

# 10:

# Thinking and Language

## CHAPTER OVERVIEW

Most of Chapter 10 deals with thinking, with emphasis on how people logically—or at times illogically—use tools such as algorithms and heuristics when making decisions and solving problems. Also discussed are several common obstacles to problem solving, including fixations that prevent us from taking a fresh perspective on a problem and our bias to search for information that confirms rather than challenges existing hypotheses. The section concludes with a discussion of the power and perils of intuition.

The rest of the chapter is concerned with language, including its structure, development in children, relationship to thinking, and use by animals. Two theories of language acquisition are evaluated: Skinner's theory that language acquisition is based entirely on learning and Chomsky's theory that humans have a biological predisposition to acquire language.

NOTE: Answer guidelines for all Chapter 10 questions begin on page 274.

## CHAPTER REVIEW

First, skim each section, noting headings and boldface items. After you have read the section, review each objective by answering the fill-in and essay-type questions that follow it. As you proceed, evaluate your performance by consulting the answers beginning on page 274. Do not continue with the next section until you understand each answer. If you need to, review or reread the section in the textbook before continuing.

## Thinking (pp. 395–410)

David Myers at times uses idioms that are unfamiliar to some readers. If you do not know the meaning of any of the following words, phrases, or expressions in the context in which they appear in the text, refer to pages 280–281 for an explanation: *kin to*; *birdier bird*; *stumbling upon one that worked*; *Try your hand . . . brain-teasers*; *shoot the basketball*; *seat-of-the-pants*; *snap judgment*; *"a broken promise"*; *plagues*; *road tested in the Stone Age*; *flip-flop*; *hunches*; *fuels social conflict*; *filled with straw*; *off-screen . . . displayed on-screen*.

### Objective 1: Define *cognition*.

1. Cognition, or \_\_\_\_\_, can be defined as \_\_\_\_\_.
2. Scientists who study these mental activities are called \_\_\_\_\_.

### Objective 2: Describe the roles of categories, hierarchies, definitions, and prototypes in concept formation.

3. People tend to organize specific items into mental groupings called \_\_\_\_\_, and many such groupings often are further organized into \_\_\_\_\_.
4. Concepts are typically formed through the development of a best example, or \_\_\_\_\_, of a category. People more easily detect \_\_\_\_\_ (male/female) prejudice against \_\_\_\_\_ (males/females) than vice versa.

**Objective 3:** Compare algorithms and heuristics as problem-solving strategies, and explain how insight differs from both of them.

5. Humans are especially capable of using their reasoning powers for coping with new situations, and thus for \_\_\_\_\_ .
6. Finding a problem's solution by trying each possibility is called \_\_\_\_\_ .
7. Logical, methodical, step-by-step procedures for solving problems are called \_\_\_\_\_ .
8. Simple thinking strategies that provide us with problem-solving shortcuts are referred to as \_\_\_\_\_ .
9. When you suddenly realize a problem's solution, \_\_\_\_\_ has occurred. Research studies show that at such moments the brain displays a burst of activity in the \_\_\_\_\_ .

**Objective 4:** Contrast confirmation bias and fixation, and explain how they can interfere with effective problem solving.

10. The tendency of people to look for information that verifies their preconceptions is called the \_\_\_\_\_ .
11. It is human nature to seek evidence that \_\_\_\_\_ our ideas more eagerly than to seek evidence that might \_\_\_\_\_ them.
12. Not being able to take a new perspective when attempting to solve a problem is referred to as \_\_\_\_\_. One example of this obstacle to problem solving is the tendency to repeat solutions that have worked previously; this phenomenon is known as the development of a \_\_\_\_\_ .
13. When a person is unable to envision using an object in an atypical way, \_\_\_\_\_ is operating.

**Objective 5:** Contrast the representativeness and availability heuristics, and explain how they can cause us to underestimate or ignore important information.

14. People judge how well something matches a particular prototype; this is the \_\_\_\_\_ .
15. When we judge the likelihood of something occurring in terms of how readily it comes to mind, we are using the \_\_\_\_\_ .

Explain how these two heuristics may lead us to make judgmental errors.

16. (Thinking Critically) Many people fear \_\_\_\_\_ more than \_\_\_\_\_ , and \_\_\_\_\_ more than \_\_\_\_\_ , despite the fact that these fears are not supported by death and injury statistics. This type of faulty thinking occurs because we fear:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. \_\_\_\_\_

**Objective 6:** Describe the drawbacks and advantages of overconfidence in decision making.

17. The tendency of people to overestimate the accuracy of their knowledge results in \_\_\_\_\_ .
18. Overconfidence has \_\_\_\_\_ value because self-confident people tend to live \_\_\_\_\_ (more/less) happily and find it \_\_\_\_\_ (easier/harder) to make tough decisions.

19. When research participants are given feedback on the accuracy of their judgments, such feedback generally \_\_\_\_\_ (does/does not) help them become more realistic about how much they know.

**Objective 7:** Describe how others can use framing to elicit from us the answers they want.

20. The way an issue is posed is called \_\_\_\_\_. This effect influences economic and business decisions, suggesting that our judgments \_\_\_\_\_ (may/may not) always be well reasoned.

**Objective 8:** Explain how our preexisting beliefs can distort our logic.

21. The tendency for our beliefs to distort logical reasoning is called \_\_\_\_\_.
22. This phenomenon makes it \_\_\_\_\_ (easier/more difficult) for us to see the illogic of conclusions that run counter to our beliefs.

**Objective 9:** Describe the remedy for the belief perseverance phenomenon.

23. Research has shown that once we form a belief or a concept, it may take more convincing evidence for us to change the concept than it did to create it; this is because of \_\_\_\_\_.
24. A cure for this is to \_\_\_\_\_.

**Objective 10:** Describe the smart thinker's reaction to using intuition to solve problems.

25. Generally speaking, our cognition is \_\_\_\_\_ and \_\_\_\_\_.
26. Intuitive reactions allow us to react \_\_\_\_\_, and in ways that are usually \_\_\_\_\_.
27. Smart thinkers check their intuitions against available \_\_\_\_\_.

## Language (pp. 410–418)

If you do not know the meaning of any of the following words, phrases, or expressions in the context in which they appear in the text, refer to pages 281–282 for an explanation: *catapulting our species forward*; *They are hunting dogs*; *combine them on the fly*; *read lips*; *a Martian scientist*; *grammar switches are thrown*.

**Objective 11:** Describe the basic structural units of a language.

- The basic sound units of language are its \_\_\_\_\_. English has approximately \_\_\_\_\_ of these units. The basic units of sign language are defined by \_\_\_\_\_ and \_\_\_\_\_.
- Phonemes are grouped into units of meaning called \_\_\_\_\_.
- The system of rules that enables us to use our language to speak to and understand others is called \_\_\_\_\_.
- The system by which meaning is derived from morphemes, words, and sentences is the \_\_\_\_\_ of a language.
- The system of rules we use to combine words into grammatically sensible sentences is called \_\_\_\_\_.

**Objective 12:** Trace the course of language acquisition from the babbling stage through the two-word stage.

- By \_\_\_\_\_ months of age, babies can read lips and discriminate speech sounds. This marks the beginning of their \_\_\_\_\_, their ability to comprehend speech. This ability begins to mature before their \_\_\_\_\_, or ability to produce words.
- The first stage of language development, in which children spontaneously utter different sounds, is the \_\_\_\_\_ stage. This stage typically begins at about \_\_\_\_\_.

months of age. The sounds children make during this stage \_\_\_\_\_ (do/do not) include only the phonemes of the language that they hear.

8. Deaf infants \_\_\_\_\_ (do/do not) babble. Many natural babbling sounds are \_\_\_\_\_ - \_\_\_\_\_ pairs formed by \_\_\_\_\_.
9. By about \_\_\_\_\_ months of age, infant babbling begins to resemble the household language. At about the same time, the ability to perceive phoneme differences is \_\_\_\_\_ (lost/acquired).
10. During the second stage, called the \_\_\_\_\_ - \_\_\_\_\_ stage, children convey complete thoughts using single words. This stage begins at about \_\_\_\_\_ year(s) of age.
11. During the \_\_\_\_\_ - \_\_\_\_\_ stage children speak in sentences containing mostly nouns and verbs. This type of speech is called \_\_\_\_\_ speech.
12. After this stage, children quickly begin to utter longer phrases that \_\_\_\_\_ (do/do not) follow the rules of syntax.

**Objective 13:** Discuss Skinner's and Chomsky's contributions to the nature-nurture debate over how children acquire language, and explain why statistical learning and critical periods are important concepts in children's language learning.

13. Skinner believed that language development follows the general principles of learning, including \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_. When there is minimal reinforcement for speaking, as is the case for hearing children whose parents are \_\_\_\_\_, the learning of spoken language proceeds \_\_\_\_\_ (more slowly/at a normal pace).

14. Other theorists believe that humans are biologically predisposed to learn language. One such theorist is \_\_\_\_\_, who believes that we all are born with a \_\_\_\_\_ in \_\_\_\_\_ which \_\_\_\_\_ switches are thrown as children experience their language. This theorist contends that all human languages have the same grammatical building blocks, which suggests that there is a \_\_\_\_\_.
15. Specific phonemes, morphemes, words, and sentences make up what Chomsky calls the \_\_\_\_\_ of a language. The underlying meaning of these components of a language make up its \_\_\_\_\_. Thus, using multiple levels of understanding language development, \_\_\_\_\_ design the mechanisms and \_\_\_\_\_ modifies the brain.

Give several examples of linguistic behavior in children that support the argument that humans are biologically predisposed to acquire language.

16. Research by Jenny Saffran has demonstrated that even before \_\_\_\_\_ year(s) of age, infants are able to discern \_\_\_\_\_ by analyzing which syllables most often go together.
17. Research studies of infants' knack for soaking up language suggest that babies come with a built-in readiness to learn \_\_\_\_\_.
18. This ability for \_\_\_\_\_ is not lifelong. Childhood seems to represent a \_\_\_\_\_ for mastering certain aspects

of language. Those who learn a second language as adults usually speak it with the \_\_\_\_\_ of their first language.

Moreover, they typically show \_\_\_\_\_ (poorer/better) mastery of the \_\_\_\_\_ of the second language.

19. The window for learning language gradually begins to close after age \_\_\_\_\_ . When a young brain doesn't learn any language, its language-learning capacity \_\_\_\_\_ (never/may still) fully develops.
20. Considering the two theories together, we can say that although we are born with a readiness to learn language, \_\_\_\_\_ is also important, as shown in linguistically stunted children who have been isolated from language during the \_\_\_\_\_ for its acquisition.

**Thinking and Language** (pp. 418–422)

If you do not know the meaning of the following phrase in the context in which it appears in the text, refer to page 282 for an explanation: *chicken-and-egg questions*.

**Objective 14:** Summarize Whorf's linguistic determinism hypothesis, and comment on its standing in contemporary psychology.

1. According to the \_\_\_\_\_ hypothesis, language shapes our thinking. The linguist who proposed this hypothesis is \_\_\_\_\_ .
2. Many people who are bilingual report feeling a different sense of \_\_\_\_\_, depending on which language they are using. There are an estimated \_\_\_\_\_ languages in the world today.
3. In several studies, researchers have found that using the pronoun "he" (instead of "he or she") \_\_\_\_\_ (does/does not) influence people's thoughts concerning gender.
4. Bilingual children, who learn to inhibit one language while using their other language, are better able to inhibit their \_\_\_\_\_ to irrele-

vant information. This has been called the \_\_\_\_\_ .

5. One study of Canadian children found that English-speaking children who were \_\_\_\_\_ in French had higher \_\_\_\_\_ scores and math scores than control children.

**Objective 15:** Discuss the value of thinking in images.

6. It appears that thinking \_\_\_\_\_ (can/cannot) occur without the use of language. Athletes often supplement physical with \_\_\_\_\_ practice.
7. In one study of psychology students preparing for a midterm exam, the greatest benefits were achieved by those who visualized themselves \_\_\_\_\_ (receiving a high grade/studying effectively).

Summarize the probable relationship between thinking and language.

**Animal Thinking and Language** (pp. 423–428)

If you do not know the meaning of the following phrase in the context in which it appears in the text, refer to page 282 for an explanation: *rhapsodized; Spying the short stick; Were the chimps language champs or were the researchers chumps?*

**Objective 16:** List five cognitive skills shared by the great apes and humans.

1. Animals are capable of forming simple \_\_\_\_\_ . Wolfgang Köhler demonstrated that chimpanzees also exhibit the "Aha!" reaction that characterizes reasoning by \_\_\_\_\_ .
2. Forest-dwelling chimpanzees learn to use branches, stones, and other objects as \_\_\_\_\_ . These behaviors, along with behaviors related to

grooming and courtship, \_\_\_\_\_ (vary/ do not vary) from one group to another, suggesting the transmission of \_\_\_\_\_ customs.

3. Deception and mirror usage by chimpanzees and other apes suggests to some researchers that these animals may possess a rudimentary understanding of mental states called a \_\_\_\_\_.

Researchers estimate apes' capacity for reasoning as similar to that of children at age \_\_\_\_\_.

**Objective 17:** Outline the arguments for and against the idea that animals and humans share the capacity for language.

4. Animals definitely \_\_\_\_\_. For example, honeybees do so by means of a \_\_\_\_\_.
5. The Gardners attempted to communicate with the chimpanzee Washoe by teaching her \_\_\_\_\_.
6. Human language may have evolved from \_\_\_\_\_ communications.

Summarize some of the arguments of skeptics of the "talking apes" research and some responses of believers.

## PROGRESS TEST 1

### Multiple-Choice Questions

Circle your answers to the following questions and check them with the answers beginning on page 275. If your answer is incorrect, read the explanation for why it is incorrect and then consult the appropriate pages of the text (in parentheses following the correct answer).

- The text defines cognition as:
  - silent speech.
  - all mental activity.
  - mental activity associated with processing, understanding, remembering, and communicating information.
  - logical reasoning.
- A mental grouping of similar things, events, or people is called a(n):
  - prototype.
  - concept.
  - algorithm.
  - heuristic.
- When forming a concept, people often develop a best example, or \_\_\_\_\_, of a category.
  - denoter
  - heuristic
  - prototype
  - algorithm
- Confirmation bias refers to the tendency to:
  - allow preexisting beliefs to distort logical reasoning.
  - cling to one's initial conceptions after the basis on which they were formed has been discredited.
  - search randomly through alternative solutions when problem solving.
  - look for information that is consistent with one's beliefs.
- The English language has approximately \_\_\_\_\_ phonemes.
  - 25
  - 30
  - 40
  - 45
- Which of the following is *not* true of babbling?
  - It is imitation of adult speech.
  - It is the same in all cultures.
  - It typically occurs from about age 4 months to 1 year.
  - Babbling increasingly comes to resemble a particular language.
- Mental set and functional fixedness are two types of:
  - algorithms.
  - heuristics.
  - fixation.
  - insight.
- Which of the following has been argued by critics of ape language research?
  - Ape language is merely imitation of the trainer's behavior.
  - There is little evidence that apes can equal even a 3-year-old's ability to order words with proper syntax.
  - By seeing what they wish to see, trainers attribute greater linguistic ability to apes than actually exists.
  - All of the above have been argued.

9. Whorf's linguistic determinism hypothesis states that:
- language is primarily a learned ability.
  - language is partially an innate ability.
  - the size of a person's vocabulary reflects his or her intelligence.
  - our language shapes our thinking.
10. Which of the following *best* describes Chomsky's view of language development?
- Language is an entirely learned ability.
  - Language is an innate ability.
  - Humans have a biological predisposition to acquire language.
  - There are no cultural influences on the development of language.
11. Failing to solve a problem that requires using an object in an unusual way illustrates the phenomenon of:
- mental set.
  - functional fixedness.
  - framing.
  - belief perseverance.
12. Which of the following is an example of the use of heuristics?
- trying every possible letter ordering when unscrambling a word
  - considering each possible move when playing chess
  - using the formula "area = length  $\times$  width" to find the area of a rectangle
  - playing chess using a defensive strategy that has often been successful for you
13. The chimpanzee Sultan used a short stick to pull a longer stick that was out of reach into his cage. He then used the longer stick to reach a piece of fruit. Researchers hypothesized that Sultan's discovery of the solution to his problem was the result of:
- trial and error.
  - heuristics.
  - functional fixedness.
  - insight.
14. You hear that one of the Smith children is an outstanding Little League player and immediately conclude it's their one son rather than any of their four daughters. You reached your quite possibly erroneous conclusion as the result of:
- the confirmation bias.
  - the availability heuristic.
  - the representativeness heuristic.
  - belief perseverance.
15. Researchers who are convinced that animals can think point to evidence that:
- monkeys demonstrate the ability to "count" by learning to touch pictures of objects in ascending numerical order.
  - chimpanzees regularly use branches, stones, and other objects as tools in their natural habitats.
  - chimps invent grooming and courtship customs and pass them on to their peers.
  - all of the above occur.
16. Deaf children who are not exposed to sign language until they are teenagers:
- are unable to master the basic words of sign language.
  - learn the basic words but not how to order them.
  - are unable to master either the basic words or syntax of sign language.
  - never become as fluent as those who learned to sign at a younger age.
17. According to the text, language acquisition is best described as:
- the result of conditioning and reinforcement.
  - a biological process of maturation.
  - an interaction between biology and experience.
  - a mystery of which researchers have no real understanding.
18. Infants as young as 6 months old display a remarkable ability to learn statistical aspects of speech. Specifically, research studies have shown that they:
- are quickly able to recognize syllable sequences that appear repeatedly.
  - respond to changes in the pitch of a speaker's voice.
  - pay less attention to a same-gender voice.
  - do all of the above.
19. The linguistic determinism hypothesis is challenged by the finding that:
- chimps can learn to communicate spontaneously by using sign language.
  - people with no word for a certain color can still perceive that color accurately.
  - the Eskimo language contains a number of words for snow, whereas English has only one.
  - infants' babbling contains many phonemes that do not occur in their own language and that they therefore cannot have heard.

20. Several studies have indicated that the generic pronoun "he":
- tends for children and adults alike to trigger images of both males and females.
  - tends for adults to trigger images of both males and females, but for children to trigger images of males.

- tends for both children and adults to trigger images of males but not females.
- for both children and adults triggers images of females about one-fourth of the time it is used.

**Matching Items**

Match each definition or description with the appropriate term.

*Definitions or Descriptions*

- \_\_\_\_\_ 1. the basic units of sound in a language
- \_\_\_\_\_ 2. the way an issue or question is posed
- \_\_\_\_\_ 3. rules for combining words into sentences
- \_\_\_\_\_ 4. the rules by which meaning is derived from sentences
- \_\_\_\_\_ 5. presuming that something is likely if it comes readily to mind
- \_\_\_\_\_ 6. the tendency to overestimate the accuracy of one's judgments
- \_\_\_\_\_ 7. being unable to see a problem from a different angle
- \_\_\_\_\_ 8. haphazard problem solving by trying one solution after another
- \_\_\_\_\_ 9. the sudden realization of the solution to a problem
- \_\_\_\_\_ 10. the tendency to repeat problem-solving techniques that worked in the past even though a fresh approach may be more appropriate.
- \_\_\_\_\_ 11. the basic units of meaning in a language

*Terms*

- syntax
- morphemes
- mental set
- trial and error
- availability heuristic
- phonemes
- semantics
- insight
- framing
- overconfidence
- fixation

**PROGRESS TEST 2**

Progress Test 2 should be completed during a final chapter review. Answer the following questions after you thoroughly understand the correct answers for the section reviews and Progress Test 1.

*Multiple-Choice Questions*

- A common problem in everyday reasoning is our tendency to:
  - accept as logical those conclusions that agree with our own opinions.
  - accept as logical those conclusions that disagree with our own opinions.

- underestimate the accuracy of our knowledge.
  - accept as logical conclusions that involve unfamiliar concepts.
- Phonemes are the basic units of \_\_\_\_\_ in language.
 

a. sound	c. grammar
b. meaning	d. semantics
  - Syntax refers to the:
    - sounds in a word.
    - rules for grouping words into sentences.
    - rules by which meaning is derived from sentences.
    - overall rules of a language.



4. Skinner and other behaviorists have argued that language development is the result of:
- imitation.
  - reinforcement.
  - association.
  - all of the above.
5. Many psychologists are skeptical of claims that chimpanzees can acquire language because the chimps have not shown the ability to:
- use symbols meaningfully.
  - acquire speech.
  - acquire even a limited vocabulary.
  - use syntax in communicating.
6. Representativeness and availability are examples of:
- mental sets.
  - belief bias.
  - algorithms.
  - heuristics.
7. The basic units of cognition are:
- phonemes.
  - concepts.
  - prototypes.
  - morphemes.
8. Researchers who believe that some primates possess a rudimentary theory of mind point to evidence that:
- chimpanzees have been observed using mirrors to inspect themselves.
  - vervet monkeys have different alarm calls for different predators.
  - orangutans in the wild frequently use stones as tools.
  - honeybees communicate the direction and distance of a food source by performing an intricate dance.
9. Assume that Congress is considering revising its approach to welfare and to this end is hearing a range of testimony. A member of Congress who uses the availability heuristic would be most likely to:
- want to experiment with numerous possible approaches to see which of these seems to work best.
  - want to cling to approaches to welfare that seem to have had some success in the past.
  - refuse to be budged from his or her beliefs despite persuasive testimony to the contrary.
  - base his or her ideas on the most vivid, memorable testimony given, even though many of the statistics presented run counter to this testimony.
10. If you want to be absolutely certain that you will find the solution to a problem you know *is* solvable, you should use:
- a heuristic.
  - an algorithm.
  - insight.
  - trial and error.
11. Complete the following: *-ed* is to *sh* as \_\_\_\_\_ is to \_\_\_\_\_.
- phoneme; morpheme
  - morpheme; phoneme
  - grammar; syntax
  - syntax; grammar
12. Which of the following is *not* cited by Chomsky as evidence that language acquisition cannot be explained by learning alone?
- Children master the complicated rules of grammar with ease.
  - Children create sentences they have never heard.
  - Children make the kinds of mistakes that suggest they are attempting to apply rules of grammar.
  - Children raised in isolation from language spontaneously begin speaking words.
13. Telegraphic speech is typical of the \_\_\_\_\_ stage.
- babbling
  - one-word
  - two-word
  - three-word
14. Children first demonstrate a rudimentary understanding of syntax during the \_\_\_\_\_ stage.
- babbling
  - one-word
  - two-word
  - three-word
15. The study in which people who immigrated to the United States at various ages were compared in terms of their ability to understand English grammar found that:
- age of arrival had no effect on mastery of grammar.
  - those who immigrated as children understood grammar as well as native speakers.
  - those who immigrated as adults understood grammar as well as native speakers.
  - whether or not English was spoken in the home was the most important factor in mastering the rules of grammar.
16. Researchers taught the chimpanzee Washoe and the gorilla Koko to communicate by using:
- various sounds.
  - plastic symbols of various shapes and colors.
  - sign language.
  - all of the above.

17. Regarding the relationship between thinking and language, which of the following most accurately reflects the position taken in the text?
- Language determines everything about our thinking.
  - Language determines the way we think.
  - Thinking without language is not possible.
  - Thinking affects our language, which then affects our thought.
18. The rules most directly involved in permitting a person to derive meaning from words and sentences are rules of:
- syntax.
  - grammar.
  - phonemic structure.
  - semantics.
19. Which of the following is true regarding the relationship between thinking and language?
- "Real" thinking requires the use of language.
  - People sometimes think in images rather than in words.
  - A thought that cannot be expressed in a particular language cannot occur to speakers of that language.
  - All of the above are true.
20. One reason an English-speaking adult may have difficulty pronouncing Russian words is that:
- the vocal tracts of English- and Russian-speaking people develop differently in response to the demands of the two languages.
  - although English and Russian have very similar morphemes, their phonemic inventories are very different.
  - although English and Russian have very similar phonemes, their morphemic inventories are very different.
  - after the babbling stage, a child who hears only English stops uttering other phonemes.

### True-False Items

Indicate whether each statement is true or false by placing *T* or *F* in the blank next to the item.

- \_\_\_\_\_ 1. The order in which children acquire an understanding of various morphemes is unpredictable.
- \_\_\_\_\_ 2. According to the confirmation bias, people often interpret ambiguous evidence as support for their beliefs.
- \_\_\_\_\_ 3. Most human problem solving involves the use of heuristics rather than reasoning that systematically considers every possible solution.

- \_\_\_\_\_ 4. When asked, most people underestimate the accuracy of their judgments.
- \_\_\_\_\_ 5. Studies have shown that even animals may sometimes have insight reactions.
- \_\_\_\_\_ 6. Mental set is the tendency to repeat problem-solving solutions that have worked in the past.
- \_\_\_\_\_ 7. Although the morphemes differ from language to language, the phonemes for all languages are the same.
- \_\_\_\_\_ 8. Children of all cultures babble using the same phonemes.
- \_\_\_\_\_ 9. Thinking without using language is not possible.
- \_\_\_\_\_ 10. Most researchers believe that we can perform statistical analyses of language throughout our lives.

### PSYCHOLOGY APPLIED

Answer these questions the day before an exam as a final check on your understanding of the chapter's terms and concepts.

#### Multiple-Choice Questions

- The word "predates" contains \_\_\_\_\_ phonemes and \_\_\_\_\_ morphemes.
  - 7; 3
  - 3; 7
  - 7; 2
  - 3; 2
- Which of the following utterances is an example of overgeneralization of a grammatical rule?
  - "We goed to the store."
  - "Ball pretty."
  - "The sky is crying."
  - "We eat 'paghetti."
- A listener hearing a recording of Japanese, Spanish, and North American children babbling would:
  - not be able to tell them apart.
  - be able to tell them apart if they were older than 6 months.
  - be able to tell them apart if they were older than 8 to 10 months.
  - be able to tell them apart at any age.
- Which of the following illustrates belief perseverance?
  - Your belief remains intact even in the face of evidence to the contrary.
  - You refuse to listen to arguments counter to your beliefs.

- c. You tend to become flustered and angered when your beliefs are refuted.  
 d. You tend to search for information that supports your beliefs.
5. Complete the following analogy: Rose is to flower as:  
 a. concept is to prototype.  
 b. prototype is to concept.  
 c. concept is to hierarchy.  
 d. hierarchy is to concept.
6. Your stand on an issue such as the use of nuclear power for electricity involves personal judgment. In such a case, one memorable occurrence can weigh more heavily than a bookful of data, thus illustrating:  
 a. belief perseverance.  
 b. confirmation bias.  
 c. the representativeness heuristic.  
 d. the availability heuristic.
7. A dessert recipe that gives you the ingredients, their amounts, and the steps to follow is an example of a(n):  
 a. prototype.                      c. heuristic.  
 b. algorithm.                      d. mental set.
8. Marilyn was asked to solve a series of five math problems. The first four problems could only be solved by a particular sequence of operations. The fifth problem could also be solved following this sequence; however, a much simpler solution was possible. Marilyn did not realize this simpler solution and solved the problem in the way she had solved the first four. Her problem-solving strategy was hampered by:  
 a. functional fixedness.  
 b. the overconfidence phenomenon.  
 c. mental set.  
 d. her lack of a prototype for the solution.
9. Dr. Mendoza is studying the mental strategies people use when solving problems. Dr. Mendoza is clearly a(n):  
 a. cognitive psychologist.  
 b. experimental psychologist.  
 c. organizational psychologist.  
 d. developmental psychologist.
10. Boris the chess master selects his next move by considering moves that would threaten his opponent's queen. His opponent, a chess-playing computer, selects its next move by considering *all* possible moves. Boris is using a(n) \_\_\_\_\_ and the computer is using a(n) \_\_\_\_\_.  
 a. algorithm; heuristic  
 b. prototype; mental set  
 c. mental set; prototype  
 d. heuristic; algorithm
11. During a televised political debate, the Republican and Democratic candidates each argued that the results of a recent public opinion poll supported their party's platform regarding sexual harassment. Because both candidates saw the information as supporting their belief, it is clear that both were victims of:  
 a. functional fixedness.      c. belief bias.  
 b. mental set.                      d. confirmation bias.
12. The child who says "Milk gone" is engaging in \_\_\_\_\_. This type of utterance demonstrates that children are actively experimenting with the rules of \_\_\_\_\_.  
 a. babbling; syntax  
 b. telegraphic speech; syntax  
 c. babbling; semantics  
 d. telegraphic speech; semantics
13. Experts in a field prefer heuristics to algorithms because heuristics:  
 a. guarantee solutions to problems.  
 b. prevent mental sets.  
 c. often save time.  
 d. prevent fixation.
14. Rudy is 6 feet 6 inches tall, weighs 210 pounds, and is very muscular. If you think that Rudy is more likely to be a basketball player than a computer programmer, you are a victim of:  
 a. belief bias.  
 b. mental set.  
 c. functional fixedness.  
 d. the representativeness heuristic.
15. Failing to see that an article of clothing can be inflated as a life preserver is an example of:  
 a. belief bias.  
 b. the availability heuristic.  
 c. the representativeness heuristic.  
 d. functional fixedness.

16. Airline reservations typically decline after a highly publicized airplane crash because people overestimate the incidence of such disasters. In such instances, their decisions are being influenced by:
- belief bias.
  - the availability heuristic.
  - the representativeness heuristic.
  - functional fixedness.
17. Most people tend to:
- accurately estimate the accuracy of their knowledge and judgments.
  - underestimate the accuracy of their knowledge and judgments.
  - overestimate the accuracy of their knowledge and judgments.
  - lack confidence in their decision-making strategies.
18. In relation to ground beef, consumers respond more positively to an ad describing it as "75 percent lean" than to one referring to its "25 percent fat" content. This is an example of:
- the framing effect.
  - confirmation bias.
  - mental set.
  - overconfidence.
19. The sentence "Blue jeans wear false smiles" has correct \_\_\_\_\_ but incorrect \_\_\_\_\_.
- morphemes; phonemes
  - phonemes; morphemes
  - semantics; syntax
  - syntax; semantics
20. In preparing her class presentation, "Updating Chomsky's Understanding of Language Development," Britney's outline includes all of the following evidence *except* that:
- computers programmed to learn to form the past tense of irregular verbs can learn to do so, even without "inborn" linguistic rules.
  - infants rapidly learn to detect subtle differences between simple sequences of syllables.
  - infants can recognize color differences even before they can name different colors.
  - children isolated from language during the first seven years of life never fully develop language.

### Essay Question

The lectures of your linguistics professor, who happens to be a staunch behaviorist, clearly imply that she believes language development can be explained according to principles of conditioning. What evidence should you present to convince her that she is

wrong? (Use the space below to list the points you want to make, and organize them. Then write the essay on a separate piece of paper.)

### KEY TERMS

#### Writing Definitions

Using your own words, on a piece of paper write a brief definition or explanation of each of the following terms.

- cognition
- concept
- prototype
- algorithm
- heuristic
- insight
- confirmation bias
- fixation
- mental set
- functional fixedness
- representativeness heuristic
- availability heuristic
- overconfidence
- framing
- belief bias
- belief perseverance
- language
- phonemes
- morphemes
- grammar

- 21. semantics
- 22. syntax
- 23. babbling stage
- 24. one-word stage
- 25. two-word stage
- 26. telegraphic speech
- 27. linguistic determinism

**Cross-Check**

As you learned in the Prologue, reviewing and overlearning of material are important to the learning process. After you have written the definitions of the key terms in this chapter, you should complete the crossword puzzle to ensure that you can reverse the process—recognize the term, given the definition.

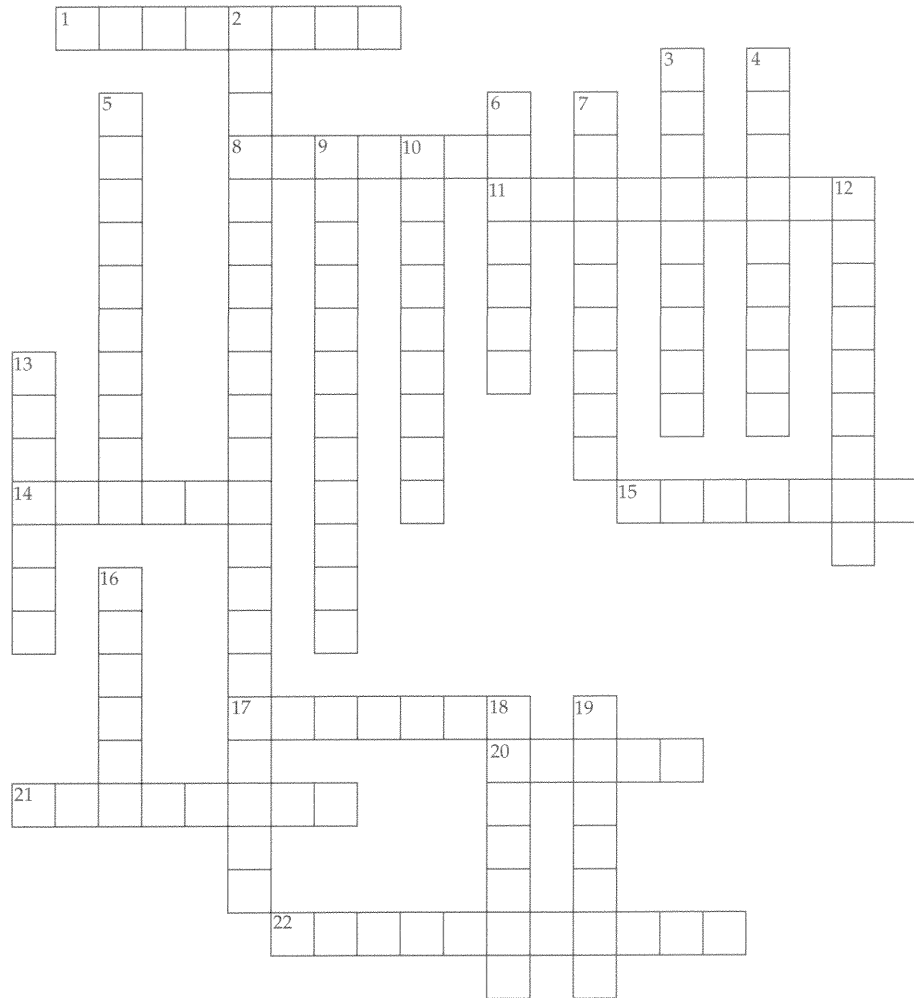
**ACROSS**

- 1. Stage of speech development characterized by the spontaneous utterance of speech sounds.
- 8. System of rules that enables us to communicate with and understand others.
- 11. Methodical problem-solving strategy that guarantees success.
- 14. Chimpanzee that was taught sign language by the Gardners.
- 15. Theorist who believed that language development could be explained by principles of learning.
- 17. Sudden and often creative solution to a problem.
- 20. Theorist who formulated the linguistic determinism hypothesis.
- 21. Inability to approach a problem in a new way.
- 22. The economical speech of children in the two-word stage.

**DOWN**

- 2. The idea that language determines the way we think.
- 3. Simple thinking strategy for solving problems.
- 4. The best example of a particular category.
- 5. Tendency for preexisting beliefs to distort reasoning.
- 6. How an issue or question is posed.

- 7. Mental activity associated with processing, understanding, and communicating information.
- 9. Heuristic based on estimating the probability of events in terms of how readily they come to mind.
- 10. Tendency to continue applying a particular problem-solving strategy even when it is no longer helpful.
- 12. Smallest units of language that convey meaning.
- 13. Stage of language development that occurs between 1 and 2 years of age.



16. Aspect of grammar specifying the rules for combining words into grammatical sentences.
18. Stage of language development that begins about age 2.
19. Mental grouping of similar objects, events, or people.

## ANSWERS

### Thinking

1. thinking; the mental activity associated with processing, knowing, remembering, and communicating
2. cognitive psychologists
3. concepts; hierarchies
4. prototype; male; females
5. problem solving
6. trial and error
7. algorithms
8. heuristics
9. insight; right temporal lobe
10. confirmation bias
11. verifies; refute
12. fixation; mental set
13. functional fixedness
14. representativeness heuristic
15. availability heuristic

Using these heuristics often prevents us from processing other relevant information; because we overlook this information, we make judgmental errors. Thus, in the text example, the representativeness heuristic leads people to overlook the fact that there are many more truck drivers than Ivy League classics professors and, as a result, to wrongly conclude that the poetry reader is more likely to be an Ivy League classics professor. Also as noted in the text, the availability heuristic leads us to incorrectly think that words beginning with *k* are more common than words having *k* as their third letter.

16. flying; driving; terrorism; accidents
  - a. what our ancestral history has prepared us to fear.
  - b. what we cannot control.
  - c. what is immediate.
  - b. what is most readily available in memory.
17. overconfidence
18. adaptive; more; easier

19. does
20. framing; may not
21. belief bias
22. easier
23. belief perseverance
24. consider the opposite
25. effective; efficient
26. quickly; adaptive
27. evidence

### Language

1. phonemes; 40; hand shapes; movements
  2. morphemes
  3. grammar
  4. semantics
  5. syntax
  6. 4; receptive language; productive language
  7. babbling; 4; do not
  8. do; consonant-vowel; bunching the tongue in front of the mouth
  9. 10; lost
  10. one-word; 1
  11. two-word; telegraphic
  12. do
  13. association; imitation; reinforcement; deaf; more slowly
  14. Chomsky; language acquisition device; grammar; universal grammar
  15. surface structure; deep structure; genes; experience
- The rate at which children acquire vocabulary and grammar is too rapid to be explained solely by learning. Children create sentences that they have never heard and, therefore, could not be imitating. Children learn grammatical rules in a predictable order. Children's linguistic errors are often logical overextensions of grammatical rules.
16. 1; word breaks
  17. grammatical rules
  18. statistical analysis; critical period; accent; poorer; grammar
  19. 7; never
  20. experience; critical period

### Thinking and Language

1. linguistic determinism; Whorf
2. self; 6000
3. does
4. attention; bilingual advantage
5. immersed; aptitude
6. can; mental
7. studying effectively

The relationship is probably a two-way one: the linguistic determinism hypothesis suggests that language helps shape thought; that words come into the language to express new ideas indicates that thought also shapes language.

### Animal Thinking and Language

1. concepts; insight
2. tools; vary; cultural
3. theory of mind; 2
4. communicate; dance
5. sign language
6. gestural

Chimps have acquired only limited vocabularies and—in contrast to children—have acquired these vocabularies only with great difficulty. Also in contrast to children, it's unclear that chimps can use syntax to express meaning. Even simpler animals, such as birds, are capable of learning behavioral sequences that some chimp researchers consider language. The signing of chimps is often nothing more than imitation of the trainer's actions. People tend to interpret such ambiguous behavior in terms of what they want to see. Believers contend that although animals do not have our facility for language, they have the abilities to communicate. For example, Washoe and Loulis sign spontaneously. Also, pygmy chimps can learn to comprehend the spoken nuances of spoken English.

### Progress Test 1

#### Multiple-Choice Questions

1. c. is the answer. (p. 395)
2. b. is the answer. (p. 396)
  - a. A prototype is the best example of a particular category, or concept.
  - c. & d. Algorithms and heuristics are problem-solving strategies.
3. c. is the answer. (p. 396)
  - a. There is no such thing as a "denoter."
  - b. & d. Heuristics and algorithms are problem-solving strategies.
4. d. is the answer. It is a major obstacle to problem solving. (p. 399)
  - a. & b. These refer to belief bias and belief perseverance, respectively.
  - c. This is trial-and-error problem solving.
5. c. is the answer. (p. 411)
6. a. is the answer. Babbling is not the imitation of adult speech since babbling infants produce phonemes from languages they have not heard and could not be imitating. (p. 412)
7. c. is the answer. Both involve failing to see a problem from a new perspective. (p. 400)
  - a. & b. Algorithms and heuristics are problem-solving strategies.
  - d. Insight is the sudden realization of a problem's solution.
8. d. is the answer. (pp. 426–427)
9. d. is the answer. (p. 418)
  - a. This is Skinner's position regarding language development.
  - b. This is Chomsky's position regarding language development.
  - c. The linguistic determinism hypothesis is concerned with the content of thought, not intelligence.
10. c. is the answer. (p. 414)
  - a. This is Skinner's position.
  - b. According to Chomsky, although the *ability* to acquire language is innate, the child can only acquire language in association with others.
  - d. Cultural influences are an important example of the influence of learning on language development, an influence Chomsky fully accepts.
11. b. is the answer. Functional fixedness is the tendency to think of things only in terms of their usual functions. (p. 400)
  - a. Mental set is the tendency to approach a problem in a particular way that worked previously.
  - c. Framing refers to the way an issue is posed; this often influences our judgment.
  - d. Belief perseverance is the tendency to cling to one's beliefs even after they have been refuted.
12. d. is the answer. Heuristics are simple thinking strategies—such as playing chess defensively—that are based on past successes in similar situations. (p. 398)
  - a., b., & c. These are all algorithms.
13. d. is the answer. Sultan suddenly arrived at a novel solution to his problem, thus displaying apparent insight. (p. 423)
  - a. Sultan did not randomly try various strategies of reaching the fruit; he demonstrated the "light bulb" reaction that is the hallmark of insight.
  - b. Heuristics are simple thinking strategies.

- c. Functional fixedness is an impediment to problem solving. Sultan obviously solved his problem.
14. c. is the answer. Your conclusion is based on sex stereotypes, that is, athletic ability and participation are for you more *representative* of boys. Your conclusion is by no means necessarily right, however, especially since the Smiths have four daughters and only one son. (p. 401)
- a. The confirmation bias is the tendency to look for information that confirms one's preconceptions.
- b. The availability heuristic involves judging the probability of an event in terms of how readily it comes to mind.
- d. Belief perseverance is the tendency to cling to beliefs, even when the evidence has shown that they are wrong.
15. d. is the answer. (pp. 423–424)
16. d. is the answer. Compared with deaf children exposed to sign language from birth, those who learn to sign as teens have the same grammatical difficulties as do hearing adults trying to learn a second spoken language. (p. 417)
17. c. is the answer. Children are biologically prepared to learn language as they and their caregivers interact. (p. 417)
- a. This is Skinner's position.
- b. No psychologist, including Chomsky, believes that language is entirely a product of biological maturation.
- d. Although language acquisition is not completely understood, research has shed sufficient light on it to render it less than a complete mystery.
18. a. is the answer. (pp. 415–416)
- b. & c. This research is unrelated to infants' ability to detect different pitches of voices or distinguish between male and female voices.
19. b. is the answer. The evidence that absence of a term for a color does not affect ability to perceive the color challenges the idea that language always shapes thought. (p. 419)
- a. & d. These findings are not relevant to the linguistic determinism hypothesis, which addresses the relationship between language and thought.
- c. This finding is in keeping with the linguistic determinism hypothesis.
20. c. is the answer. The generic pronoun *he* evidently tends, for both adults and children, to conjure up images of males. (p. 419)

### Matching Items

- |               |               |                |
|---------------|---------------|----------------|
| 1. f (p. 410) | 5. e (p. 402) | 9. h (p. 398)  |
| 2. i (p. 406) | 6. j (p. 403) | 10. c (p. 400) |
| 3. a (p. 411) | 7. k (p. 400) | 11. b (p. 411) |
| 4. g (p. 411) | 8. d (p. 397) |                |

### Progress Test 2

#### Multiple-Choice Questions

1. a. is the answer. Reasoning in daily life is often distorted by our beliefs, which may lead us, for example, to accept conclusions that haven't been arrived at logically. (p. 407)
- b., c., & d. These are just the opposite of what we tend to do.
2. a. is the answer. (p. 410)
- b. Morphemes are the basic units of meaning.
- c. & d. The text does not refer to basic units of grammar or semantics.
3. b. is the answer. (p. 411)
- a. Phonemes are the sounds in a word.
- c. Such rules are known as semantics.
- d. Such rules are the language's grammar, which would include its syntax as well as its semantics.
4. d. is the answer. These are all basic principles of learning and, according to Skinner, explain language development. (p. 413)
5. d. is the answer. Syntax is one of the fundamental aspects of language, and chimps seem unable, for example, to use word order to convey differences in meaning. (p. 426)
- a. & c. Chimps' use of sign language demonstrates both the use of symbols and the acquisition of fairly sizable vocabularies.
- b. No psychologist would require the use of speech as evidence of language; significantly, all the research and arguments focus on what chimps are and are not able to do in acquiring other facets of language.
6. d. is the answer. Both are simple thinking strategies that allow us to make quick judgments. (pp. 401–402)
- a. Mental sets are obstacles to problem solving, in which the person tends to repeat solutions that have worked in the past and is unable to conceive of other possible solutions.
- b. Belief bias is the tendency for preexisting beliefs to distort logical reasoning.
- c. Algorithms are methodical strategies that guarantee a solution to a particular problem.



7. **b.** is the answer. (p. 396)  
**a. & d.** Phonemes and morphemes are units of sound and meaning in language, respectively.  
**c.** Prototypes are the best examples of specific categories.
8. **a.** is the answer. (p. 424)  
**b. & c.** Alarm-calling and tool use are clear indicators of animal communication and thinking, respectively. However, they reveal nothing about the ability to infer mental states in oneself or another.  
**d.** Honeybees are insects, not primates!
9. **d.** is the answer. If we use the availability heuristic, we base judgments on the availability of information in our memories, and more vivid information is often the most readily available. (p. 402)  
**a.** This would exemplify use of the trial-and-error approach to problem solving.  
**b.** This would exemplify a mental set.  
**c.** This would exemplify belief perseverance.
10. **b.** is the answer. Because they involve the systematic examination of all possible solutions to a problem, algorithms guarantee that a solution will be found. (p. 397)  
**a., c., & d.** None of these methods guarantees that a problem's solution will be found.
11. **b.** is the answer. The morpheme *-ed* changes the *meaning* of a regular verb to form its past tense; the phoneme *sh* is a unique *sound* in the English language. (pp. 410, 411)  
**c. & d.** Syntax, which specifies rules for combining words into grammatical sentences, is one aspect of the grammar of a language.
12. **d.** is the answer. Chomsky believes that the inborn capacity for language acquisition must be activated by exposure to language. And, in fact, children raised in isolation will *not* begin to speak spontaneously. (p. 414)
13. **c.** is the answer. (p. 413)
14. **c.** is the answer. Although the child's utterances are only two words long, the words are placed in a sensible order. In English, for example, adjectives are placed before nouns. (p. 413)  
**a. & b.** Syntax specifies rules for *combining* two or more units in speech.  
**d.** There is no three-word stage.
15. **b.** is the answer. (p. 416)
16. **c.** is the answer. (pp. 425, 426)
17. **d.** is the answer. (p. 422)
18. **d.** is the answer. Semantic rules are directly concerned with the derivation of meaning from morphemes, words, and sentences. (p. 411)  
**a.** Syntax is the set of rules for a language that permits the combination of words into sentences.  
**b.** Grammar is the overall system of rules for using a language and, as such, includes syntax as well as semantics.  
**c.** Phonemic structure concerns the basic sounds, or phonemes, of a language.
19. **b.** is the answer. (pp. 420–421)  
**a.** Researchers do not make a distinction between “real” and other thinking, nor do they consider nonlinguistic thinking less valid than linguistic thinking.  
**c.** As indicated by several studies cited in the text, this is not true.
20. **d.** is the answer. Following the babbling stage, the child's ability to produce all phonemes becomes in a sense shaped and limited to the ability to produce those phonemes he or she hears. (p. 412)  
**a.** The vocal tract of *Homo sapiens* does not develop in specialized ways for different languages.  
**b. & c.** English and Russian differ significantly in both their phonemes and their morphemes. Nor is there any reason why differences in morphemes would in and of themselves cause pronunciation difficulties.

#### True-False Items

- |               |                    |
|---------------|--------------------|
| 1. F (p. 412) | 6. T (p. 400)      |
| 2. T (p. 399) | 7. F (pp. 410–411) |
| 3. T (p. 398) | 8. T (p. 412)      |
| 4. F (p. 403) | 9. F (pp. 420–421) |
| 5. T (p. 423) | 10. F (p. 416)     |

#### Psychology Applied

##### Multiple-Choice Questions

1. **a.** is the answer. Each sound of the word is a phoneme (note that the second letter “e” does not itself represent a sound); the morphemes are “pre,” which means before; “date”; and “s,” which indicates the plural. (p. 411)
2. **a.** is the answer. Adding *-ed* to the irregular verb *go* results in the ungrammatical *goed*—an overgeneralization of the rule by which the past tense of regular verbs is formed. (p. 414)  
**b.** This is an example of telegraphic speech.

- c. This is a grammatical statement.  
 d. "paghetti" is simply an immature pronunciation of "spaghetti"; young children often have difficulty with consonant clusters like "sp."
3. a. is the answer. (p. 412)
4. a. is the answer. (p. 407)  
 b. & c. These may very well occur, but they do not define belief perseverance.  
 d. This is the confirmation bias.
5. b. is the answer. A rose is a prototypical example of the concept *flower*. (p. 396)  
 c. & d. Hierarchies are organized clusters of concepts. In this example, there is only the single concept *flower*.
6. d. is the answer. The availability heuristic is the judgmental strategy that estimates the likelihood of events in terms of how readily they come to mind, and the most vivid information is often the most readily available. (p. 402)
7. b. is the answer. Follow the directions precisely and you can't miss! (p. 397)  
 a. A prototype is the best example of a concept.  
 c. Heuristics are simple thinking strategies that help solve problems but, in contrast to a recipe that is followed precisely, do not guarantee success.  
 d. A mental set is a tendency to approach a problem in a way that has been successful in the past.
8. c. is the answer. By simply following a strategy that has worked well in the past, Marilyn is hampered by the type of fixation called mental set. (p. 400)  
 a. Functional fixedness is being unable to conceive of an unusual function for an object.  
 b. Overconfidence is exhibited by the person who overestimates the accuracy of his or her judgments.  
 d. Prototypes are best examples of categories, not strategies for solving problems.
9. a. is the answer. Cognitive psychologists study how we process, understand, and communicate knowledge. Problem solving involves processing information and is therefore a topic explored by cognitive psychologists. (p. 395)  
 b. Cognitive psychologists often use experimentation to study phenomena but, because not all experimental psychologists study cognition, a. is the best answer.  
 c. Organizational psychologists study behavior in the workplace.  
 d. Developmental psychologists study the ways in which behavior changes over the life span.
10. d. is the answer. (pp. 397, 398)
- b. & c. If Boris always attacks his opponent's queen when playing chess, he is a victim of mental set; prototypes, however, have nothing to do with chess playing.
11. d. is the answer. The confirmation bias is the tendency to search for information that confirms one's preconceptions. In this example, the politicians' preconceptions are biasing their interpretation of the survey results. (p. 399)  
 a. Functional fixedness is the inability to perceive an unusual use for a familiar object.  
 b. Mental set is the tendency to approach a problem in a particular way. There is no problem per se in this example.  
 c. Belief bias is the tendency for one's preexisting beliefs to distort logical reasoning. This answer is incorrect because it is not clear, in this example, whether either politician is reasoning illogically.
12. b. is the answer. Such utterances, characteristic of a child of about 2 years, are like telegrams, in that they consist mainly of nouns and verbs and show use of syntax. (p. 413)  
 a. & c. Babbling consists of phonemes, not words.  
 d. Semantics refers to the rules by which meaning is derived from sentences; this speech example indicates nothing in particular about the child's understanding of semantics.
13. c. is the answer. (p. 398)  
 a., b., & d. Heuristics do not guarantee solutions or prevent mental sets.
14. d. is the answer. Your conclusion is based on the stereotype that muscular build is more *representative* of athletes than computer programmers. (p. 401)  
 a. Belief bias is the tendency for one's preexisting beliefs to distort logical reasoning.  
 b. Mental set is the tendency to repeat solutions that have worked in the past.  
 c. Functional fixedness is the tendency to think of things only in terms of their usual functions.
15. d. is the answer. (p. 400)
16. b. is the answer. The publicity surrounding disasters makes such events vivid and seemingly more probable than they actually are. (p. 402)  
 a. The belief bias is the tendency for preexisting beliefs to distort logical thinking.  
 c. The representativeness heuristic operates when we judge the likelihood of things in terms of how well they represent particular prototypes. This example does not involve such a situation.  
 d. Functional fixedness operates in situations in which effective problem solving requires using an object in an unfamiliar manner.

17. **c.** is the answer. This is referred to as overconfidence. (p. 403)
18. **a.** is the answer. In this example, the way the issue is posed, or framed, has evidently influenced consumers' judgments. (p. 406)  
**b.** Confirmation bias is the tendency to search for information that confirms one's preconceptions.  
**c.** Mental set is the tendency to approach a problem in a particular way.  
**d.** Overconfidence is the tendency to be more confident than correct.
19. **d.** is the answer. This sentence, although semantically meaningless, nevertheless follows the grammatical rules of English syntax for combining words into sentences. (p. 411)  
**a. & b.** The phonemes (smallest units of sound) and morphemes (smallest units of meaning) of this sentence are equally correct.
20. **c.** is the answer. This fact challenges the linguistic determinism hypothesis; it neither supports nor refutes Chomsky's concept of an inborn universal grammar. (p. 418)

### Essay Question

You should point out that the rate at which children acquire words and grammar is too extraordinary to be explained solely according to principles of learning. Children also utter all sorts of word forms they have never heard and could not, therefore, be imitating. Furthermore, children begin using morphemes in a predictable order, which learning theorists would not expect since each child experiences a unique linguistic environment. Children also make predictable errors that result from overuse of grammatical rules, rather than from imitation. It therefore seems clear that children are biologically prepared to acquire language and that the behaviorist position is incorrect.

### Key Terms

- Cognition** refers to the mental activity associated with thinking, knowing, remembering, and communicating information. (p. 395)
- A **concept** is a mental grouping of similar objects, events, and people. (p. 396)
- A **prototype** is the best example of a particular category. (p. 396)
- An **algorithm** is a methodical, logical procedure that, while sometimes slow, guarantees success. (p. 397)
- A **heuristic** is a simple thinking strategy that often allows us to make judgments and solve problems efficiently. Although heuristics are more efficient than algorithms, they do not guarantee success and sometimes even impede problem solving. (p. 398)
- Insight** is a sudden and often novel realization of the solution to a problem. Insight contrasts with trial and error and, indeed, may often follow an unsuccessful episode of trial and error. (p. 398)
- The **confirmation bias** is an obstacle to problem solving in which people tend to search for information that validates their preconceptions. (p. 399)
- Fixation** is an inability to approach a problem in a new way. (p. 400)
- Mental set** refers to the tendency to continue applying a particular problem-solving strategy even when it is no longer helpful. (p. 400)
- Functional fixedness** is a type of fixation in which a person can think of things only in terms of their usual functions. (p. 400)
- The **representativeness heuristic** is the tendency to judge the likelihood of things in terms of how well they conform to one's prototypes. (p. 401)
- The **availability heuristic** is based on estimating the probability of certain events in terms of how readily they come to mind. (p. 402)
- Another obstacle to problem solving, **overconfidence** refers to the tendency to overestimate the accuracy of one's beliefs and judgments. (p. 403)
- Framing** refers to the way an issue or question is posed. It can affect people's perception of the issue or answer to the question. (p. 406)
- Belief bias** is the tendency for a person's preexisting beliefs to distort his or her logical reasoning. (p. 407)
- Belief perseverance** is the tendency for people to cling to a particular belief even after the information that led to the formation of the belief is discredited. (p. 407)
- Language** refers to spoken, written, or gestured words and how we combine them to communicate meaning. (p. 410)
- Phonemes** are the smallest units of sound in a language that are distinctive for speakers of the language. (p. 410)
- Morphemes** are the smallest units of language that convey meaning. (p. 411)  
*Example:* The word "dogs," which contains four phonemes, contains only two **morphemes**—"dog" and "-s." Although most morphemes are combinations of two or more phonemes, the plural "-s" conveys a distinctive meaning of "more than one."

20. **Grammar** is a system of rules that enables us to communicate with and understand others. (p. 411)
21. **Semantics** is the aspect of grammar that specifies the rules used to derive meaning from morphemes, words, and sentences in a given language. (p. 411)  
*Example:* One **semantic** rule of English is that adding *-ed* to a verb gives the verb a past-tense meaning.
22. **Syntax** is the aspect of grammar specifying the rules for combining words into grammatically sensible sentences in a given language. (p. 411)  
*Example:* One **syntactic** rule of English is that adjectives are positioned before nouns.
23. The **babbling stage** of speech development, which begins around 4 months, is characterized by the spontaneous utterance of speech sounds. During the babbling stage, children the world over sound alike. (p. 412)
24. Between 1 and 2 years of age children speak mostly in single words; they are therefore in the **one-word stage** of linguistic development. (p. 413)
25. Beginning about age 2, children are in the **two-word stage** and speak mostly in two-word sentences. (p. 413)

26. **Telegraphic speech** is the economical, telegram-like speech of children in the two-word stage. Utterances consist mostly of nouns and verbs; however, words occur in the correct order, showing that the child has learned some of the language's syntactic rules. (p. 413)
27. **Linguistic determinism** is Benjamin Whorf's hypothesis that language determines the way we think. (p. 418)

### Cross-Check

#### ACROSS

1. babbling
8. grammar
11. algorithm
14. Washoe
15. Skinner
17. insight
20. Whorf
21. fixation
22. telegraphic

#### DOWN

2. linguistic determinism
3. heuristic
4. prototype
5. belief bias
6. framing
7. cognition
9. availability
10. mental set
12. morphemes
13. one-word
16. syntax
18. two-word
19. concept

### FOCUS ON VOCABULARY AND LANGUAGE

Page 395: . . . our species is *kin to* . . . Myers notes that we are biological creatures related to (*kin to*) other species of animals. We have exceptional abilities for innovation, learning, memory, and rational thinking; yet, at the same time we are prone to making mistakes and thinking and acting irrationally.

#### Thinking

Page 397: For most of us, the robin with its smaller beak, and overall size, and its easier flight, is the *birdier bird* . . . We develop our ideas of how things go together (*concepts*) from definitions or by using **prototypes**. The best example (*prototype*) of a bird is a robin (*the birdier bird*) rather than a penguin, a kiwi, or an ostrich.

Page 397: Thomas Edison tried thousands of light bulb filaments before *stumbling upon one that worked*. Edison was a famous inventor and he used a trial-and-error method in developing the metal filament that makes the light bulb glow brightly. Using trial and error, he came upon the solution by chance (*stumbled upon one that worked*). Myers contrasts this method with following an **algorithm** (a step-by-step

method that always ends with the answer and is typical of computer programs).

Page 399: *Try your hand* at these two classic *brain-teasers*. Myers offers you a chance to attempt (*try your hand at*) some intriguing mental puzzles (*brain-teasers*) taken from (*drawn from*) well-known experiments. If you encounter problems in solving these puzzles, it may be due to **fixation** (our inability to see things from a new or different perspective), **mental set** (repeating old solutions that worked before), or **functional fixedness** (our tendency to see things as having only one function or use).

Page 401: Should I *shoot* the basketball or pass to the player who's *hot*?—we seldom take the time and effort to reason systematically. (Don't take this sentence literally.) For example, in a game of basketball, the player holding the ball has to decide to throw it through the hoop (*shoot the basketball*) or pass it to a player who has scored frequently (*who's hot*). We usually follow our subjective feelings (*intuitions*) rather than taking the time to use logic and reason.

Page 401: . . . *seat-of-the-pants* decisions. When we make decisions based on subjective or intuitive reasons, rather than using logical, reflective problem-

solving strategies, we are using *seat-of-the-pants* judgments. Thus, when we employ **heuristics** (simple thinking strategies), we may make decisions that are incorrect and not very smart (*dumb decisions*).

Page 401: The **representativeness heuristic** enabled you to make a *snap* judgment. We can make quick (*snap*) judgments using a strategy that allows us to determine the probability of things by how well they appear to be typical of some prototype (*representativeness heuristic*). For example, is person A, who is intelligent, unimaginative, compulsive, and generally lifeless, more likely to (a) play jazz for a hobby or (b) play jazz for a hobby and work as an accountant? The representativeness heuristic leads most people to incorrectly pick (b) as the answer.

Page 402: The faster people can remember an instance of some event ("*a broken promise*"), the more they expect it to recur. We tend to use whatever information is accessible in our memories when making decisions and judgments; similarly, events or mistakes that are easiest to access (i.e., those that most readily come to mind) will most likely be used. This is called the **availability heuristic**. So, if on one occasion, someone did not keep his or her word (*broke a promise*) about doing something, we tend to remember that event and use it in predicting future behavior. Sometimes the availability heuristic can cause errors in judgment.

Page 403: Overconfidence *plagues* decisions outside the laboratory, too. Many factors combine to produce the tendency to overestimate the accuracy of our decisions, judgments, and knowledge (**overconfidence**). In everyday life, as well as in lab experiments, our judgments are greatly afflicted (*plagued*) by overconfidence.

Page 405: Human emotions were *road tested* in the Stone Age. During our evolutionary past, certain traits or characteristics were selected for because they helped our ancestors survive, and those that survived because of these attributes passed them on to their descendants. Fearful reactions to snakes, lizards, spiders, confinement, and heights were selected for (*they were road tested*) during earlier times (*in the Stone Age*) and are part of human nature today.

Page 406: That our judgments *flip-flop* so dramatically is startling. Presenting the same information in two different ways can cause people to react more negatively or positively depending on how the (logically equivalent) information was **framed**. The framing effect can cause alarming and dramatic reversals (*flip-flops*) in people's decisions and judgments. For

example, a very fatty food product made by grinding meat (*ground beef*) will be seen more positively if described as "75% lean" as opposed to "25% fat," despite the fact that exactly the same information is conveyed in each case.

Page 406: . . . *hunches* . . . We have a propensity to make mistakes because we seek information that will confirm our intuitive feelings (*hunches*) about situations, people, or future events. We rely on heuristics, we are overconfident in our estimates, and we are unduly influenced by (*fall prey to*) the effects of framing. Myers notes that it is difficult to escape bias even by use of forceful logic.

Page 407: *Belief perseverance* often *fuels social conflict*. Our irrationality also shows when we persist (*persevere*) in our views despite evidence to the contrary (**belief perseverance**). This can lead to an increase in strong feelings or passions over controversial issues (*fuels social conflict*). Myers suggests one solution for those who wish to restrain (*rein in*) the effect of belief perseverance, and that is to give serious consideration to beliefs *opposite* to your own.

Page 408: From this we might conclude that our heads are indeed *filled with straw*. The discussion about human irrationality might lead to the conclusion that we have ineffective and inefficient cognitions (*heads filled with straw*). Myers, however, is optimistic and suggests that we can learn about our irrational propensities (tendencies) and be alert to the dangers that can result in poor or foolish (*dumb*) decisions.

Page 409: More than we realize, *thinking occurs off-screen*, with the results occasionally *displayed on-screen*. Humans process a great deal of information without any conscious awareness of doing so. This is similar to a computer's hidden processing, which is not displayed on the monitor (*it occurs off-screen*). Once in a while the results of our unconscious processing enter consciousness (the results are occasionally *displayed on-screen*).

### Language

Page 410: When the human vocal tract evolved the ability to utter vowels, *our capacity for language exploded, catapulting our species forward*. When the physiological ability for complex vocalization evolved, the ability to communicate orally expanded exponentially (*exploded*). This new linguistic capacity propelled (*catapulted*) our species to new levels of accomplishments, enabling us to communicate from person to person and to transmit civilization's accumulated knowledge from generation to generation.

Page 411: *They are hunting dogs.* The sentence “*They are hunting dogs*” is syntactically correct, but its meaning (semantics) is derived from the context. In one context it could mean that people (*they*) are out looking (*hunting*) for dogs, and in another it could refer to dogs that are used to track or seek (*hunt*) animals.

Page 412: With remarkably efficiency, you can selectively sample the tens of thousands of words in your memory, effortlessly *combine them on the fly* with near-perfect syntax, and *spew them out three words a second*. Humans have an amazing facility for language. With little or no effort, we can select the appropriate words from the tens of thousands in memory, put them together hurriedly (*combine them on the fly*), and verbally produce them in rapid succession (*spew them out three words a second*).

Page 412: Yet by 4 months of age, babies can *read lips* and *discriminate* speech sounds. When people speak, their lips move in ways that correspond to the sounds they utter. Many deaf people can understand what is being said by watching how the lips move (*lip reading*). Very young children can not only tell the difference (*discriminate*) between sounds, but can also recognize lip movements that correspond with certain sounds (*read lips*).

Page 414: Surely, Chomsky has said, a *Martian scientist* observing children in a single-language community would conclude that language is almost entirely inborn. The famous linguist Chomsky believes that the behaviorist’s views (as exemplified by Skinner) are simplistic (*naive*). He argues that language acquisition could not be simply a function of experience or learning. Instead, he contends that any unbiased observer (e.g., *an imaginary scientist from the planet Mars*) would have to arrive at the inescapable fact that our capacity for language is almost totally biologically inherited (*inborn*). The specific language you speak is a product of your environment, which builds on your innate capacity for language. As Myers puts it, “*we are born with the hardware and an operating system for language, and our linguistic experiences write the software.*”

Page 416: Chomsky would say that once the *grammar switches are thrown* during a child’s developing years, mastering another grammar becomes more difficult. Chomsky likens learning a particular grammar during early childhood to turning on (*throwing*) switches that influence language acquisition. When they have been turned on for one grammar, it becomes much harder to master a second grammar. During the early years of language development, we easily and accurately acquire (*master*) grammar and

accent, but after that critical period the language acquisition system tends to work less hard (*it is inclined to rest on its laurels*), and mastering another grammar becomes more difficult (*the window for learning language gradually closes*).

### Thinking and Language

Page 418: Thinking and language intricately intertwine. Asking which comes first is one of psychology’s *chicken-and-egg* questions. “Which came first: the chicken or the egg?” Clearly, you need an egg to produce a chicken, but you also need a chicken to lay the egg. So, like this age-old conundrum (riddle), psychologists have argued over which comes first, our ideas and thoughts or the words we use to name and verbalize them. Myers concludes that language influences (but does not determine) thought, and our thinking affects our language, which in turn affects thought.

### Animal Thinking and Language

Page 423: If in our use of language we humans are, as the psalmist long ago *rhapsodized*, “little lower than God,” where do other animals fit in the scheme of things? The psalmist (an author of religious or sacred songs) spoke in an extravagantly enthusiastic manner (*rhapsodized*) about human nature, and Myers notes that it is our use of human language that elevates us above nonhumans. Nevertheless, we do share a capacity for language with other animals.

Page 423: *Spying* the short stick, Sultan (the chimp) grabbed it and tried to reach the fruit. Kohler’s experiment with the chimpanzee Sultan showed that our closest relatives are capable of cognition. When the fruit was out of reach, Sultan noticed (*spied*) the short stick and used it to pull a longer stick into the cage, which he then used to get the fruit.

Page 426: Were the chimps *language champs* or were the researchers *chumps*? Critics of “ape language” argue that for animals, language acquisition is painfully slow, resembles conditioned responses, does not follow syntax, and is little more than imitation. In addition, demonstrations of animal language are always subjectively interpreted by their trainers. Myers asks: Were the chimps exceptionally talented (*language champs*) or were the researchers just easily fooled or duped (*were they chumps*) and were they acting foolishly (*making monkeys out of themselves*)? The answer is that the controversy has led to further research and progress, and a renewed appreciation of our own, as well as our closest relatives’, capacity for communication and language.