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.
14. Chimp 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.
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 activities associated with thinking, knowing, remembering, 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

Chapter Review

Thinking

1. thinking; the mental activities associated with thinking, 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; frontal lobe; 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.

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; more
19. does
20. belief perseverance
21. consider the opposite
22. quickly; adaptive
23. framing; may not

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 the front of the mouth
9. 10; lost
10. one-word; 1
11. two-word; telegraphic; does
12. association; imitation; reinforcement
13. Noam Chomsky; language acquisition device; grammar; universal grammar
14. 1; word breaks; statistically
15. grammatical rules
16. critical period; accent; poorer; grammar
17. 7; never
18. experience; critical period
19. aphasia; Broca’s area; Wernicke’s area; angular gyrus
20. visual area; angular gyrus; Wernicke’s area; Broca’s area; motor cortex
21. unified whole

Thinking and Language
1. linguistic determinism; Benjamin Whorf
2. self
3. does
4. attention; bilingual advantage
5. immersed; aptitude
6. can; nondeclarative (procedural) memory; 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. numerical
4. do; dance
5. sign language
6. perceptual set
7. alone
8. Descartes

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. 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 sponta-
neously. Also, pygmy chimpanzees can learn to comprehend the spoken nuances of spoken English.

**Progress Test 1**

**Multiple-Choice Questions**

1. c. is the answer. (p. 369)
2. b. is the answer. (p. 369)
   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. 370)
   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. 372)
   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. 383)
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. 385)
7. c. is the answer. Both involve failing to see a problem from a new perspective. (p. 373)
   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. 398–400)
9. d. is the answer. (p. 391)
   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. 386)
    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. 373)
    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. 371)
   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. 396)
   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 because the Smiths have four daughters and only one son! (p. 374)
   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. 396–397)
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. 388)
17. c. is the answer. Children are biologically prepared to learn language as they and their caregivers interact. (p. 388)
   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. (p. 387)
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. 392)
   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. (pp. 392–393)

21. c. is the answer. (p. 389)
   a. The angular gyrus translates the signals into the auditory code.
   b. Broca’s area is involved in speech production.
   d. The association areas are involved in higher-order activities such as planning.

Matching Items

1. f (p. 383) 6. j (p. 376) 11. b (p. 384)
2. i (p. 381) 7. k (p. 373) 12. m (p. 389)
3. a (p. 384) 8. d (p. 371) 13. n (p. 389)
4. g (p. 384) 9. h (p. 371) 14. l (p. 389)
5. e (p. 375) 10. c (p. 373)

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. 372)
   b., c., & d. These are just the opposite of what we tend to do.

2. a. is the answer. (p. 383)
   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. 384)
   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. 386)

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. 400)

6. d. is the answer. Both are simple thinking strategies that allow us to make quick judgments. (pp. 374, 375)
   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. 369)
   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. 396)
   b. & c. Imitation and tool use are clear indicators of animal communication and thinking, respectively. However, they reveal nothing about the ability to read intent in 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. 375)
   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. 371)
    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 /s/ is a unique sound in the English language. (pp. 383, 384)
    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. 386–387)

13. c. is the answer. (p. 386)

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. 386)
   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. 388)

16. c. is the answer. (p. 398)

17. d. is the answer. (p. 395)

18. d. is the answer. Semantic rules are directly concerned with the derivation of meaning from morphemes, words, and sentences. (p. 384)
   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. 393–394)
   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. 385)
   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.

**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. (pp. 383, 384)

2. a. is the answer. (p. 389)
   b. Broca’s area is involved in speech production.
   c. The angular gyrus converts to auditory code.
   d. The hippocampus has nothing to do with language.

3. a. is the answer. (p. 385)

4. a. is the answer. (p. 377)
   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. 370)
   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. 375)

7. b. is the answer. Follow the directions precisely and you can’t miss! (p. 371)
   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. 373)
   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. 369)
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. (p. 371)
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. 372)
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 perseverance is the tendency to cling to one’s beliefs despite evidence to the contrary.

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. 386)
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. 371)
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. 374)
a. Belief perseverance is the tendency to cling to one’s beliefs despite evidence to the contrary.
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. 373)
16. b. is the answer. The publicity surrounding disasters makes such events vivid and seemingly more probable than they actually are. (p. 375)
a. Belief perseverance is the tendency to cling to one’s beliefs despite evidence to the contrary.
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. 376)

18. a. is the answer. In this example, the way the issue is posed, or framed, has evidently influenced consumers’ judgments. (p. 381)
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. 384)
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. (pp. 391–392)

**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. It therefore seems clear that children are biologically prepared to acquire language and that the behaviorist position is incorrect.
Key Terms

Writing Definitions

1. **Cognition** refers to all the mental activities associated with thinking, knowing, remembering, and communicating information. (p. 369)

2. A **concept** is a mental grouping of similar objects, events, and people. (p. 369)

3. A **prototype** is the best example of a particular category. (p. 370)

4. An **algorithm** is a methodical, logical procedure that, while sometimes slow, guarantees success. (p. 371)

5. 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. 371)

6. **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. 371)

7. The **confirmation bias** is an obstacle to problem solving in which people tend to search for information that supports their preconceptions. (p. 372)

8. **Fixation** is an inability to approach a problem in a new way. (p. 373)

9. **Mental set** refers to the tendency to continue applying a particular problem-solving strategy even when it is no longer helpful. (p. 373)

10. **Functional fixedness** is a type of fixation in which a person can think of things only in terms of their usual functions. (p. 373)

11. The **representativeness heuristic** is the tendency to judge the likelihood of things in terms of how well they match particular prototypes. (p. 374)

12. The **availability heuristic** is based on estimating the probability of certain events in terms of how readily they come to mind. (p. 375)

13. Another obstacle to problem solving, **overconfidence** refers to the tendency to overestimate the accuracy of our beliefs and judgments. (p. 376)

14. **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. 377)

15. **Intuition** is an immediate, automatic, and effortless feeling or thought. (p. 378)

16. **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. 381)

17. **Language** refers to spoken, written, or signed words and how we combine them to communicate meaning. (p. 382)

18. **Phonemes** are the smallest units of sound in a language that are distinctive for speakers of the language. (p. 383)

19. **Morphemes** are the smallest units of language that carry meaning. (p. 384)

   *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. 384)

21. **Semantics** is the set of rules used to derive meaning from morphemes, words, and sentences in a given language. (p. 384)

   *Example:* One semantic rule of English is that adding -ed to a verb gives the verb a past-tense meaning.

22. **Syntax** is the rules for combining words into grammatically sensible sentences in a given language. (p. 384)

   *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. 385)

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. 385)

25. Beginning about age 2, children are in the **two-word stage** and speak mostly in two-word sentences. (p. 386)

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. 386)
27. **Aphasia** is an impairment of language as a result of damage to any of several cortical areas, including Broca's area and Wernicke's area. (p. 389)

28. **Broca's area**, located in the left frontal lobe, is involved in controlling the motor ability to produce speech. (p. 389)

29. **Wernicke's area**, located in the left temporal lobe, is involved in language comprehension and expression. (p. 389)

30. **Linguistic determinism** is Benjamin Whorf's hypothesis that language determines the way we think. (p. 391)

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**Cross-Check**

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<td>2. linguistic determinism</td>
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