CHAPTER PREVIEW

Concepts, the building blocks of thinking, simplify the world by organizing it into a hierarchy of categories. Concepts are often formed around prototypes, or the best examples of a category.

When faced with a novel situation for which no well-learned response will do, we may use problem-solving strategies such as trial and error, algorithms, heuristics, and insight. Obstacles to successful problem solving include the confirmation bias, mental set, and functional fixedness. Heuristics provide efficient, but occasionally misleading, guides for making quick decisions. Overconfidence, framing, belief bias, and belief perseverance further reveal our capacity for error. Still, human cognition is remarkably efficient and adaptive. With experience, we grow adept at making quick, shrewd judgments.

Language facilitates and expresses our thoughts. Spoken language is built of phonemes, morphemes, words, and the semantics and syntax that make up grammar. The ease with which children master language has sparked a lively debate over whether children acquire language through association and imitation or are biologically prepared to learn words and use grammar.

Thinking and language are difficult to separate. Although the linguistic determinism hypothesis states that language determines thought, we know that thinking can occur without language, and so we might better say that thinking affects our language, which then affects our thoughts.

Another debate concerns whether language is uniquely human; it has been fueled by studies of animals, particularly chimpanzees, who have developed considerable vocabularies and who can string words together to express meaning. Although apes have considerable cognitive ability, skeptics point out important differences between apes’ and humans’ abilities to order words using proper syntax.

CHAPTER GUIDE

➤ Introductory Exercise: Fact or Falsehood?
➤ Exercises: The Limits of Human Intuition; Differences in Thinking Styles
➤ Project: The Need for Cognition Scale
➤ Video: Discovering Psychology, Updated Edition: Cognitive Processes

Thinking

➤ Exercises: Cognitive Complexity; Introducing Prototypes; Dice Games to Demonstrate Problem Solving; The “Aha!” Experience; Confirmation Bias; Mental Set and Insight; Demonstrating Mental Set; Functional Fixedness; The
1. Define cognition.

Cognition refers to the mental activities associated with thinking, knowing, remembering, and communicating. Cognitive psychologists study these activities including the logical and illogical ways we solve problems and make decisions.

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

To think about the countless events, objects, and people in our world, we organize them into mental groupings called **concepts**. We create mental hierarchies of groupings by clustering them into categories based on their similarities, and then subdividing those categories into increasingly smaller and more detailed units. Although we form some concepts by definition—for example, a triangle has three sides—more often we form a concept by developing a **prototype**, a mental image or best example of a particular category. For example, a robin more closely resembles our “bird” category than does a goose. The more closely objects match our prototype of a concept, the more readily we recognize them as examples of a concept.

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

We approach some problems through trial and error, attempting various solutions until stumbling upon one that works. For other problems we may follow a methodical rule or step-by-step procedure called an **algorithm**. Because algorithms can be laborious, we often rely instead on simple strategies called **heuristics**. Speedier than algorithms, heuristics are also more error-prone. Sometimes, however, we are unaware of using any problem-solving strategy; the answer just comes to us as a sudden flash of inspiration or **insight**.

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

A major obstacle to problem solving is our eagerness to search for information that confirms our ideas, a phenomenon known as **confirmation bias**. This can mean that once people form a wrong idea, they will not budge from their illogic.

Another obstacle to problem solving is **fixation**—the inability to see a problem from a fresh perspective. The tendency to repeat solutions that have worked in the past is a type of fixation called **mental set**. It may interfere with our taking a fresh approach when faced with problems that demand an entirely new solution. Our tendency to perceive the functions of objects as fixed and unchanging is called **functional fixedness**. Perceiving and relating familiar things in new ways is an important aspect of creative problem solving.

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

The **representativeness heuristic** involves judging the likelihood of things in terms of how well they seem to represent particular prototypes. If something matches our mental representation of a category, that fact usually overrides other considerations of statistics or logic. The **availability heuristic** operates when we base our judgments on the availability of information in our memories. If instances of an event come to mind readily, we presume such events are common. Both
heuristics enable us to make snap judgments. However, these quick decisions sometimes lead us to ignore important information or to underestimate the chances of something happening.

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

Overconfidence, the tendency to overestimate the accuracy of our knowledge and judgments, can have adaptive value. People who err on the side of overconfidence live more happily and find it easier to make tough decisions. At the same time, failing to appreciate one’s potential for error when making military, economic, or political judgments can have devastating consequences.

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

The same issue presented in two different but logically equivalent ways can elicit quite different answers. This framing effect suggests that our judgments and decisions may not be well reasoned, and that those who understand the power of framing can use it to influence important decisions—for example, by wording survey questions to support or reject a particular viewpoint.

8. Explain how our preexisting beliefs can distort our logic.

We show a belief bias in our reasoning, accepting as more logical those conclusions that agree with our beliefs. Similarly, we more easily see the illogic of conclusions that run counter to our beliefs. This belief bias can lead us to accept invalid conclusions and to reject valid ones.

9. Describe the remedy for the belief perseverance phenomenon

We exhibit belief perseverance, clinging to our ideas in the face of contrary evidence because the explanation we accepted as valid lingers in our minds. Once beliefs are formed and justified, it takes more compelling evidence to change them than it did to create them. The best remedy for this form of bias is to make a deliberate effort to consider evidence supporting the opposite position.

10. Describe the smart thinker’s reaction to using intuition to solve problems.

Although human intuition is sometimes perilous, it can be remarkably efficient and adaptive. Moreover, it feeds our creativity, our love, and our spirituality. Smart intuition is born of experience. As we gain expertise in a field, we become better at making quick, adept judgments. Experienced nurses, firefighters, art critics, and hockey players learn to size up a situation in an eye blink. Smart thinkers will welcome their intuitions but also check them against available evidence in an effort to avoid overconfidence and illogical thinking.

Language

- Lectures: Vanishing Languages; Universals of Language; Language Development; Bilingualism; The Smart-Talk Syndrome
- PsychSim 5: Dueling Brains
- Transparencies: 114 Summary of Language Development; 115 Levels of Understanding Language Development; 116 New Language Gets Harder With Age

11. Describe the basic structural units of a language.

Language is our way of combining words to communicate meaning. Spoken language is built of basic speech sounds, called phonemes; elementary units of meaning, called morphemes; and words. Finally, language must have a grammar, a system of rules that enables us to communicate with others. Semantics refers to the rules we use to derive meaning from the morphemes, and syntax refers to the rules we use to order words into sentences.
12. Trace the course of language acquisition from the babbling stage through the two-word stage.

Children’s language development mirrors language structure—by moving from simplicity to complexity. Beginning at about 4 months, infants enter a babbling stage in which they spontaneously utter various sounds at first unrelated to the household language. By about age 10 months, a trained ear can identify the language of the household by listening to an infant’s babbling. Around the first birthday, most children enter the one-word stage, and by their second birthday, they are uttering two-word sentences. This two-word stage is characterized by telegraphic speech. This soon leads to their uttering longer phrases (there seems to be no “three-word stage”), and by early elementary school, they understand complex sentences.

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.

The debate between the behaviorist view of the malleable organism and the view that each organism comes biologically prepared to learn certain associations surfaces again in theories of language development.

Representing the nurture side of the argument, behaviorist B. F. Skinner argued 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 success, smiles and hugs after saying something right). Challenging this claim, and representing the nature side of the debate, Noam Chomsky notes that children are biologically prepared to learn words and use grammar (they are born with what Chomsky called a language acquisition device already in place). He argues that children acquire untaught words and grammar at too fast a rate to be explained solely by learning principles. Moreover, there is a sort of “universal grammar” that underlies all human language. Cognitive neuroscientists suggest that the statistical learning that occurs during life’s first few years is critical for the mastery of grammar. Skinner’s emphasis on learning helps explain how infants acquire their language as they interact with others. Chomsky’s emphasis on our built-in readiness to learn grammar helps explain why preschoolers acquire language so readily and use grammar so well. Nature and nurture work together.

Thinking and Language

➤ Lectures: The Vocabulary of Taste; Think Before You Speak; The Impact of Language on Thought
➤ Exercises: Doublespeak; Introducing Imagery Research; Mental Imagery; Creating a Mental Model
➤ Project: Cognitive Maps
➤ Transparency: 117 Language and Perception

14. Summarize Whorf’s linguistic determinism hypothesis and comment on its standing in contemporary psychology.

Although Whorf’s linguistic determinism hypothesis suggests that language determines thought, it is more accurate to say that language influences thought. Language expresses our thoughts and different languages can embody different ways of thinking. Many bilinguals report that they have a different sense of self, depending on which language they use. At the same time, those without our words for shapes and colors perceive them much as we do. Given the subtle influence of words on thinking, we ought to choose our words carefully. Studies of the effects of the generic pronoun he and the ability of vocabulary enrichment to enhance thinking reveal the influence of words. Some ideas, such as the ability to perceive and remember different colors, do not depend on language. We might say that our thinking influences our language, which then affects our thoughts.

15. Discuss the value of thinking in images.

We often think in images. In remembering how we do things, for example, turning on the water in the bathroom, we use procedural memory—a mental picture of how we do it. Artists, composers,
poets, mathematicians, athletes, and scientists all find images to be helpful. Researchers have found that thinking in images is especially useful for mentally practicing upcoming events and can actually increase our skills.

**Animal Thinking and Language**

- **Lecture:** Kanzi and Mulika, Remarkable Pygmy Chimps

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

   Animals, especially the great apes, show remarkable capacities for thinking. Both great apes and humans (1) form concepts, (2) display insight, (3) use and create tools, (4) transmit cultural innovations, and (5) have a theory of mind, including the capacity for reasoning, self-recognition, empathy, intuition, and understanding another’s mind.

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

   Animals obviously communicate. Velvet monkeys have different alarm cries for different predators, whales communicate with clicks and wails, and bees communicate the location of food through an intricate dance. Several teams of psychologists have taught various species of apes, including a number of chimpanzees, to communicate with humans by signing or by pushing buttons wired to a computer. Apes have developed considerable vocabularies. They string words together to express meaning and have taught their skills to younger animals. Skeptics point out important differences between apes’ and humans’ facilities with language, especially in their respective abilities to master the verbal or signed expression of complex rules of syntax. Nevertheless, studies reveal that apes have considerable ability to think and communicate.