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## MODULE 32

# Language and Thought

### Module Preview

Language facilitates and expresses our thoughts. Spoken language is built from 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. Language processing illustrates how the mind's subsystems are localized in particular brain regions, yet the brain acts as a unified whole.

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 in the verbal or signed expression of complex grammar.

### Module Guide

#### Introduction and Language Structure

- ▶ Lectures: Vanishing Languages; Universals of Language
- ▶ PsychSim 5: Dueling Brains
- ▶ Videos: Modules 25 and 28 of *The Mind* series, 2nd ed.: *Human Language: Signed and Spoken* and *Language and Culture*

- 32-1. *Describe the basic structural units of a language, including the rules that enable us to communicate meaning.*

**Language** is our way of combining words to communicate meaning. Spoken language is built from 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 and understand others. **Semantics** refers to the rules we use to derive meaning from the morphemes, words, and sentences; **syntax** refers to the rules we use to order words into grammatically sensible sentences. In all 6000 human languages, the grammar is intricately complex.

## Language Development

- ▶ Lectures: Language Development; Bilingualism
- ▶ Videos: Modules 23 and 24 of *The Mind* series, 2nd ed.: *Infant Speech Sound Discrimination and Language Predisposition*; Segments 18 and 21 of the Scientific American *Frontiers* Series, 2nd ed.: *Talking Babies and Born to Talk*
- ▶ ActivePsych: *Digital Media Archive*, 2nd ed.: *Learning Language: Language Development in Infants and Toddlers*; Scientific American *Frontiers*, 3rd ed.: *Genes and Personality: Understanding Williams Syndrome*

### 32-2. Trace the course of language acquisition from the babbling stage through the two-word stage.

Children's **language** development moves from simplicity to complexity. Their *receptive language* abilities mature before their *productive language*. 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.

- ▶ Videos: Video Clip 21 of *Digital Media Archive: Psychology*, 1st ed.: *Chomsky's View of Language Development*; *Discovering Psychology, Updated Edition: Language Development*

### 32-3. 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 that emphasizes learning and the view that each organism comes with innate predispositions 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 *universal grammar* that underlies all human language.

Cognitive neuroscientists suggest that the statistical analysis that children perform during life's first 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.

Childhood does seem to represent a *critical period* for certain aspects of learning. Research indicates that children who have not been exposed to either a spoken or signed language by about age 7 gradually lose their ability to master any language. Learning a second language also becomes more difficult after the window of opportunity closes. For example, adults who attempt to master a second language typically speak it with the accent of their first.

## The Brain and Language

- ▶ Lecture: The Smart-Talk Syndrome
- ▶ Videos: Module 16 of *Psychology: The Human Experience: Language Centers in the Brain*; Video Clip 22 of *Digital Media Archive: Psychology*, 1st ed.: *Gleason's Wig Test*; Modules 6 and 8 of *The Brain* series, 2nd ed.: *Language and Speech: Broca's and Wernicke's Areas*; *Language Processing in the Brain*

32-4. *Identify the brain areas involved in language processing and speech.*

Language depends on a chain of events in several brain regions. When we read aloud, the words (1) register in the visual area, (2) are relayed to the *angular gyrus*, which transforms the words into auditory code, which is (3) received and understood in nearby **Wernicke's area** and sent (4) to **Broca's area**, which (5) controls the motor cortex as it creates the pronounced word. Depending on which link in this chain is damaged, a different form of aphasia occurs. For example, damage to the angular gyrus leaves the person able to speak and understand but unable to read. Damage to Wernicke's area disrupts understanding. Damage to Broca's area disrupts speaking. What we experience as a continuous experience is the visible tip of a subdivided information-processing iceberg, most of which is outside our awareness. More generally, language processing illustrates how the mind's subsystems are localized in particular brain regions, yet the brain acts as a unified whole.

## Thinking and Language

- ▶ Lectures: The Vocabulary of Taste; Think Before You Speak; The Impact of Language on Thought; New Words
- ▶ Exercise: Doublespeak

32-5. *Discuss Whorf's linguistic determinism hypothesis in relation to current views regarding thinking, and describe the value of thinking in images.*

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. We use language in forming categories, and words can influence our thinking about colors. Perceived differences grow when we assign different names to colors. 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. We might say that our thinking influences our language, which then affects our thoughts.

- ▶ Exercises: Introducing Imagery Research; Mental Imagery; Creating a Mental Model
- ▶ Project: Cognitive Maps
- ▶ Instructor Video Tool Kit: *Learning Through Visualization: A Gymnast Acquires New Skills*

We often think in images. In remembering how we do things, for example, turning on the water in the bathroom, we use nondeclarative (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. Research suggests that mental rehearsal can help one to achieve an academic goal.

## Animal Thinking and Language

- ▶ Lecture: Kanzi and Mulika, Remarkable Pygmy Chimps; Talking With Our Hands
- ▶ Videos: Segments 19 and 20 of the Scientific American *Frontiers* Series, 2nd ed.: *If Only They Could Talk!* and *Who Needs Words, Anyway?*; Module 27 of *The Mind* series, 2nd ed.: *Animal Language*; Module 15 of *Psychology: The Human Experience: Animal Language*; Program 14 of *Moving Images: Exploring Psychology Through Film: Animal Language: The Case of Kanzi*
- ▶ Instructor Video Tool Kit: *How Intelligent Are Animals?*; *Can Chimpanzees Plan Ahead?*; *Teaching Language to Chimpanzees*
- ▶ ActivePsych: *Digital Media Archive*, 2nd ed.: *Problem Solving in Genus Corvus (Crows, Ravens, and Magpies)*

32-6. *Identify some of the cognitive skills shared by the great apes and humans, and outline the arguments for and against the idea that animals and humans share the capacity for language.*

Animals, especially the great apes, show remarkable capacities for thinking. Both great apes and humans (1) form concepts, (2) display insight, (3) are shaped by reinforcement in becoming tool users, (4) show remarkable numerical capacity, and (5) transmit cultural patterns.

Animals obviously communicate. Marmosets can learn from and imitate others, sheep can recognize and remember individual faces, 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.