**Chapter 10**

**Objective 1|** **Define cognition.** Cognition is a term covering all the mental activities associated with thinking, knowing, remembering, and communicating.

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**Objective 2|** **Describe the roles of categories, hierarchies, definitions, and prototypes in concept formation.**We use concepts to simplify and order the world around us. We divide clusters of objects, events, ideas, or people into categories based on their similarities. In creating hierarchies, we subdivide these categories into smaller and more detailed units. We form other concepts, such as triangles, by definition (three-sided objects). But we form most concepts around prototypes, or best examples of a category. Matching objects and ideas against prototypes is an efficient way of making snap judgments about what belongs in a specific category.

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**Objective 3|** **Compare algorithms and heuristics as problem solving strategies, and explain how insight differs from both of them.** An algorithm is a time-consuming but thorough set of rules or procedures (such as a recipe for cookies, or a step-by-step description for evacuating a building during a fire) that guarantees a solution to a problem. A heuristic is a simpler thinking strategy (such as running for an exit if you smell heavy smoke) that may allow us to solve problems quickly, but sometimes leads us to incorrect solutions. Insight differs from both because it is not a strategy-based solution, but rather an Aha! reaction—a sudden flash of inspiration that solves a problem.

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**Objective 4|** **Contrast the confirmation bias and fixation, and explain how they can interfere with effective problem solving.** The confirmation bias predisposes us to verify rather than challenge our hypotheses. Fixation, such as mental set and functional fixedness, may leave us doggedly pursuing one line of reasoning and prevent us from taking the fresh perspective that would let us solve the problem.

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**Objective 5|** **Contrast the representativeness and availability heuristics, and explain how they can cause us to underestimate or ignore important information.** The representativeness heuristic leads us to judge the likelihood of things in terms of how they represent our prototype for a group of items. The availability heuristic leads us to judge the likelihood of things based on how vivid they are or how readily they come to mind. Either of these two thinking shortcuts can cause us to ignore important information or to underestimate the chances of something happening.

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**Objective 6|** **Describe the drawbacks and advantages of overconfidence in decision making.** The main drawback of overconfidence is that our tendencies to seek confirmation of our hypotheses and to use quick and easy heuristics can blind us to our vulnerability to error—a fault that can be tragic if we are in a position of responsibility. But on a personal level, overconfident people tend to live happier lives, make difficult decisions more easily, and seem more credible.

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**Objective 7**| **Describe how others can use framing to elicit from us the answers they want.** An issue can be presented (or framed) in different but equally logical ways, but the subtle wording can nudge us in the direction the questioner wants us to take. (Consider, for example,” Do you think people should be free to smoke in public places?” versus “Do you think smokers should have the right to expose the lungs of nonsmokers to second-hand smoke?”)

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**Objective 8|** **Explain how our preexisting beliefs can distort our logic.**We tend to judge conclusions that agree with our beliefs as more logical than those that do not match our beliefs. This belief bias can lead us to accept invalid conclusions and reject valid ones.

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**Objective 9|** **Describe the remedy for the belief perseverance phenomenon.** Belief perseverance is clinging to our ideas because the explanation we once accepted as valid lingers in our mind even after it has been discredited. The best remedy for this form of bias is making the effort to consider evidence supporting the opposite position.

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**Objective 10|** **Describe the smart thinker’s reaction to using intuition to solve problems.** Although it sometimes leads us astray, human intuition can be remarkably efficient and adaptive, giving us instant help when we need it. As we gain expertise in a field, for example, we grow adept at making quick, shrewd judgments. Smart thinkers will welcome their intuitions but check them against available evidence, hoping to avoid overconfidence and biased and illogical thinking.

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**Objective 11|** **Describe the basic structural units of a language.** All languages have the same basic structural units. Phonemes are the basic units of sound in a language. Morphemes are the elementary units of meaning; some (such as I) are words, but most are elements such as prefixes (anti-) or suffixes (-ing).Grammar is the system of rules (mental rules, not those taught in English classes) that enable us to communicate and understand others. Semantics, which is part of grammar, is a set of rules for deriving meaning in a given language. Syntax, also a part of grammar, is a set of rules for ordering words into sentences.

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**Objective 12|** **Trace the course of language acquisition from the babbling stage through the two-word stage.** At about 4 months of age, infants babble, making a wide range of sounds found in languages located all over the world. By about 10 months, their babbling contains only the sounds found in their household language. Around 12 months of age, babies speak in single words. This one-word stage evolves into two-word (telegraphic) utterances before their second birthday. Shortly after that, children begin speaking in full sentences. The timing of these stages varies a little from one child to another, but all children follow this sequence.

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**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 and learning.**Behaviorist B. F. Skinner (representing the nurture side of the language-development debate) proposed that we learn language by the familiar principles of association (of sights of things with sounds of words), imitation (of words and syntax modeled by others), and reinforcement (with smiles and hugs after saying something right). Challenging this claim, linguist Noam Chomsky (representing the nature position) argues that we are born with a language acquisition device that biologically prepares us to learn language. He cites as evidence the species-wide presence of language and its underlying universal grammar; children’s amazing rate of acquiring vocabulary; and the uniform sequence of the stages of language development. Statistical learning is the ability to detect speech patterns (such as syllable breaks). Childhood is a critical period for learning spoken and signed language: Children who do not learn language during this early period lose their ability to fully master language.

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**Objective 14|** **Summarize Whorf’s linguistic determinism hypothesis, and comment on its standing in contemporary psychology.** Although the linguistic determinism hypothesis suggested that language determines thought, it is more accurate to say that language influences thought. Words convey ideas, and research on people who are bilingual demonstrates that different languages embody different ways of thinking. Studies of the effects of the generic pronoun he show that subtle prejudices can be conveyed by the words we choose to express our everyday thoughts. Some evidence indicates that vocabulary enrichment, particularly immersion in bilingual education, can enhance thinking.

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**Objective 15**| **Discuss the value of thinking in images.**We often think in images when we use procedural memory—our unconscious memory system for motor and cognitive skills and conditioned associations. Researchers have found that thinking in images is especially useful for mentally practicing upcoming events and can actually increase our skills.

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**Objective 16|** **List five cognitive skills shared by the great apes and humans.**Both humans and the great apes form concepts, display insight, use and create tools, transmit cultural innovations, and have a theory of mind (including the capacity for reasoning, self-recognition, empathy, imitation, and understanding another’s mind).

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**Objective 17|** **Outline the arguments for and against the idea that animals and humans share the capacity for language.** Bees dance to communicate the direction and distance of food, parrots sort items by number, and dogs comprehend and respond to complicated human commands. Several species of apes have learned to communicate with humans by signing or by pushing buttons wired to a computer. These apes have developed vocabularies of hundreds of words, have communicated by stringing these words together, and have taught their skills to younger animals, who—like humans—tend to acquire the skills most easily and thoroughly if taught them at a very young age. Nevertheless, research reveals an important difference between apes’ and humans’ facilities with language: Only humans can master the verbal or signed expression of complex rules of syntax.

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