analyzed as three intersecting dimensions involving operations, contents, and products, with 120 combinations.
- D. Vernon (1960, 1979) viewed intelligence as having a general factor and a structured set of specific factors.

XII. More Contemporary Models of Intelligence

- A. Howard Gardner suggests that people can display intelligence in any one of eight ways or in a combination of them.
 - 1. These include intelligence displayed in the following areas: mathematical/logical, verbal/linguistic, spatial, musical, body/kinesthetic, naturalistic, interpersonal, and intrapersonal.
 - 2. Gardner is considering a ninth type of intelligence, “existential.”
 - 3. Which are valued the most depend on the demands of one’s culture.
- B. Robert Sternberg also sees intelligence as multifaceted.
 - 1. Intelligence is a matter of how one goes about solving problems that arise in their lives.
 - 2. Sternberg’s (often interacting) components of intelligence are called *analytic*, *practical*, and *creative*.
- C. John Mayer and Peter Salovey introduced into psychology’s vocabulary the term **emotional intelligence**, characterized by the ability to perceive, generate, and regulate emotions in order to promote better emotional reactions and thoughts.

XIII. Intelligence Across Cultures

- A. Western ideas about intelligence are not always shared by non-Western cultures.
- B. Differences reflect what is valued in a culture.
 - 1. The Chinese, for example, think of intelligence in terms of a general cognitive factor, interpersonal and intrapersonal intelligence, intellectual self-assertion, and intellectual self-effacement.
 - 2. Native Americans are more likely than European Americans to think of intellectual giftedness in terms of those individuals who contribute most to the welfare of the group.

XIV. The Characteristics of Psychological Tests

- A. A **psychological test** is an objective, standardized measure of a sample of behavior.
- B. **Reliability** refers to a test’s ability to produce the same or highly similar results across similar testing situations.
- C. Measures of **validity** refer to a test measuring what it claims to be measuring.
 - 1. The four forms of validity are face, predictive, concurrent, and construct.
 - 2. The more dimensions along which a test is valid, the better.
- D. Results of a test taken by a large group of people whose scores are used to make comparisons are called **norms**.

XV. The Stanford-Binet Intelligence Scale and the Concept of IQ

- A. This test appeared in 1905 in France.
 - 1. Lewis Terman at Stanford supervised a translation and revision of the test in 1916, calling it the Stanford-Binet.
 - 2. The fifth edition was published in 2003.
- B. The test follows a three-level, hierarchical model of cognitive ability.
- C. The current test yields an overall g score, or general intellectual ability.
- D. Under g there are three second-level factors.
 - 1. Crystallized abilities represent those skills needed for acquiring and using information about verbal and quantitative concepts.
 - 2. Fluid-analytic abilities are those needed to solve problems that involve figural or nonverbal types of information.
 - 3. The third factor at this level is short-term memory.
- E. Crystallized abilities are further divided into verbal and quantitative reasoning.
- F. Fluid-analytic abilities are further divided into abstract/visual reasoning.
- G. There is a total of 15 subtests, all of which yield individual scores.
- H. **IQ** is an abbreviation for the term intelligence quotient.
 - 1. IQ formerly was calculated by taking a person’s mental age, dividing it by his or her chronological age, and multiplying by 100.

2. The deviation IQ uses established group norms and compares intelligence scores across age groups.
3. Since IQ is considered a common vocabulary term, it is still used to refer to general intelligence.

XVI. The Wechsler Tests of Intelligence

- A. David Wechsler published his first intelligence test in 1939.
 1. Its latest edition is the WAIS-III, published in 1997, and is used for persons between 16 and 74 years of age.
 2. There is a Wechsler Intelligence Scale for Children (WISC-III) used with those 6 to 16 years of age.
 3. The Wechsler Preschool and Primary Scale of Intelligence (WPPSI-R) was designed for 4-to 6-year olds.
- B. The WAIS-III has seven verbal subtests and seven subtests that constitute a performance scale.
- C. Each of the Wechsler tests yields an overall score, verbal score, and performance score.

XVII. Group Tests of Intelligence

- A. These tests are generally paper-and-pencil tests that can be administered to many people at one time.
 1. The Army Alpha Test was published in 1917 and made rough discriminations among examinees on the basis of intelligence.
 2. The Army Beta Test was designed for illiterates.
 3. The Army now uses the Armed Forces Qualification Test for inductees.
- B. When psychological tests of cognitive ability are used to predict future behaviors, we call them **aptitude tests**.
 1. The American College Testing Program (ACT) and the Scholastic Aptitude Test (SAT) are administered to predict academic success.
 2. The SAT-I was published in 1994 to more thoroughly assess skills.
 3. The SAT-II includes a written essay section, a language proficiency test for native speakers of Japanese and Chinese, and tests for non-native English speakers.

XVIII. Group Differences in Measured Intelligence

- A. IQ scores reflect a particular measure of intelligence and do not equal one's intelligence.
- B. Even though, *on average*, the IQ of one group is higher than that of another, many individuals from the second group may be more intelligent than individuals in the first.
- C. Just knowing that, on average, two groups have different IQ scores tells us nothing about why that difference exists—even if the difference is a reliable one.

XIX. Gender Differences in IQ

- A. There are few studies that report any gender differences in IQ between men and women on any test of general intelligence.
 1. There may be no differences because the tests are constructed to minimize or eliminate any such differences.
 2. There are hints of small gender differences on a few specific intellectual skills.
 - a. Males score higher than females on tests of spatial relations.
 - b. Scores on mathematics skills are well correlated with the number and type of math classes taken while a student.
 - c. In a recent study, significantly more boys than girls scored higher on tests of math and science.
 - d. Girls scored better than boys did on tests of perceptual speed, reading comprehension, and writing skills.

XX. Age Differences in IQ

- A. When using a cross-sectional testing method, results indicate that overall IQ peaks in the early 20s, remains stable for about 20 years, and then declines sharply.
- B. When a longitudinal method is used, IQ scores rise until the late 30s or early 40s, stabilizing for about 20 years, then falling after age 60.
- C. Specific intellectual skills do not decline at the same rate, and some do not decline at all.
- D. **Fluid intelligence** refers to abilities related to speed, adaptation, flexibility, and abstract reasoning; these skills show the greatest decline with age.
- E. **Crystallized intelligence** refers to abilities depending on acquired knowledge, accumulated experiences, and general information; these skills remain constant or increase throughout one's lifetime.

XXI. SPOTLIGHT: Racial and Ethnic Differences in IQ

- A. On average, Caucasians score 15 points higher on general intelligence than do African Americans.
- B. Japanese children between 6 and 16 score higher on IQ tests than do Caucasian American children of the same age.
- C. Researchers have tried to determine if tests are biased, or if environmental factors, genetic factors, or cultural differences in motivation influence scores.
- D. Steele and Aronson believe that a *stereotype threat* will cause members of a group to perform more poorly on tasks that relate to prevailing negative stereotypes.
- E. The argument over the causes for race differences may one day be a moot issue.
 - 1. The very definition of "intelligence" is changing.
 - 2. The differences between the IQ scores of African Americans and Caucasian Americans is getting smaller.

XXII. Extremes of Intelligence

- A. The most frequently occurring score is the average score, 100.
- B. 95% of all IQ scores fall between 70 and 130.

XXIII. The Mentally Gifted

- A. According to The United States Office of Education, individuals can be described as gifted who excel in any of the following six areas.
 - 1. Psychomotor ability
 - 2. Visual and performing arts
 - 3. Leadership ability
 - 4. Creative or productive thinking
 - 5. Specific academic aptitude
 - 6. Intellectually gifted
- B. Lewis Terman began a study of the mentally gifted in the 1920s.
 - 1. His research group focused on children who had IQ scores above 135.
 - 2. This longitudinal study concluded that, in general, gifted children experience advantages in many areas.

XXIV. Mental Retardation

- A. According to the AAMD, **mental retardation** refers to sub-average general intellectual functioning, which originated during the developmental period, and is associated with impairment in adaptive behavior.
 - 1. IQ scores from 70 to 85 are considered to be borderline.
 - 2. IQ scores from 50-69 are in the mildly retarded range.
 - 3. IQ scores from 35-49 are in the moderately retarded range.
 - 4. IQ scores from 20-34 reflect severe mental retardation
 - 5. IQ scores less than 19 indicate profound mental impairment.
- B. Estimates indicate that at any one time approximately 3 percent of the population falls within the IQ range for retardation.

- C. **Down syndrome** occurs when a fetus develops with 47 chromosomes instead of the usual 23 pairs.
 - 1. Down syndrome is more likely to occur as the age of either parent increases.
 - 2. A person with this syndrome may fall into any level of retardation.
- D. **Fragile X syndrome** is a variety of mental retardation with a genetic basis that was discovered in the late 1960s.
- E. About one-half to three-quarters of cases of mental retardation do not have known biological or genetic causes.
- F. **Phenylketonuria**, or **PKU**, is a genetic disorder that can be detected with a blood test at birth, and treated with a prescribed diet during childhood.

Practice Test Questions

Multiple Choice

1. Some cognitive processes can be called “higher” because they
 - a. begin higher in the spinal cord than do other cognitive processes.
 - b. require and use (manipulate) more basic cognitive process.
 - c. involve language and the “lower” cognitive processes do not.
 - d. use algorithm instead of heuristics.
2. A prototypic concept is one that
 - a. is also referred to as a “fuzzy” concept.
 - b. has been experienced before other members of the same category.
 - c. tends to have more members than most others because we experience them more often/
 - d. best represents members of the category or class of concepts.
3. When we say that we are faced with a problem, what are we MOST LIKELY to be missing?
 - a. an awareness that a problem exists
 - b. a goal or an objective to be reached
 - c. a sense of how to get from where we are to where we want to be
 - d. an appreciation of the current situation and the resources that are available
4. More than anything else, what makes a problem “well-defined” as opposed to “ill-defined”?
 - a. the ability to know with certainty when an adequate solution has been found
 - b. the extent to which we realize that we are faced with a problem that needs to be solved
 - c. the adequacy of problem representation
 - d. the choice of an adequate problem-solving strategy
5. Which provides the best example of a well-defined problem?
 - a. How can Israeli-Palestinian differences be peacefully resolved?
 - b. Which country in North America has the longest coastline?
 - c. What would be required to establish a psychology laboratory in a new college?
 - d. What is the best way to organize a surprise party for a co-worker?
6. When we say that problem solving begins with problem representation, we are suggesting that one needs to
 - a. put the problem in numerical, or mathematical form.
 - b. examine all possible problem-solving strategies before deciding on one.
 - c. decide if the problem even has a solution.
 - d. make the problem meaningful.
7. Problem representation typically is easiest when
 - a. the problem deals with familiar information.
 - b. the problem is well-defined.
 - c. there is only one way in which the problem can be solved.
 - d. the problem is ill-defined.
8. Which strategy is relatively inefficient, but guarantees a solution if a solution is possible?
 - a. working backward
 - b. hill-climbing
 - c. using an algorithm
 - d. means-ends analysis

9. As more and more solutions and routes to problem solutions become available, the more sensible it is to use
- a. a comprehensive search of all possibilities.
 - b. a heuristic strategy.
 - c. fewer and fewer hypotheses.
 - d. an algorithmic approach.
10. Functional fixedness is essentially a type of
- a. problem representation.
 - b. heuristic strategy.
 - c. creativity.
 - d. mental set.
11. The ultimate test of a creative solution to a problem is whether
- a. anyone else has ever thought of it before.
 - b. it is artistic, balanced, or beautiful.
 - c. it actually works to solve the problem at hand.
 - d. it is convergent or divergent.
12. If the solution to a problem is going to occur to you, it will probably occur in the sub-process identified by Wallas (1926) as
- a. preparation.
 - b. incubation.
 - c. illumination.
 - d. verification.
13. Which is LEAST descriptive of language? Language is
- a. rule-governed.
 - b. correct or incorrect.
 - c. creative, or generative.
 - d. both cognitive and social.
14. When we say that language allows us to communicate about things that are not present, neither here nor now, we are saying that language demonstrates
- a. displacement.
 - b. behavior that follows rules.
 - c. a cognitive process.
 - d. arbitrariness.
15. The social context in which language is produced and understood is the most central, or important, concern of
- a. syntax.
 - b. pragmatics.
 - c. phonemics.
 - d. semantics.
16. The rules that govern the ways in which morphemes and words can be combined to form sentences are
- a. morphemic rules.
 - b. pragmatics.
 - c. syntax.
 - d. semantics.
17. Which of these is the most appropriate operational definition of intelligence? Intelligence is
- a. the sum of those cognitive abilities that allow us to adapt to the environment.
 - b. that which is measured by the revised edition of the Wechsler Adult Intelligence Scale.
 - c. the accumulation of information over one's lifetime.
 - d. the ultimate problem-solving skill.
18. Spearman and Thurstone devised their theories of intelligence by
- a. introspecting about their own intellectual skills.
 - b. making up their own tests of intelligence, or IQ.
 - c. interviewing many people of differing intellectual abilities.
 - d. examining the correlations among tests for different abilities.

19. A view of human intelligence proposed by Howard Gardner argues that
- a. intelligence will soon be measured by physiological means.
 - b. humans are no more intelligent than any other organisms.
 - c. there are at least eight very different ways in which to demonstrate intelligence.
 - d. intellectual capacity is inherited and therefore related to one's race or ethnic origins.
20. Sternberg's Triarchic Model of Intelligence focuses on
- a. a careful description of over 100 intelligent behaviors.
 - b. making sure that there is a test for each aspect of intelligence.
 - c. the functions, or use of, intellectual skills in practice.
 - d. the relationships between general and specific abilities.
21. If a psychological test is reliable, it will
- a. measure whatever it measures with consistency.
 - b. measure what it claims to be measuring and nothing else.
 - c. yield scores that can be interpreted easily.
 - d. have a very large and representative norm group.
22. When Binet and Simon wrote their first test of intelligence, their major concern was to
- a. study the long-term consequences of being judged to be mentally gifted as a child.
 - b. determine how much of one's intelligence is inherited and how much reflects the environment.
 - c. identify those children who needed to be placed in remedial or special education classes.
 - d. discover if intelligence was one unitary "g" factor, or several specific "s" factors combined.
23. Using the classic approach to IQ as an intelligent quotient, if 10-year-old Sally demonstrates the intellectual functioning typical of an average 8-year-old, her IQ is
- a. 70.
 - b. 80.
 - c. 100.
 - d. 125.
24. When David Wechsler first published his tests, what did he bring to IQ testing?
- a. individually administered testing
 - b. tests that were more valid for children than for adults
 - c. a way to assess general intelligence, or "g"
 - d. a separate score for nonverbal performance items
25. In the context of intelligence testing, what is a "standard score?"
- a. the actual number of items for which the subject is given credit
 - b. the average score earned on the test by all of those who have taken it
 - c. a score that indicates a person's placement relative to similar persons in the norm group
 - d. the number of items correct minus the number of items incorrect
26. What do IQ tests predict best?
- a. success on the job (in terms of happiness and money earned)
 - b. the presence or absence of psychological disorders
 - c. academic achievement
 - d. socioeconomic level
27. In psychology today, the concept of IQ
- a. has been discredited to the point that psychologists hardly ever use the term.
 - b. is taken to be synonymous with intelligence, but only for children and adolescents.
 - c. is considered to be but one indicator, or measure, of intelligence.
 - d. is taken to be one's mental age multiplied by one's chronological age and divided by 100.

28. If we discover that the difference between the IQ scores for Group A and Group B is significant—greater than we could expect by chance—where Group A's scores are higher than those of Group B, we would then have evidence that
- a. Group B has been educationally deprived.
 - b. Group A is genetically smarter than Group B.
 - c. Group A has a higher socioeconomic level than Group B.
 - d. Group A is more intelligent than Group B as indicated by IQ scores.
29. For which intellectual skill do males tend to score higher than do females?
- a. verbal reasoning
 - b. spatial relations
 - c. arithmetic computation
 - d. general information
30. The long-term study of the mentally gifted begun by Terman tells us that which observation about the mentally gifted is FALSE?
- a. They are physically healthier than average.
 - b. They have brighter-than-average children.
 - c. They experience more divorces than average.
 - d. They earn more money than average.
31. Down syndrome
- a. can be treated by changes in diet—if the disorder is caught at birth.
 - b. children are invariably either severely or profoundly mentally retarded.
 - c. develops as a result of a chromosomal abnormality.
 - d. is usually caused by alcohol or drug use by the mother during pregnancy.

True/False

1. ___ True ___ False Languages, including English, generally contain more words than morphemes.
2. ___ True ___ False The concept of a language acquisition device, or LAD, is useful in accounting for the biological or instinctive nature of the language acquisition process.
3. ___ True ___ False Problems can be (and often are) solved without the use of memory.
4. ___ True ___ False Computers cannot use algorithms to solve problems effectively; only humans can.
5. ___ True ___ False A mental set can be helpful in a problem-solving situation.
6. ___ True ___ False Divergent thinking involves generating as many potential solutions as possible, while convergent thinking involves reducing the number of possibilities in problem solving.
7. ___ True ___ False Taking data and inputs and observations from many different areas and putting them together to reach one conclusion (or a small number of conclusions), represents deductive reasoning.
8. ___ True ___ False Failing to find evidence for any general (g) factor of intelligence, Thurstone proposed that what we call intelligence is made up of seven primary mental abilities.
9. ___ True ___ False The current version of the Stanford Binet test yields just one score—a measure of general intelligence, “g.”
10. ___ True ___ False There are no differences between the average IQ scores for men and the average IQ scores for women.
11. ___ True ___ False Racial differences in IQ scores that cannot be accounted for on the basis of environmental factors, must then be due to genetic factors.
12. ___ True ___ False We stand a better chance of preventing mental retardation than we do of adequately treating it.

Key Terms and Concepts

thinking _____

concepts _____

prototype _____

reasoning _____

inductive reasoning _____

deductive reasoning _____

problem _____

problem-solving strategy _____

algorithm _____

heuristic _____

mental set _____

functional fixedness _____

availability heuristic _____

representativeness heuristic _____

positive test strategy _____

creativity _____

divergent thinking _____

convergent thinking _____

language _____

arbitrary symbolic reference _____

semanticity _____

productivity _____

displacement _____

phonemes _____

semantics _____

morphemes _____

syntax _____

grammar _____

pragmatics _____

intelligence _____

g-factor _____

primary mental abilities _____

emotional intelligence _____

psychological test _____

reliability _____

validity _____

test norms _____

intelligence quotient (IQ) _____

deviation IQ _____

aptitude tests _____

fluid intelligence _____

crystallized intelligence _____

stereotype threat _____

mental retardation _____

Answers to Practice Test Questions

Multiple Choice

1. **b** The so-called higher cognitive process (thinking, reasoning, problem-solving, language use, for example) require and manipulate the “lower” cognitive processes of perception, learning, and memory.
2. **d** This one is “by definition.” A prototype is the best example of a concept or category.
3. **c** If we knew how to get from where we were to where we wanted to go, we wouldn’t even have a problem, so the best alternative is the third one.
4. **a** With a well-defined problem, the goal state is very clear so we know when we are there, and we know it with some degree of certainty. We can say, “There, that problem is solved.”
5. **b** Given the answer provided right above to #8, the only acceptable answer is **b**.
6. **d** Once we realize that we’ve got a problem, the first and most difficult step is to put that problem into terms that are meaningful to us.
7. **a** If a problem already exists in a form with which we are familiar, representation will be relatively easy.
8. **c** It may be very inefficient and very time-consuming, but one thing about an algorithmic strategy is that we are guaranteed that eventually we will find a solution if one is available.
9. **b** Heuristics (in general) allow us to cut back on the number of choices we may pursue in problem solving. The more possibilities there are, the more important to devise a heuristic strategy.
10. **d** By definition, functional fixedness is a variety of mental set.
11. **c** No matter how unique, no matter if divergent or convergent, no matter how artistic or beautiful, the ultimate test of a creative solution is whether it actually works to solve the problem at hand.
12. **c** Solutions to problems—creative or not—tend to occur in the illumination stage of problem solving. (Can’t you just see the little cartoon character with the light bulb—hence, illumination—above his head, saying, “AHA!!”?)
13. **b** Language is rule-governed. It is creative or generative, and it is both cognitive and social. I’m not sure I know what it means to say that language is either correct or incorrect.
14. **a** Although language is an arbitrary, cognitive process that follows rules, communicating about the not here and the not now reflects displacement.
15. **b** Pragmatics focuses on the social contextual issues involved in language use (at least to a greater degree than the other choices listed here).
16. **c** The terms “syntax” and “grammar” are often used interchangeably. This is what we’re talking about here—making grammatically correct utterances.
17. **b** Each of these defines intelligence, and reasonably so, but only the second alternative is an operational definition, specifying the operations used to measure intelligence.
18. **d** Although they came to different conclusions when they did so, they both used the same method of examining the correlations among test scores.
19. **c** The fact that Gardner talks about eight (or eight-and-a-half) ways of displaying intelligence (as opposed to nine or ten) is not terribly relevant. What is relevant is the basic notion that there are ways of being intelligent other than in the arena of academic excellence.
20. **c** What makes Sternberg’s approach quite different from the others is that he claims we should look at intelligent behaviors in action, in use, rather than as structures or test scores.
21. **a** In the context of testing, reliability means what it means elsewhere: dependability or consistency.
22. **c** Their basic job was to identify children in the French school system who needed a different (special) style of education because of some general intellectual deficit.
23. **b** What we’re looking for here is MA divided by CA , times 100, or 8 divided by 10 , times $100 = 80$.
24. **d** One of Wechsler’s complaints about IQ tests of his day was that they were so heavily verbal and vocabulary-oriented. He included many performance items on his tests, and allowed for the computation of a performance IQ.
25. **c** By definition, we calculate standard scores by comparing earned scores with those achieved by members of the appropriate norm group.

26. **c** Although IQ scores may be positively correlated with the factors named in the other alternatives, what IQ scores predict best is achievement in school, or academics.
27. **c** Obviously, we can find psychologists who will argue with this point of view, but I think that the most conservative response here is that psychologists see IQ test scores as just one indicator of the underlying trait that we call intelligence.
28. **d** All we know with any certainty is that Group A, on the average, is more intelligent than Group B, as indicated by IQ scores.
29. **b** Spatial relations tests are about the only ones on which males seem to have a consistent advantage.
30. **c** Once you realize that I am looking for a false statement (which is always a bit backwards and troublesome), it is clear that alternative **c** should be your choice.
31. **c** Down Syndrome (and there are those who refer to this as “Down’s Syndrome”—either way is okay) appears when a zygote manages to pick up an extra chromosome, making 47 instead of the usual 46 in 23 pairs.

True/False

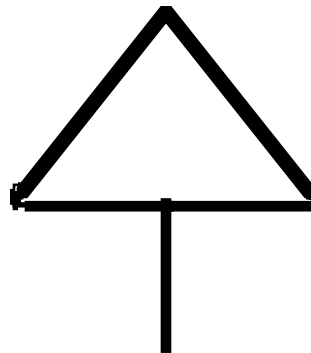
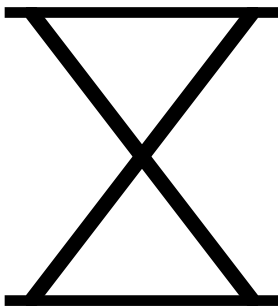
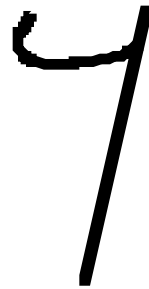
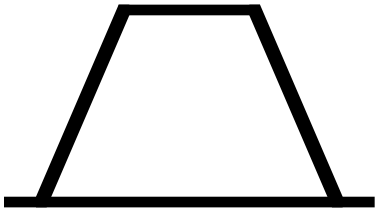
NOTE: THESE FIRST FEW TRUE/FALSE ITEMS ARE NOT IN THE ORDER IN WHICH THEY ARE COVERED IN THE TEXT. This is on purpose. You need to know the material; you seldom need to know it in the order in which it is presented.

1. **F** Quite the contrary, because morphemes include such non-words as prefixes (e.g., un- or dis-), suffixes (e.g., -ment or -ing) and plurality (e.g., -s or -es). Languages have many more morphemes than words.
2. **T** No one knows just what a LAD is, or exactly how it works, but it is the “structure” used to describe the biological aspects of language acquisition, so this item is true,
3. **F** I certainly hope that you didn’t fall for this one. Think about it. How can one even understand the nature of a problem without reference to memory? This one is so easy; so obviously false, that some students can’t believe it and make it more difficult than it is.
4. **F** In fact, computers can solve problems with what amounts to a heuristic strategy, but they are best at using algorithmic strategies, checking out all possibilities—quickly.
5. **T** Sure it can. If it is an appropriate mental set or expectation, a mental set can be very useful in a problem-solving situation.
6. **T** Not only is this statement true, it also provides a pretty good definition of both divergent and convergent thinking.
7. **F** Easily confused, this definition is for the other variety of reasoning: inductive.
8. **T** This is a good, straightforward statement of Thurstone’s position on intelligence.
9. **F** No, what makes this revision different from previous ones (among other things, of course) is that it can provide a number of more specific scores than just one general, overall score.
10. **T** Seems deceptively simple, doesn’t it? And it’s true.
11. **F** Just because we cannot specify an environmental determinant does not mean or imply that one must go all the way in the other direction and assume that there must be a genetic determinant.
12. **T** We do.

EXPERIENCING PSYCHOLOGY

By Their Label Shall Ye Know Them

Here are four simple drawings:



As best you can, reproduce each of them, using four 3x5-inch index cards. The task here is to ask several people to try to remember them and reproduce them from memory on blank 3x5 cards. For half of the people in your experiment, hand them a card and, in order, name the objects as:

- A bee hive
- The number seven
- An hourglass
- A pine tree.

For the other half of your participants, do exactly the same thing, except identify the objects as:

- A hat
- The number four
- A picnic table
- A trowel.

Once you have presented all the cards, wait about two minutes, then provide your participants with four blank cards and ask them to reproduce the four drawings as best they can. To what extent did your verbal label of the image influence the drawings that were reproduced from memory?

Using the Internet to Expand Your Appreciation of Psychology

1. SOME THOUGHTS ON THINKING (pp. 232-233)

There is something sensible about looking on the Internet for information about higher cognitive processes. The very creation of the Internet reflects some serious cognitive processing. Indeed, for each of the Topics in this chapter there are thousands and thousands of websites that one could visit. Many are, understandably, quite technical or specific. As always, I have tried to pull together here a few sites that have general interest and appear to have staying power.

<http://www.criticalthinking.org>

(Critical thinking has its own website. There are some free goodies under the heading “Research” on the homepage.)

<http://www.austhink.org/critical>

(Patience will pay off. If nothing else, take a minute to skim through the “Top Ten” on the homepage.)

<http://www.thinking.net>

(With a URL like this, it has to be a good website—and it is. Most links are free, but there are several attempts to sell you things along the way.)

<http://pegasus.cc.ucf.edu/~janzb/reasoning>

(a mega-site, where there are lists of relevant sites on “Argumentation,” “Critical Thinking,” “Formal Reasoning,” “Logic,” etc., etc.)

2. PROBLEM-SOLVING (pp. 234-239)

As you might imagine—if you thought about it—most of the Internet websites devoted in any way to “problem-solving” deal with trying to provide help for persons with personal adjustment problems. (Google will give you nearly 5.5 million sites on the subject.) Indeed, you can think of psychotherapy as a form of problem solving. In this section, however, let’s try to stay focused on more intellectual or academic sorts of problems.

<http://www.une.edu.au/psychology/staff/malouffproblemsolving.php>

(this site is that it is noncommercial, it presents a wide variety of problem-solving techniques from several different perspectives. It is titled, “Fifty Problem Solving Strategies Explained,” and that is quite a promise.)

<http://mentalhelp.net/psyhelp/chap13/chap13o.html>

(another practical approach to “Decision-Making and Problem-Solving”)

<http://www.mindtools.com>

(a major website on all sorts of issues—here, scroll down and click on problem-solving and decision-making)

3. CREATIVITY (pp. 240-241)

Most people seem to think that creativity and creative problem-solving skills are blessings given to others. It is as if creativity were a gift—either you have it or you don't. There no evidence that such is the case. Approaching life—and problem-solving creatively is something all of us can do, but like so many other things, it will take effort.

<http://members.optusnet.com.au/~charles57/Creative/index2.html>

(an enormous website on creative problem-solving)

<http://www.cpsb.com>

(homepage of the [commercial] “Creative Problem Solving Group”)

<http://www.winwenger.com/mind.htm>

(a whimsical—and creative—site of links on creative problem-solving techniques)

<http://www.quantumbooks.com/Creativity.html#15>

(a somewhat strange and charming site on creative problem-solving)

4. LANGUAGE (pp. 241-245)

Of all our cognitive skills, our ability to communicate with language may be the most impressive. Most psychologists argue that language-use is what makes us human and unique in the animal world. The psychological study of language is a relatively new field in psychology, having begun as did cognitive psychology in the mid-1960s.

<http://nationalzoo.si.edu/Publications/ZooGoer/1995/6/machiavellianmonkeys.cfm>

(a bit dated (1995), but an excellent article on the issue of primate language)

<http://animal-info.net/animalwelfare/primata.html>

(a host site for issues about primates in general, with many links that will get you to the discussion of language in primates)

<http://www.psyc.memphis.edu/POL/POL.htm>

(a page of links on the psychology of language—look around, but I suspect that there is not much here of interest to beginning psychology students!)

<http://www.lsadc.org>

(there are great gems here at the site of the “Linguistic Society of America.”)

<http://digilander.libero.it/linguaggiodelcorpo/nonverb>

(only on the Internet!—a very full website on body language and nonverbal communication)

5. JUST WHAT *IS* INTELLIGENCE? (pp. 246-251)

If by now you need any convincing of the difficulties involved in even defining the concept of intelligence, try entering the term in your favorite web browser. You will be overwhelmed with sites on every kind of intelligence imaginable—and some that are just tough to imagine! Again, I've tried to stick to mainstream issues covered in the Topic. Even scarier is entering "IQ Tests."

<http://www.indiana.edu/~intell>

(the site is called "Human Intelligence"—historical influences, current controversies, teaching resources—most excellent)

<http://www.personalityresearch.org/intelligence.html>

(a great site on theories of intelligence, with a focus on "One versus Many")

<http://eqi.org>

(Everything you might want to know about emotional intelligence—NOT an "academic" site, so go slowly and be careful.)

<http://www.eiconsortium.org>

(a much more academic site on emotional intelligence, and many other links are available here)

<http://www.eq.org>

(a site that bills itself as the Internet's leading directory for Emotional Intelligence, EQ/QI sites, sources, and organizations)

6. PSYCHOLOGICAL TESTS OF INTELLIGENCE (pp. 251-257)

Theoretical definitions notwithstanding, an operational approach to intelligence claims that intelligence is what intelligence tests measure. True, such an approach is a bit tongue-in-cheek, but there is some logic to the notion. For “intelligence” to be a useful, practical concept in any setting, there must be some reliable and valid way to measure it. Measuring intelligence is an effort with a long history in psychology. The following websites will shed some light on the issue, hopefully beyond what is in the text.

<http://psychclassics.yorku.ca/Binet/binet1.htm>

(a great paper by A. Binet—get the word from the pioneer himself)

<http://psychclassics.yorku.ca/Terman/terman1.htm>

(and here’s another—by L. M. Terman, who brought Binet’s test to the U.S.)

<http://www.wilderdom.com/personality/L3-2EssentialsGoodPsychologicalTest.html>

(a very good discussion of the “Essentials of a Good Psychological Test”)

<http://www.riverpub.com/products/sb5/index.html>

(the home page for the Stanford Binet Intelligence Scales, provided by their publisher—check the link to “product details”)

7. GROUP DIFFERENCES IN MEASURED INTELLIGENCE (pp. 257-265)

Once psychologists had tools for measuring general intelligence, they tended to follow the natural inclination to use it. If a trait such as intelligence can be measured, a reasonable course of action would be to look for differences (or similarities) among people on that measured trait. Your text talks first (and importantly) on the interpretation of measured differences between groups of individuals, no matter what the trait being measured. Then we address gender, age, and ethnic/racial differences in measured intelligence. The Internet seems much less interested in age and gender differences, with nearly all of its coverage focusing on racial differences in IQ. Nonetheless, there are a few sites on gender differences worth a look.

<http://sq.4mg.com/male-femaleIQ.htm>

(frankly, a strange site, but it raises good issues on gender differences in IQ—be sure to follow the links)

<http://www.polymath-systems.com/intel/essayrev/sexdiff.html>

(an only-slightly dated summary article on gender and mental abilities)

<http://www.apa.org/monitor/mar98/dial.html>

(the American Psychological Association on race and ethnicity)

http://en.wikipedia.org/wiki/Race_and_intelligence

(an almost surprisingly good summary on race and intelligence)

<http://www.indiana.edu/~intell/bellcurve.shtml>

(the definitive site on *The Bell Curve*, and racial differences in IQ from the “Human Intelligence” website)

8. EXTREMES OF INTELLIGENCE (pp. 265-268)

Most of us, black or white, male or female, young or old, have measured IQ values that tend to huddle around the overall mean (average) of 100. However, there are some individuals—a minority almost by definition—whose IQs fall at the extreme, at the tails of the IQ’s bell curve. Most of what we know about folks with IQs at the extreme, we know about those with low IQs, below 70, often called “mentally retarded.” We know less about people with IQs above 130—the “mentally gifted.”

<http://www.nagc.org>

(the website of the *National Association for Gifted Children*, basically an advocacy group of parents, teachers, and educators)

<http://www.nfgcc.org/index.html>

(site of the *National Foundation for Gifted and Creative Children*—with a ton of excellent links to explore!)

<http://www.aamr.org>

(site of the *American Association on Mental Retardation*—a huge site with many links)

<http://www.thearc.org>

(The ARC—a “grassroots” advocacy organization of 140,000 members in over 1,000 chapters)

<http://www.acf.hhs.gov/programs/pcpid>

(site of *The President’s Committee for People with Intellectual Disabilities*, a part of the Administration for Children and Families of the U.S. Department of Health and Human Services)