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Language Development

An Introduction

LEARNING OUTCOMES

After completion of this chapter, the reader will be able to:

- 1. Define the term *language*.
- 2. Describe how language relates to speech, hearing, and communication.
- 3. Describe the major domains of language.
- 4. Identify several remarkable features of language.
- 5. Discuss the distinction between language differences and language disorders.



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Lundreds of scientists worldwide study the remarkable phenomenon of children's language acquisition. Each year, these scholars publish the results of numerous studies on children's language development in scientific journals, pursuing answers to such questions as:

- Does the language a child is learning (e.g., Chinese vs. English) influence the rate of language development?
- How do caregivers' interactions with their child affect the timing of their child's first word?
- Do children who show early delays in language development typically catch up with their peers?
- Do children learning a signed language develop language similarly to children learning a spoken language?
- Why do children with autism have such difficulties developing language skills?

These questions provide the student of language development a glimpse into many of the interesting topics language scientists focus on in their work around the world. These questions also suggest how important language research is to informing the everyday practices and activities of parents, teachers, psychologists, and other professionals invested in helping children achieve their fullest language development potential. That these questions have yet to be fully answered, shows that the study of language development is a constantly evolving and complex area of science in which practitioners have many more questions than answers.

In this chapter, we provide a general introduction to the study of language development and consider five major topics. In the first section, we answer the question "What is language?", and present a definition of *language* that we build on throughout this text. In the second section, we discuss differences among speech, hearing, and communication—three aspects of human development and behavior that are closely related but are nonetheless distinct capacities. In the third section, we address the five major domains of language, a topic we introduce here and discuss more fully in Chapter 2. In the fourth section, we describe differences in and disorders of language development—two topics we explore more comprehensively in Chapter 9 and 10.

WHAT IS LANGUAGE?

Language Defined

You probably have an intuitive sense of what language is because it is a human behavior you have acquired to a sophisticated level and use regularly for various purposes. In fact, you are using your language abilities as you read and analyze the content of this chapter. However, if you take a moment to define language more explicitly, you may find the task challenging. If you were to ask 10 classmates for a definition of language, each would likely respond differently. The same outcome would probably occur if you questioned 10 language researchers.

You are also most likely aware that language is a basic and essential human behavior that develops early in life. You probably recognize that language involves words and sentences and both expression (language production) and comprehension (language understanding). In addition, you know language is a process of the brain that helps people communicate their thoughts to other individuals, although you may be somewhat unclear about how language differs from speech and communication.

However, to be as specific as possible about what language is and is not, let's look at the official definition of the term *language* the American Speech-Language-Hearing Association (1982) uses:

The relationship between a word and its referent is arbitrary. English speakers use the word happy to represent an internal feeling of happiness, but any word would do.



Language is a "complex and dynamic system of conventional symbols that is used in various modes for thought and communication."

Next, we delineate in more detail the specific characteristics of language identified in this definition:

1. *Language Is a System of Symbols*. The first characteristic of language warranting discussion is that it is a code, consisting of a system of symbols called **morphemes.** Morphemes are the smallest units of language that carry meaning; we combine them to create words. Some words consist of a single morpheme (e.g., *school*), but many words comprise two or more morphemes, such as *schools* (two morphemes—*school* + *-s*) and *preschools* (three morphemes—*pre-* + *school* + *-s*). These symbols can exist in spoken or written format, a point we'll return to shortly.

The term *code* refers to the translation of one type of information into another type of information; this involves the use of symbols. For humans to develop the capacity to use language thousands of years ago, perhaps the most important prerequisite was the human ability to use symbols, such as representing a specific concept with a specific sound (Christianson & Kirby, 2003). In language, we create words by using morphemes to represent myriad aspects of the world around our language community. For instance, as English speakers, we can represent an internal feeling of happiness by using the single word *happy*. When we use the word *happy* in a conversation with other people to describe our feelings, we use the word to translate our feelings. Although we can share feelings and ideas through other means—such as gesture, facial expression, and posture—words are much more specific and provide a uniquely powerful tool for communicating.

One important characteristic of language code is that the relationship between a word and its **referent** (the aspect of the world to which the word refers) is arbitrary. For example, although English speakers recognize that *happy* refers to a specific feeling, any other word (e.g., *sprit, nopic*, or *grendy*) would do. Likewise, one way English speakers can denote plurality is to attach the morpheme *-s* to words (e.g., *pens, dogs*). Because the relationship between the plural morpheme *-s* and its plural marking is arbitrary, English speakers could denote plurality in various other ways. In contrast, the code we use to organize words into sentences is not arbitrary; rather, we must follow specific rules for organizing thoughts into words and sentences, as we discuss next.

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2. The System of Language Is Conventional. The second characteristic of language is that the system of symbols is conventional, so the members of a community or culture can share it. The term *conventional* means users of a language abide by accepted rules. For instance, speakers of English agree to use the word dog (and related words and synonyms, such as pup, puppy, and canine) to refer to those companionable creatures, rather than other potential words, such as *boop* or ming. Speakers of Spanish use a different word to refer to this concept (perro), as do users of American Sign Language. Adhering to specific conventions allows all members of a language community to use language with one another as a tool for expression. A language community is a group of people who use a common language. In fact, somewhere in the history of the human species, a single language probably emerged within a social community of about 100 hominids (Cartwright, 2000). Some experts contend that language emerged within this community as a type of grooming behavior, essentially an efficient way to share socially useful information (Christiansen & Kirby, 2003). Accordingly, the numerous languages of the world emerged from this single community of language users.

Language communities emerge for many reasons. Some form as a result of geographic circumstances, as in the case of Ukrainian, the language people speak in Ukraine, a country in the western region of the former Soviet Union. Alternatively, a language community may emerge for sociological reasons, as in the case of Hebrew, which many persons of Jewish faith share, or American Sign Language, which persons in the U.S. Deaf community use. A language community can organize for economic reasons as well. For instance, the World Trade Organization (WTO), a global group that coordinates and regulates trade among 161 countries (as of April, 2015), conducts its activities in English, French, and Spanish.

3. *The Language System Is Dynamic.* The third characteristic of language is that it is dynamic. This means language is in a state of activity and change, both within an individual who is acquiring language and within a community that uses a certain language. Let's consider first the case of the individual. As we discuss throughout this book, the acquisition of language begins at birth, or even before birth, in utero, and is in a state of change across the lifespan. Even as adults, our language skills are dynamic. As one example, we might seek to learn a second language. As another example, as we age, some aspects of our language skill decline. We might, for example, have increased difficulty finding the names for things (Capuron et al., 2011), which is a normal part of aging.

The language a community uses is also very dynamic. When the first edition of this book was published, in 2008, there was no such word as *selfie* (or *selfie stick*, for that matter). Sometime during the last eight years, this word entered the English language and is now in our vocabulary. In any language, words come and go and other changes happen as well, as we discuss more thoroughly in Chapter 9.

4. Language Is a Tool for Human Communication. The final and perhaps most important characteristic of language requiring discussion is that it exists as a tool for communication. Communication is the process of sharing information, such as thoughts, feelings, and ideas, among two or more persons. Although other species are able to communicate, such as dogs, primates, birds, dolphins, and ants, the innate and specialized capacity of humans to use language as a tool to communicate is what makes the human species unique. For instance, although some primates may communicate alarms to one another using calls, these alarm calls seem to be general and do not symbolically represent a given predator (e.g., eagle) (Christiansen & Kirby, 2003). Experts therefore argue that "language is the most distinctive feature that distinguishes humans from other animals" (Wang & Minett, 2005, p. 263). Language itself is what supports the highly complex communication enjoyed by the human species, such as your ability to comprehend and learn from the complex matter contained within this text.



As you watch the video titled "What Is Language?" consider the different features of language and how language differs from other systems of communication. https://www.youtube. com/watch?v=GenkKxTk7bw

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Language as a Module of Human Cognition

Beyond its role in supporting human communication, language is a cognitive tool that helps humans to develop the "picture of the world that we use for thinking" (Bickerton, 1995). This "picture of the world" includes not only symbolic representations of linguistic concepts (e.g., *big*, *fly*, *crazy*) that are organized in a vast network, but also the formal syntactic or grammatical rules that organize these concepts into orderly, surface-level representations. According to this proposition, first and foremost, language is a representational tool people use for thinking, and, second, this tool permits people to communicate their thoughts to other individuals.

Language probably emerged in the human species for the latter reason: to provide an efficient and effective means for communication within a community. In other words, language emerged as a cultural and social evolution, rather than a biological evolution: Our need and interest to communicate with others gave rise to the complexity of language over time (Christiansen & Kirby, 2003). Some experts suggest that language emerged in the human species because of increases in the size of human communities (e.g., from about 50 members in a group to more than 100 members), and therefore increases in the complexity of social dynamics (Dunbar & Aiello, 1993). With time, the neural circuitry of the human brain responded to the adaptive advantage of using language not only as a social tool but also as an inner representational tool, emerging as a specialized part of the human mind (Christiansen & Kirby, 2003).

The human brain uses language as a representational tool to store information and to carry out many cognitive processes such as reasoning, hypothesizing, memorizing, planning, and problem solving. These processes are sometimes called *higher-level* language skills to differentiate them from more basic-level language abilities. When applied to mathematical and scientific tasks, these higher-level abilities may be called *mathematical reasoning* and *scientific reasoning*; however, it is important to acknowledge the role of language in mathematical and scientific reasoning tasks. For instance, suppose you are asked to complete the following mathematical reasoning task:

The average cost of a smart phone in the United States in 2015 is about \$250. Assuming the prices of consumer goods decline about 3% per year, how much, on average, would a smart phone cost in 2020?

You would have difficultly generating an answer without using language as a tool. Although some persons may contend that they think in images and not in words, certain thoughts—such as "My trust in you has been shattered forever by your unfaithfulness"—are impossible to view as images and require language to be invoked as a representational tool (Bickerton, 1995, p. 22).

As we consider the definition of language, particularly its relation to cognition, we need to explore the concept of *modularity*. We introduce this concept here, and discuss it more thoroughly in Chapter 4. Modularity is a cognitive science theory about how the human mind is organized within the structures of the brain (Braisby & Gellatly, 2012). Questions about modularity concern whether the human brain contains a set of highly specific modules—regions of the brain developed to process specific types of information—or whether the human brain is itself a generalized module in which all parts work together to process information. A module is a specialized problem-solving device in the brain that responds to information of a restricted type. Because of the specificity of such modules, they are termed domain specific, meaning they can process only very specific types of information, such as depth perception within the visual system. Some cognitive theorists contend that the brain consists of very large domain-general modules, which carry out very general tasks like memory and reasoning, as well as domain-specific modules that execute very specific types of tasks.



Too many people in the world are without food. We need a solution to the global food-shortage problem. Try to reason through a solution to this problem without using language. Is it possible? Can an individual engage in complex reasoning without language?

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With respect to language, some language theorists argue that the human brain contains a large number of language-specific modules, tightly clustered and highly interconnected, each of which processes specific types of linguistic information (see Curtiss, 2012). Such theorists contend that during human evolution, the neural circuitry of the brain became highly specialized in several regions to handle the task of developing and using language (Cartwright, 2000). In fact, researchers have long known that specific regions of the brain are associated with specific language abilities. For instance, people who sustain damage to certain areas of the left frontal lobe, such as during a stroke, often exhibit difficulty with basic grammar. These people may omit grammatical markers and speak with a "telegraphic" quality (e.g., "Tommy go store now"), which suggests this region of the brain governs aspects of grammar (Shapiro & Caramazza, 2003). The results of brain-imaging studies of the workings of undamaged brains also indicate that various regions of the brain correspond to highly specific aspects of language (Okada et al., 2013), a concept we elaborate on in Chapter 3.

Studies of children with language impairment (a group we discuss more thoroughly in Chapter 10) also provide some support for the notion of language modularity. Typically developing in all areas except for language, children with a condition called *specific language impairment* (SLI) exhibit problems in very precise aspects of grammar, such as marking verb tense. Verb tense marking includes, for instance, inflecting verbs with *–ed* to create the past tense, as in "Juan brushed his teeth." At ages 4 and 5 years, children with SLI have significant problems with past-tense marking (typically omitting it; Clahsen, Rothweiler, Sterner, & Chilla, 2014), even when other aspects of language development are proceeding normally. Across any number of languages, including English, German, and Swedish, this is a prominent marker of children with SLI (e.g., Clahsen et al., 2014). That verb structures are so clearly impaired in children with SLI suggests that, perhaps, there is a particular module of the brain that processes verb structures and that this is the site of disturbance in cases of SLI.

The concept of language modularity is not without its critics. Some theorists argue that language emerges in response to an individual's culture rather than in response to any specific internal architecture. Others argue that language is processed by a general neural network that operates on all aspects of language and that the hypothesized language modules lack "neurological reality" (Bickerton, 1995, p. 76). Bickerton, in a well-reasoned critique of modularity theory as it applies to language, showed that the results of research on disordered language due to developmental disability (e.g., cognitive impairment) and brain injury have failed to support the modularity concept. For instance, Bickerton reviewed studies of persons with damage to a specific area of the brain purportedly linked to grammar problems, noting that these individuals showed diverse patterns of syntactic impairment. Because the same module was likely damaged in these individuals, the expectation would be little variability in their impairment. At the same time, it is also important to recognize that, even if language processes are modular, this does not mean language functions specific to a given module (or area of the brain) cannot be subsumed by another area of the brain when injury occurs. We'll discuss the notion of brain plasticity in Chapter 3. Undoubtedly, researchers in the next several decades will better elucidate how language is represented in the neural architecture of the brain.

HOW DOES LANGUAGE RELATE TO SPEECH, HEARING, AND COMMUNICATION?

Language, speech, hearing, and communication together represent basic and interrelated human abilities. Although simple forms of communication such as gesturing do not necessarily require language, speech, and hearing, more advanced forms of communication—particularly speaking and listening—require them.



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DISCUSSION POINT

Speech, hearing, communication, and language are distinct processes, although people often use the terms interchangeably. Before reading further, consider your definition for each, focusing on what differentiates the four processes. Often, the terms *language*, *speech*, *hearing*, and *communication* are used synonymously, but in fact they describe substantially different processes. We previously defined *language* as the rule-governed, code-based tool a person uses to represent thoughts and ideas. Once individuals formulate thoughts and ideas, they can communicate them to other people using speech or a manual sign system; otherwise, individuals can choose to keep thoughts and ideas to themselves (inner language) or can write them down (written language).

Speech describes the neuromuscular process by which humans turn language into a sound signal and transmit it through the air (or another medium such as a telephone line) to a receiver. **Hearing** is the sensory system that allows speech to enter into and be processed by the human brain. We described communication previously as the process of sharing information among individuals. Communication in the form of a spoken conversation between two persons involves language, hearing, and speech; in contrast, communication between two persons in an Internet chat room involves only language.

Speech

Speech is the voluntary neuromuscular behavior that allows humans to express language and is essential for spoken communication. In spoken communication, after people formulate ideas in the brain using language, they must then transmit the message by using speech. Speech involves the precise activation of muscles in four systems: **respiration**, **phonation**, **resonation**, and **articulation**. These four systems represent the remarkable coordination of a breath of air as it is inspired into and then expired from the lungs to travel up through the trachea, or windpipe (respiration). Within the trachea, the breath of air moves through the vocal cords, which are set into vibration to create one's voice (phonation). Then the breath of air proceeds into the oral and nasal cavities, where it resonates (resonation). Finally, the breath of air is manipulated by the oral articulators—including the tongue, teeth, lips, and jaw (articulation)—to emerge as a series of speech sounds that are combined into words, phrases, and sentences. Figure 1.1 illustrates these four systems.

When and how humans first began to use speech is the subject of considerable popular, philosophical, and scientific debate; estimates range from 2 million years ago with *Homo erectus* to only 35,000 years ago with *Homo sapiens* (Cartwright, 2000; Wang & Minett, 2005). Anatomically modern humans (based on remains



FIGURE 1.1 Systems involved with speech production.

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found in Ethiopia) existed about 160,000 years ago, and it is believed that speech and language emerged sometime between 160,000 and 50,000 years ago when the human species experienced a "cultural explosion" (Wang & Minett, 2005). Although this continues to be debated, it is likely that speech became the mode for language expression because of its advantages over other modalities, such as gesturing or grunting (Christiansen & Kirby, 2003). Whereas gesturing requires a direct line of sight, speech enables communication in the dark, around corners, and from relatively far distances; speech also allows one to communicate when the hands are occupied, as when one is carrying an infant or working manually. In addition, speech allows an individual to communicate with a larger number of persons, which became necessary as the group size of early humans increased from small bands of hunter-gatherers of a dozen or so individuals, to larger organized communities of more than 100 members (Cartwright, 2000). Finally, and possibly most important, speech provides the medium for sharing language.

Model of Speech Production

We provide here a relatively basic model of speech production to show how speech moves from the brain to the articulators. A **model** is a way to represent an unknown event on the basis of the best current evidence governing the event. Models of speech production provide a theoretical description of how an individual can move from a cognitive representation ("I forgot to bring paper . . . I'll have to borrow a piece ... I see she has an extra one in her notebook") to a clearly articulated spoken product ("May I borrow a piece of paper?").

Figure 1.2 presents a basic model of speech production involving three stages. The first stage is a perceptual event: The speech production process is initiated with a mental, abstract representation of the speech stream to be produced. This abstract representation is the language code, which provides a *perceptual target* of what is to be produced by speech. At the perceptual level, the code is represented by the phoneme. A phoneme is the smallest unit of sound that can signal a difference in meaning; we combine phonemes to produce syllables and words. For instance, the word *mama* comprises four phonemes, whereas the word *my* comprises two. In written form, phonemic representations are usually bounded by slashes; thus, the four phonemes in *mama* are /m//a//m//a/, and the two phonemes in *my* are /m//aI/. Conventionally, phonemes are represented by the symbols of the International



FIGURE 1.2

Model of speech production.

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FIGURE 1.3

International Phonetic Alphabet.

Source: International Phonetic Association (updated 1993) copyright 1993 by International Phonetic Association.

Phonetic Alphabet (IPA), which is an international set of symbols that represents all of the phonemes of the world's languages. Figure 1.3 provides a reproduction of the IPA simply for illustrative purposes. (Shortly, we'll focus on the smaller subset of phonemes used in General American English; for a preview, turn to Table 1.2.)

The second stage of speech production is development of a *motor schema* to represent the perceptual language–based representation. This is a rough motor plan based on the abstract representation of the perceptual target. The rough plan organizes the phonemes into syllable chunks; for instance, for an infant who wants to call her mother, *mama* is represented as two syllables to be executed: /ma/ /ma/. The rough plan is sent forward to the major muscle groups involved with speech production. This stimulates the production of speech *output* in the

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Humans can share language through many means, such as reading, writing, speaking, and communicating manually (e.g., sign language).



third stage of speech production. The airflow, vocal fold vibration, and oral cavity movements are all finely manipulated to carry out the motor schema and to create speech. Ongoing **feedback** relays information about speech output back to the origination of the perceptual target and motor schema.

Relationship of Speech to Language

Speech is the voluntary and complex neuromotor behavior humans use to share language. Language does not depend on speech because people can share language by other means, such as writing, reading, and signing, or they can keep it to themselves as a tool for thinking. However, speech depends wholly on language because language gives speech its meaning. Without language, speech is just a series of meaningless noises. Persons with significant speech disorders, such as those occurring in some instances of cerebral palsy (a motor-based disorder present at birth), may be able to produce little or no speech, or they may produce unintelligible speech. These persons cannot use speech to transmit their thoughts to other people.

Speech and language are largely independent processes; thus, some persons can have no functional speech yet have excellent language skills. As an example, there is one relatively rare condition called *locked-in syndrome*, in which an individual has completely intact language and cognitive skills, but is unable to perform any voluntary movements (i.e., has complete paralysis) with the exception of eye movement. Persons with locked-in syndrome can learn to communicate with others through eye movements, such as blinking. However, it is also the unfortunate case that many persons with locked-in syndrome don't receive the opportunity to communicate because their consciousness is unrecognized by everyone *except* the person with the condition (Chisholm & Gillett, 2005). Nick Chisholm, who as a 23-year-old New Zealander who was injured while playing rugby, describes his experience after having locked-in syndrome for 5 years this way: "When you're like this (despite having 24 hour care) it's an incredibly lonely existence at times. It's amazing how much time I have to think about things now since the accident. There's heaps of thoughts that I don't bother even expressing" (Chisholm & Gillett, 2005, p. 96).

Hearing

When people produce speech to share language for communication, not only a sender (the speaker) but also a receiver (the listener) is necessary. The receiver's task is to receive and comprehend the information the speaker conveys, and hearing



Speech and language are independent processes, as the case of locked-in syndrome illustrates. Can you think of other illustrations of the independence of speech and language?

is essential to both *reception* and *comprehension* of spoken language. Hearing, or audition, is the perception of sound, and it includes both general auditory perception and speech perception.

Sound Fundamentals

So that you understand hearing and how it relates to language and speech, we will provide a brief overview of **acoustics**, or the study of sound. The transmission and reception of speech involve four acoustic events: creation of a sound source, vibration of air particles, reception by the ear, and comprehension by the brain (Champlin, 2011):

- 1. *Creation of a Sound Source.* A sound source sets in motion a series of events. The sound source creates a disturbance—or set of vibrations—in the surrounding air particles. When you bring your hands together to clap, doing so sets the air particles near the sound source into a complex vibratory pattern. Likewise, when you produce the word *coffee*, it sets the air particles near the sound source (in this case, just in front of your mouth) into a complex pattern of vibration.
- 2. Vibration of Air Particles. Fundamentally, sound is the movement or vibration of air particles. The air particles, set in motion by the sound source, move back and forth through the air (or another medium, such as water). How *fast* the particles move back and forth is the sound **frequency**, or pitch. How *far apart* the particles move when they move back and forth creates intensity, or the loudness of the sound. When you clap your hands or say a word, you set the air particles around the sound source into a vibratory pattern, and how the particles move carries information about frequency (pitch) and intensity (loudness). This information is represented in the movements of air particles between the sender and the receiver.
- 3. *Reception by the Ear.* The ear is specially designed to channel information carried by the air-particle vibrations into the human body. The ear is a complex structure with three chambers. The outer chamber (the outer ear) captures the sound and channels it to the middle chamber (the middle ear). The middle chamber then forwards the acoustic information to the inner chamber (the inner ear), which contains the cochlea. From the cochlea, the auditory information travels up the auditory nerve to the auditory regions of the brain.
- 4. *Comprehension by the Brain*. The auditory centers of the brain—located in the left hemisphere—translate the auditory information sent through the ear and along the auditory nerve. If the information that arrives at the brain involves speech sounds, the speech and language centers of the brain facilitate the comprehension process. If the information that arrives at the brain is not a speech sound (e.g., a clap of the hands or the hum of a fan), the speech and language centers are not involved. The human brain differentiates sound information as speech and nonspeech; in fact, the human ear and the brain are designed to be "remarkably responsive" to processing the sounds of speech (Borden et al., 1994, p. 176).

Speech Perception

Speech perception refers to how the brain processes speech and language. Speech perception is different from **auditory perception**, which is a more general term describing how the brain processes any type of auditory information. Processing a clap of the hands or the hum of a fan involves auditory perception, but processing the word *coffee* requires speech perception. The brain differentiates between general auditory information and speech sounds, processing speech differently than other auditory stimuli.

Speech perception involves specialized processors in the brain that have evolved specifically to respond to human speech and language. Infants enter the world with biologically endowed processing mechanisms geared to the perception of speech, and with exposure to a specific language (or languages), the perceptual mechanism



As you watch the video titled "Auditory Transduction (2002)," consider how the physiological process of hearing can impact a person's speech and communication skills. https:// www.youtube.com/ watch?v=PeTriGTENoc

is calibrated to reflect this language. Calibration of the speech perception mechanism is aided by a few capacities of the young child. First, young children show a preference for auditory rather than visual information; this phenomenon is called *auditory overshadowing* (Sloutsky & Napolitano, 2003), a principle of early development suggesting that young children have a bias toward attending to auditory information in their environment. Second, young children—mostly infants—show a striking ability to process and analyze speech as a particular type of auditory stimulus. From an early age, infants "engage in a detailed analysis of the distributional properties of sounds contained in the language they hear," which helps calibrate their speech perception abilities for their native language or languages (Tsao, Liu, & Kuhl, 2004, p. 1068).

In fact, this detailed analysis appears to involve the infant's use of **statistical learning** (Hay, Pelucchi, Estes, & Saffran, 2011). Believe it or not, infants appear to assess statistical regularities among the sounds they hear in the speech stream around them and use these regularities to identify and learn the words of their native language. To learn new words, infants need to be able to isolate words within running speech so as to recognize that the three sounds in *cup*, blended together, represent the entity "cup." Infants calculate statistics on the durations between phonemes, for instance, to identify whether the phonemes are likely to mark word boundaries, as in my#cup, in which the # marks the word boundary (Hay et al., 2011).

At the most basic level, speech perception involves processing phonemic information, such as the four phonemes in the word *coffee* (/k/a/f/i/) or the three phonemes in the word *cup* (/k//n//p/). Sometimes, analogies are made between how the brain processes a series of phonemes in a spoken word, and how a reader reads a series of letters in a written word, as if speech perception involves the sequential one-on-one processing of individual speech sounds. This analogy is incorrect. When humans produce phonemes, the phonemes overlap with one another in a process called **coarticulation**. For instance, the initial /k/ in *coffee* and the initial /k/ in *coop* are produced differently because the initial /k/ in each word carries information about the subsequent vowels, which differ. The /k/ in *coffee* is influenced by the subsequent *ab* sound, whereas the /k/ in *coop* is influenced by the subsequent *oo* sound. As a result, the $/\mathbf{k}/$ in *coop* is produced with rounded lips in anticipation of the oo sound. Coarticulation is the term that describes this "smearing," or overlapping, of phonemes in the production of strings of speech sounds. The articulators (lips, tongue, etc.) coarticulate speech sounds because doing so is much more efficient than producing just one sound at a time, and the speech-processing mechanisms of the brain have evolved to process the rapidly occurring and coarticulated speech sounds.

Communication

We defined communication previously as the process of sharing information among two or more persons, usually differentiated as the sender (speaker) and the receiver(s) (listeners). Typically in communication, only one person is the sender, although this is not always the case, such as when students coauthor a paper. In addition, although communication may at times involve only one receiver, it can also involve numerous receivers, such as when the re-elected president, Barack Obama, gave his second inaugural speech to an estimated audience of more than 1 million on Washington, D.C.'s National Mall.

Regardless of the number of senders and receivers, communication involves four basic processes: formulation, transmission, reception, and comprehension. The sender formulates and then transmits the information he or she would like to convey, and the receiver takes in and then comprehends the information. *Formulation* is the process of pulling together your thoughts or ideas for sharing with another

person. *Transmission* is the process of conveying these ideas to another person, often by speaking, but alternatively by signing, gesturing, or writing. *Reception* is the process of receiving the information from another person, and *comprehension* is the process of making sense of the message.

Symbolic communication, also called **referential communication**, occurs when an individual communicates about a specific entity (an object or event), and the relationship between the entity and its referent (e.g., a word) is arbitrary (Leavens, Russell, & Hopkins, 2005). For instance, the 1-year-old who says "bottle" to request something to drink is communicating symbolically because the relationship between the word *bottle* and its referent is arbitrary. Symbolic communication also "knows no limitations of space or time" (Bickerton, 1995, p. 15).

However, some communication is not symbolic and is thus constrained to a particular space and time. **Preintentional communication** is communication in which other people assume the relationship between a communicative behavior and its referent. For example, a cat's purr and an infant's cry are types of preintentional communication. The cat and the baby are communicating, but the communicative partner must infer the actual referent or goal of the communication. The infant's cry could mean "I am really hungry" or "This blanket is too hot." In contrast, **intentional communication** is relatively precise in its intent and the relationship between the communication are very transparent (called **iconic communication**) because of the clear relationship between the message and its referent (Bickerton, 1995). For instance, when an infant points to a bottle, or a chimpanzee gestures toward a banana, the act is intentional, iconic communication.

Whether communicating intentionally or symbolically, people share information for three basic purposes: to request ("May I have some cake?"), to reject ("I don't want this cake"), and to comment ("This cake is delicious"). Requesting, rejecting, and commenting need not use language, as any adult interacting with an 8-month-old infant can attest. Infants at this age can request, reject, and comment using an array of nonlinguistic yet intentional means, including crying, laughing, gesturing, smiling, and cooing. However, as infants develop as language users, they begin to use language and speech as a means to disseminate their needs and wants more precisely. By 1 year of age, toddlers use language for all three purposes, even if their vocabulary is not yet well developed ("Bottle?" "Bottle!" "Bottle.").

The combination of speaking and listening is a common mode of communication called **oral communication**. However, communication need not involve speaking or listening. A person can reject by turning away, a baby can comment by smiling, and a dog can request by panting at the door. What is unique about *human* communication though, is the use of *language* and *speech* in the communication process. In much of this text, we emphasize the development and use of language as a tool for uniquely human, sophisticated communication.

Model of Communication

Figure 1.4 provides a model of communication that includes three essential components: (a) a sender to formulate and transmit a message, (b) a receiver to receive and comprehend the message, and (c) a shared symbolic means for communication. Figure 1.5 shows the roles of language, speech, and hearing in formulation, transmission, reception, and comprehension during communication.

In addition to these basic processes is another aspect of communication: *feed-back* (see Figure 1.4). Feedback is information the receiver provides to the sender. In effective communication, the receiver provides continual feedback, and the sender responds to this feedback to maintain the ongoing effectiveness of the communication process. The feedback system is what makes communication *active* and



relationship between the symbol used for communication and the referent is transparent. Provide some other examples of iconic communication common in the life of a university student.



As you watch the video titled "Brain Highways: Speech and Language," consider how speech and hearing processes are related in a child's language comprehension and how this can impact a child's development. https://www.youtube.com/ watch?v=1jiFNqKF7gA



FIGURE 1.4 Model of communication.

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FIGURE 1.5

Roles of language, speech, and hearing in communication.

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dynamic. It is active because both sender and receiver must be fully engaged. It is dynamic because the receiver is constantly sending feedback that the sender interprets and uses to modulate the flow of communication.

A receiver can provide feedback in numerous ways. Linguistic feedback includes speaking, such as saying "I totally agree," "I hear what you are saying," or "Wait; I don't get it." It also includes vocalizing, such as saying "mm-hmm" or "uh-oh." Nonlinguistic feedback, or extralinguistic feedback, refers to the use of eye contact, facial expression, posture, and proximity. This type of feedback may supplement linguistic feedback or it may stand alone. Paralinguistic feedback refers to the use of pitch, loudness, and pausing, all of which are superimposed over the linguistic feedback. These linguistic and nonlinguistic forms of feedback keep the communication flowing, and provide the speaker with valuable information concerning the receiver's comprehension.

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When communicating, people often supplement their speech and language with nonlinguistic, or extralinguistic feedback, such as eye contact, facial expressions, posture, and proximity.



For communication to be effective, the receiver's feedback is just as important as the information the sender provides. The sender and the receiver use feedback to prevent communication breakdowns from occurring:

CHILD: I need that one.FATHER: This one?CHILD: No, that one.FATHER: This here?CHILD: No. (starts crying)FATHER: Maybe it's this one?CHILD: Yeah, I said that one.

If you look closely at this snippet of conversation, you should be able to find a communication breakdown that seems to occur because of inadequacies of both the sender and the receiver. The child appears not to have the language abilities to produce sufficiently explicit information about what he or she desires, and the father does not provide adequate feedback to clarify the lack of specificity. Eventually the father repairs the breakdown, which is called a **conversational repair**. Minor communication breakdowns occur in every conversation but are easily recognized and repaired if the sender is closely monitoring the receiver's feedback and the receiver is providing ongoing feedback. More serious communication breakdowns occur when receivers do not provide appropriate types or amounts of feedback or when senders do not attend to the feedback.

Purpose of Communication

The primary purpose of communication is to provide and solicit information. Humans communicate to provide information about their feelings and to obtain information from other people. Individuals communicate to share information about trivial and exciting events and to describe their needs and desires. Table 1.1 provides one system of differentiating the major purposes of communication. All of these purposes are vitally important for developing and maintaining social relationships with other people, as well as for meeting personal basic needs and satisfying desires.



TABLE 1.1

Seven purposes of communication

PURPOSE	DESCRIPTION	EXAMPLE
Instrumental	Used to ask for something	"Will you pass me the butter, please?"
Regulatory	Used to give directions and to direct others	"Go ahead and sit down over there."
Interactional	Used to interact and converse with others in a social way	"How was the game last night?"
Personal	Used to express a state of mind or feelings about something	"There is no way I passed that test!"
Heuristic	Used to find out information and to inquire	"Do you know how much this book is?"
Imaginative	Used to tell stories and to role-play	"Okay, let's practice what you're going to say when you call her."
Informative	Used to provide an organized description of an event or object	"So, we got to the hotel, and they had no record of our reservation. Then, they tell me they have no rooms left at all"

Source: Based on *Learning How to Mean: Explorations in the Development of Language Development* by M. A. Halliday, 1975, London: Arnold; and "Presentation of Communication Evaluation Information" by C. Simon and C. L. Holway, in *Communication Skills and Classroom Success* (pp. 151–199), edited by C. Simon, 1991, Eau Claire, WI: Thinking Publications.

WHAT ARE THE MAJOR DOMAINS OF LANGUAGE?

Form, Content, and Use

Language is a single dimension of human behavior that consists of several distinct domains. In Chapter 2 we discuss these domains more deeply; however, we introduce them here as their understanding will be useful in Chapter 4, when we discuss prominent theories of language development.

A classic representation of the domains comprising language distinguishes among content, form, and use (Lahey, 1988). Consider the following utterances by 3-year-old Adelaide: "I beating you up the stairs." "I wonned!" "I am so fast." These utterances provide an array of analytical possibilities for characterizing Adelaide's language. First, you can consider the *form* of Adelaide's utterances. Form is how words, sentences, and sounds are organized and arranged to convey content. When you consider form, you examine such things as sentence structure, clause and phrase usage, parts of speech, verb and noun structures, word prefixes and suffixes, and the organization of sounds into words. For instance, in examining the form of Adelaide's utterances, note that she uses three simple sentences, the first of which contains a prepositional phrase (*up the stairs*). She uses various parts of speech, including nouns (*stairs*), pronouns (*I*), articles (*tbe*), prepositions (*up*), verbs (*running*), and adverbs (*so*). Adelaide also uses a number of speech sounds, including a variety of vocalic sounds (i.e., vowels) and several consonantal sounds (i.e., consonants; e.g., /b/, /w/, /f/).

In considering form, you must take a closer look at how sentences are structured. Examination of Adelaide's sentence structures reveals that each sentence contains a subject, which, in all cases, is the personal pronoun *I*. Each sentence also contains a predicate, or verb, structure. In her three short utterances, Adelaide uses three different verb structures. In the first sentence, *I beating you up the stairs*, she uses the transitive verb *beating*, which requires an object (i.e., you). Note that although she has inflected the verb *beat* with the present progressive marker *-ing* to show that the actions are occurring continuously in the present, she has also omitted the auxiliary verb *am*. In the



In the example of Adelaide's language, she said the word *wonned*. What are some possible explanations for this error?

second sentence, Adelaide uses the verb *wonned*. In this case, she has produced the irregular past tense form of *win* but has added the past tense marker for regular verbs, *-ed*. This verb is an intransitive verb, which does not require an object, and none is provided. In the third sentence, the verb structure comprises a *be* verb (*am*) that serves as the main verb in the sentence and requires a subject complement (*so fast*).

Second, you can consider **content**, which refers to the meaning of language—the words used and the meaning behind them. We humans convey content through our vocabulary system, or lexicon, as we select and organize words to express our ideas or to understand what other individuals are saying. You can consider the content of Adelaide's utterances in a variety of ways: She uses 12 words; of these, she repeats one word (1) several times, for a total of 10 different words. The words beating, wonned, and *fast* create lexical ties across the utterances because conceptually they work together to denote that a race of some type is occurring. The words she uses and the concepts she expresses through these words are fairly concrete. She does not use figurative or idiomatic words, nor does she use abstract language. The focus is clearly on the here and now. Language that focuses on the immediate context is contextualized, and typically the content of highly contextualized language is concrete and supported by cues within the environment (e.g., gestures, facial expressions). Thus, in this particular example, the context in which Adelaide speaks provides important information that supplements the content of the language. In contrast, imagine that Adelaide was telling the story of this race over the telephone to her grandmother. She would need to be much more precise to convey the content. When we share language with little reliance on the context for conveying content, it is decontextualized.

Third, you can consider the language *use*. **Use** pertains to how people draw on language functionally to meet personal and social needs. When you examine this domain of language, you are asking about the intentions behind the utterances and how well the utterances achieve these intentions. Thus, you examine individual utterances to consider their intent. One possible scheme is Halliday's seven communication functions (see Table 1.1). For the analysis of Adelaide's language use, you can conclude that the intentions behind her utterances are primarily interactional (language used to interact socially) and personal (language used to express a state of mind).

Examination of use also involves consideration of how well language achieves these intentions—for example, whether an individual can maintain a topic through several turns in a conversation, can regulate the participation of other people (e.g., through eye contact, facial expressions, pausing), and can adjust language given the particular demands of the communicative situation and the listener's needs. Because analysis of use requires understanding the context in which language is occurring, it may be difficult to evaluate one's language use by reading a transcript. For example, you would have no way to know from the transcript of Adelaide's utterances whether she is meeting the contextual needs of the situation, and whether she is regulating her language use effectively to achieve her intentions.

Components of Form, Content, and Use

Form, content, and use represent a three-domain system used to represent and organize the major dimensions of language. A five-component system is also often used, which provides a slightly more refined description of the components of each of the three domains. The five components are phonology, morphology, syntax, semantics, and pragmatics. The first three—phonology, morphology, and syntax—are three components of form, whereas the components of semantics and pragmatics are synonymous with the domains of content and use, respectively. Following is a brief description of each component; these topics are considered in more depth in Chapter 2:

1. Phonology (form) refers to the rules of language governing the sounds that make syllables and words. Every language has a relatively small number of meaningful sounds, or *phonemes*.General American English (GAE; also called *Standard American*



As you watch the video titled "Language Domains," consider how each domain allows for detailed specificity in communication. https://www.youtube.com/ watch?v=WrNi7VrumJU

TABLE 1.2

Vowels and consonants of General American English

CONSONANT SYMBOL	EXAMPLE	CONSONANT SYMBOL	EXAMPLE
b	<u>b</u> at	r or ī	<u>r</u> ose
р	pat	S	<u>s</u> un
d	<u>d</u> ip	ſ	<u>sh</u> ine
t	<u>t</u> ip	f	<u>f</u> it
g	give	ţſ	<u>ch</u> urch
h	<u>h</u> ot	θ	<u>th</u> ink
j	уes	ð	<u>th</u> at
k	<u>c</u> at	V	vet
1	<u>l</u> ot	W	<u>w</u> ash
m	mine	Z	zag
n	nose	3	trea <u>s</u> ure
ŋ	ri <u>ng</u>	ф	jail

VOWEL SYMBOL	EXAMPLE	ARTICULATORY FEATURES
i	f <u>ee</u> t	high, front, unrounded
I	f <u>i</u> t	high, front, unrounded
e	m <u>a</u> ke	mid, front, unrounded
ε	b <u>e</u> t	mid, front, unrounded
æ	c <u>a</u> t	low, front, unrounded
u	bl <u>u</u> e	high, back, rounded
U	pull	high, back, rounded
Э	b <u>ough</u> t	mid, back, rounded
0	<u>go</u>	mid, back, rounded
a	b <u>o</u> x	low, back, unrounded
Λ	b <u>ug</u>	mid, central, unrounded
Э	<u>a</u> round	mid, central, unrounded
3^{ι}	b <u>ir</u> d	mid, central, unrounded
9 ^r	fath <u>er</u>	mid, central, unrounded

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English) has about 39 phonemes (give or take a few, depending on the dialect), as shown in Table 1.2. GAE relies on the combination of 15 vowels and 24 consonants to create about 100,000 words. Some languages use more phonemes; others use fewer.

Allophones are the subtle variations of phonemes that occur as a result of contextual influences on how phonemes are produced in different words. For instance, the two /p/ phonemes in *pop* are produced differently, given the position of each in the word. The initial /p/ is aspirated, meaning that it is produced with a small puff of air. In contrast, the final /p/ is unaspirated. (The final /p/ can be aspirated but typically is not.) The two /p/ sounds in *pop* are allophonic variations of a single phoneme, and many phonemes have several allophones. In addition, each language has rules governing how sounds are organized in words, called **phonotactics**. For instance, in English the phoneme /g/ never directly follows /s/ or /l/ at the beginning of a syllable.

2. Morphology (form) pertains to the rules of language governing the internal organization of words. Previously, we defined *morpheme* as the smallest unit of language that carries meaning; many words contain two or more morphemes. We can "morph" (manipulate) words in a variety of ways to change their meaning. For instance, we can add prefixes to words to change their meaning—such as by adding the morpheme *pre*- to words to create *preschool*, *predisposition*, *preview*, and *pretest*. Also, we can use suffixes to add grammatical information to words (i.e., to indicate basic grammatical information such as tense or plurality). These types of suffixes are called *grammatical morphemes*. Grammatical morphemes include the plural *-s* (*cat_cats*), the possessive 's (*mom_mom*'s), the past tense *-ed* (*walk_walked*), and the present progressive *-ing* (*do_doing*), to name a few. Morphology is an important linguistic tool that not only allows us to add precision to language (e.g., "Tamika walk" vs. "Tamika had walked"), but also to expand vocabulary exponentially using a relatively small core of words (base vocabulary) and morphing them into a much larger pool of word families (e.g., *school, schools, schooling, schooled, preschool*).

3. Syntax (form) refers to the rules of language governing the internal organization of sentences. Knowledge of the rules governing syntax enables us to readily turn the simple statement *He did it* into the question *Did be do it?*, and to embed one simple sentence (e.g., *Andre is angry*) in another (e.g., *Andre is not coming*) to produce a complex sentence (e.g., *Andre, who is angry, is not coming*). Syntax is what permits a child to produce a seemingly endless sentence by linking a series of simple sentences: *This is Thomas and he is so mad at Lady and Lady goes off the siding and here comes Percy and Thomas gets out of the way and Percy is coming so fast.* In short, whereas semantics provides the meaning to utterances, syntax provides the structure. Noam Chomsky's well-known proposition that *Colorless green ideas sleep furiously* illustrates the difference between semantics and syntax, in which a sentence is devoid of meaning but conforms to sophisticated syntactic rules.

4. Semantics (content) refers to the rules of language governing the meaning of individual words and word combinations. When people produce a given word (e.g., *cat*) or phrase (*black cat*), they express a certain meaning. Semantics thus involves consideration of the meaning of various words and phrases. For instance, you know that a *culprit* is someone who has done something wrong; the word *run* has many meanings, whereas the word *stapler* has only one meaning; the phrase *bent over backwards* has both a figurative and a literal meaning; and the words *papaya*, *banana*, and *kiwi* go together conceptually. If you ask a person to produce the first word that comes to mind when he or she hears the word "vehicle," the semantic relationship among words might provoke the person to respond "car" (or, alternatively, "truck" or "tractor"). Knowledge of semantics tells you something is wrong with the sentence linguist, Noam Chomsky produced, *Colorless green ideas sleep furiously*, and differentiates the meaning the words express (semantics) from the grammar that organizes them into a sentence (syntax) (Pinker, 1994).

5. **Pragmatics** (use) pertains to the rules governing language use for social purposes, and is a synonym for the term *social communication*. Pragmatics com-



As you watch the video titled "Fantastic Feature We Don't Have In the English Language," consider how English creates form, content, and use and how other languages do the same but with different features. https://www.youtube. com/watch?v=QYIVJImjLEc



prises the set of rules that govern three important aspects of the social use of language: (a) using language for different functions or intentions (communication intentions); (b) organizing language for discourse, including conversation; and (c) knowing what to say and when and how to say it (social conventions). In using language for social purposes, pragmatic rules govern linguistic, extralinguistic, and paralinguistic aspects of communication, such as word choice, turn taking, posture, gestures, facial expression, eye contact, proximity, pitch, loudness, and pauses.

WHAT ARE SOME REMARKABLE FEATURES OF LANGUAGE?

Language is one of the most extraordinary capacities of the human species, and young children's extremely rapid language acquisition is one of the most remarkable aspects of early development. Given the thousands of scientific studies exploring the extraordinariness of language, including how children go about learning the languages of their communities, you might assume nothing is left to learn about language development. Such an assumption could not be further from the truth. There are many mysteries that remain regarding how children develop their language abilities and, indeed, how humans acquired language in the first place.

Why is language such a mystery? In part, its mysteriousness relates to several remarkable features of language that work together to make it a particularly complicated area of study, albeit one that continues to capture the attention of numerous scholars around the world. In this section, we consider five of these remarkable features of language: acquisition rate, universality, species specificity, semanticity, and productivity.

Acquisition Rate

Faced with the task of explaining how children develop their remarkable language skills, scholars have often noted that the sheer **acquisition rate** of language makes it difficult to study. For instance, consider the following interaction between a mother and her 30-month-old daughter:

- TAJIKA: Thomas the very useful engine is in the siding.
- MOTHER: He's in the what?

TAJIKA: The siding. This is the siding.

MOTHER: Oh, that's the siding?

This brief interaction shows the extraordinary capacity of young children to learn and use new words at a stunning rate. *Siding* is a part of a train track that runs off the main course. In this vignette, Tajika has placed her miniature Thomas the Tank Engine on the siding. Her mother did not know the meaning of *siding*, but Tajika clearly did.

Erica Hoff, a scientist who studies early language development, stated that language development reveals the genius in all children (Hoff, 2013), whereas others have referred to infants and young children as "scientists in cribs" (Gopnik, Meltzoff, & Kuhl, 2009). The reference to children as geniuses and young scientists is based on the fact that children acquire the complexities of language at a seemingly miraculous rate: Although at birth children understand and use no words, within a year, they begin to understand and use several words, and by about 24 months, they have a vocabulary of several hundred words and can combine them into short sentences. Whereas the 1-year-old can say only "mama" to request something to drink, the 3-year-old can say, "Mom, Daddy said I could have some chocolate milk and I think I'll have it in the pink sippy cup."

The years of early language acquisition, from birth to about puberty, are often called a critical period (or sometimes a *sensitive period*) for language development,

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meaning that a window of opportunity exists during which language develops most rapidly and with the greatest ease. (We will discuss the concept of a critical period in more depth in Chapter 3.) A critical period for language development also implies periods of time in which the environment has particularly important impacts on language growth.

One important study of the critical period, as it applies to language development, involved research on institutionalization of infants in Romania (Nelson et al., 2007). Institutionalized care in Romania, at least until the early 2000s, typically featured very limited stimulation of infants, in part due to the very high child-to-caregiver ratio in such settings (Smyke et al., 2007). In this study, institutionalized infants were randomly assigned to remain in institutionalized care or to be placed in foster homes, in which presumably, stimulation would be greater because of a decrease in the child-to-caregiver ratio. An important part of this study, in addition to assessing the benefits of foster-care placements, was testing the critical-age hypothesis; the researchers did this by varying the time when children were moved into foster care: 14 children were placed in foster care before 18 months, 16 children between 18 and 24 months, 22 between 24 and 30 months, and 9 after 30 months (Nelson et al., 2007). If a critical period is operating, within which language development is most readily influenced by features of the environment, we might expect that children placed earlier in foster care would exhibit better language skills than children placed later. In fact, this is exactly what researchers found when they measured the language abilities of the foster-care children at 3.5 years of age. On standardized measures of language ability, those placed earlier had the highest scores, and those placed later had the lowest scores, with a gap of about 15 points separating those with the earliest versus the latest placements.

The critical period in the human species for language development is similar to the critical periods in other species for acquisition of behaviors considered essential for survival. For instance, songbirds show a critical period for song learning, although considerable differences in the ways in which songbirds acquire songs occur among the more than 4,000 songbird species (e.g., some songbirds require early exposure to songs for song learning, whereas others can develop song in isolation; Brenowitz & Beecher, 2005). Because only one species of *Homo sapiens* exists, the critical period of language development applies to all children everywhere.

Universality

Language is ubiquitous among the communities of the world. Every human culture has one language, and sometimes many languages, and all are equally complex. The **universality** of language, as Steven Pinker wrote in *The Language Instinct* (1994),

fills linguists with awe, and is the first reason to suspect that language is not just any cultural invention but the product of a special human instinct. . . . Cultural inventions vary widely in their sophistication from society to society. . . . [L]anguage, however, ruins this correlation. There are Stone Age societies, but there is no such thing as a Stone Age language. (p. 26)

The universality concept, as applied to language, suggests all persons around the world apply the same cognitive infrastructure to the task of learning language, and that this cognitive infrastructure is particularly suited to the task of developing symbolic representations for objects and actions (Christiansen & Kirby, 2003). Although world languages clearly vary in their syntactic organization (e.g., some languages do not have auxiliary verbs, whereas others do; see Tomasello, 2005), the cognitive infrastructure is the same for all languages. Therefore, the way in which children learn language, and the time points at which they achieve certain milestones appear to be fairly invariant among global language communities.



In this section, we consider the concept of critical period as it applies to language development. To what other areas of development does the concept of critical period apply?

Species Specificity

Language is strictly a human capacity. No other animals share this aptitude; thus, human language shows **species specificity**. Although many nonhuman species can communicate, their communication abilities tend to be relatively iconic, such that there is a transparent relationship between *what* is being communicated and *how* it is being communicated. One study of the communication skills of domestic dogs (Border Collies, for those interested in the details) revealed they were able to fetch an object when shown a miniature version of the object (Kaminksi, Tempelman, Call, & Tomasello, 2009). (They did less well when asked to fetch objects shown in a photograph.) The study found domestic dogs could comprehend human communication that featured iconic signs. Although this is an interesting feat, it pales in comparison to what even very young children can do, as little is iconic about human language. For instance, a 2-year-old would have little difficulty comprehending the phrase "Mommy will be home soon" even though it is not iconic at all.

Animal communication systems differ in another important way from human communication systems, specific to its hierarchical properties. Human language provides a syntactic framework that permits the combination of ideas into larger hierarchical propositions; in fact, humans can produce an endless array of novel constructions with the tool of syntax. Although animals can learn sequences of complex actions, the hierarchical complexity of human language far exceeds the capabilities of even the most sophisticated of nonhuman primates (Conway & Christiansen, 2001). No other animal has a communication system that provides the means for combining symbols in the way syntax allows humans to use language.

Semanticity

Human language allows people to represent events that are decontextualized, or removed from the present—to share what happened before this moment or what may happen after this moment. This concept is called **semanticity** or, alternatively, **displacement**. As mentioned previously, human language has no time or space boundaries because the relationship between a referent and the language used to describe it is completely **arbitrary**. For instance, the word *cup* has no relationship to that to which it refers; the relationship is completely arbitrary. As such, a person can say the word *cup* without having a cup present, and other people will know to what the person is referring. Semanticity (or displacement) is the aspect of language that allows people to represent the world to others, a remarkable capacity shared by no other species.

Productivity

Productivity describes the principle of combination—specifically, the combination of a small number of discrete units into seemingly infinite novel creations. Productivity is a phenomenon that applies to other human activities—such as mathematics and music—as well as to language. With a relatively small set of rules governing language, humans can produce an endless number of ideas and new constructions. For instance, humans use only a small set of sounds (speakers of GAE use about 39) and can combine these small units—according to a set of rules they know intuitively (e.g., /g/ cannot follow /l/ in English at the beginning of a syllable)—into an infinite number of words. Likewise, humans use a relatively small number of words and with them, can create an infinite variety of new sentences, most of which no one has ever heard. Because of the remarkable principle of productivity, you could, right now, produce a sentence that no other person has ever uttered.

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Although many nonhuman species can communicate, their communication is iconic in that a transparent relationship exists between what is being communicated and how it is being communicated.





The principle of productivity is inherent in language in its earliest stages of acquisition: Children who are 18 months old and have about 50 words in their vocabulary can combine and recombine this small set of words to produce sentences that neither they nor others have ever heard. This feature of language is unique to humans because the units of nonhuman communication systems cannot be recombined to make new meanings. For instance, night monkeys have 16 communication units. These units cannot be recombined to make more than 16 possible ways to communicate because the principle of productivity does not apply (Bickerton, 1995).

WHAT ARE LANGUAGE DIFFERENCES AND LANGUAGE DISORDERS?

For most children, language development follows a fairly invariant path. Children around the world typically begin to communicate using words around the same time (12 months), and they often begin to combine words to form two-word combinations (e.g., daddy shoe, mommy go) by around 18 months. From that point, they accrue thousands of words in their productive vocabulary by age 5 years and achieve an adultlike grammar well before puberty. However, although this general developmental trajectory characterizes most children, it does not describe them all. In fact, a comparison of any two children of about the same age will reveal considerable differences in the form, content, and use of their language. Such differences relate to the language being learned, gender and temperament, and the language-learning environment. In addition, some children show mild to severe disorders in language acquisition as a result of innate genetic predispositions, developmental disability, or injury or illness. In Chapter 10, we provide a more in-depth examination of these topics.

Language Differences

Language difference is a general term that describes the variability among language users. Two children of exactly the same age will likely show a range of differences if their language abilities are compared. For example, they may differ in

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the number of words they understand, the length of their sentences, the types of words they use, and the way they share language with other people during conversation. Sometimes the differences between two individuals are subtle. However, in other instances the differences may be more significant and may even compromise communication. For instance, consider the following descriptions of young children in the United States:

- Lamika, a 5-year-old girl, speaks a dialect of African American English. She attends a child care center in which all the other children and her teachers speak GAE.
- Angela, a 3-year-old child with hearing loss, communicates by using Signed Exact English. She attends a special preschool for children with hearing loss, and most of her peers sign with American Sign Language.
- Jack, a 2-year-old child, is learning Spanish and English simultaneously. His family speaks both languages at home. In his preschool, which includes mostly monolingual Spanish-speaking children, he speaks primarily Spanish but sometimes uses the grammar of English.
- Mimi, a 3-year-old child adopted from China at age 18 months, uses fewer vocabulary words and produces shorter sentences than other children in her child care center.

These examples reveal how children (as well as adults) who live in culturally and linguistically diverse communities show variability in their language. In this section, we discuss several major factors that help explain differences among individuals—specifically, dialect, bilingualism, gender, genetic predisposition, and language-learning environment.

DISCUSSION POINT

What English dialect do you speak? What dialects do your friends speak? To what extent do these differences affect your communication with one another?

Learn More About 1.6

As you watch the video titled "The Psychology of Accents," consider your own perception of accents and how these perceptions may influence how you interact with others. https://www.youtube.com/ watch?v=CSp9ghRymgk

Dialect

Dialects are the natural variations of a language that evolve within specific cultural or geographic boundaries. These variations affect form, content, and use. Given the many speakers of English around the world, the fact that numerous English dialects exist is not surprising. In the United States, common dialects include Appalachian English, African American English, and Spanish-Influenced English. Each of these dialects may show subtle to more significant variations in form, content, and use from those of the GAE dialect. This finding is also true of the dialects of English spoken around the world, including those of Great Britain, Australia, and New Zealand.

Every language includes a range of dialectal variations, and the number of dialects for a given language increases when users of a language are spread across a large geographic region, when significant geographic barriers isolate one community from other communities, or when social barriers are present within a language community. Language Diversity and Differences: *African American English* provides an in-depth look at the African American English dialect. We provide a more thorough discussion of language diversity and differences, including dialects, in Chapter 9.

Bilingualism

Although many children in the United States learn a single language (monolingualism), others acquire two or more languages (bilingualism). Hawaii is the only officially bilingual state (English and Hawaiian), although a number of states are unofficially bilingual, providing services in multiple languages. This is particularly the case in cities, like the international hub of Miami, Florida, in which the population is very culturally and linguistically diverse. With such diversity increasing across the United States, it is not surprising that today, about one-fifth of Americans speak a language other than English at home (U.S. Census Bureau, 2013).

Bilingualism is the norm in many countries, such as Belgium, where many citizens speak both French and Dutch. (There are in fact three official languages in Belgium, as some persons also speak German.) Canada is officially bilingual (English and French), and the constitution requires that services be available in both languages. India has a staggering 23 official languages, and most persons are trilingual, speaking Hindi, English, and the language of their community. Children who are raised bilingually often show language differences not seen in children who are raised monolingually, such as interchanges between the syntax and the vocabulary of the two languages they are learning. This phenomenon is called **code switching** (Muñoz, Gillam, Peña, & Gulley-Faehnle, 2003). For instance, a child who is bilingual in Spanish and English may produce a sentence in Spanish that includes an English phrase or an English sentence that reflects Spanish syntax.

Children who learn multiple languages can do so simultaneously or sequentially. With *simultaneous bilingualism*, children acquire their two languages concurrently. With *sequential bilingualism*, children develop one language initially, then acquire a second language later. Sequential bilingualism is relatively common for Hispanic children in the United States who learn Spanish at home but then develop English in preschool or elementary school. The English skills of a sequential

LANGUAGE DIVERSITY AND DIFFERENCES

African American English

The English language has many dialects. The term *dialect* refers to natural variations in form, content, and use within a single language. In the United States, African American English (AAE) is a prominent dialect used not only by some African American individuals, but also by persons of various other ethnicities and races. An individual's use of AAE is typically influenced by the amount of contact that person has with AAE-speaking peers rather than by his or her ethnic or racial heritage, a point that holds true for any English dialect.

Sociolinguists, who study variability in languages as a function of social influences, have provided rich descriptions of some of the most prominent features of AAE that distinguish it from GAE (e.g., Labov, 1972). Some features of AAE involve language form, including phonology (e.g., reduction of final consonant clusters, such as /mos/ in AAE vs. /most/ in GAE) and grammar (e.g., omission of the copula verb, such as "that hers" in AAE vs. "that is hers" in GAE; Charity, Scarborough, & Griffin, 2004). Additional features of AAE involve language content and use.

Like all other English dialects, AAE is a systematic, rule-governed system with its own rules and conventions that influence form, content, and use. In every way, AAE is equivalent in its complexity to any other English dialect (Goldstein & Iglesias, 2013). This point is important because some scholars in the past suggested that AAE is an "impoverished" version of English, a perspective that shows a clear lack of understanding of dialectal variations, including the fact that all languages (and their dialects) are equivalent in complexity. Still, in many language communities around the world, people value and assign greater prestige to some dialects than others.

In the United States, some experts contend that speakers of AAE face risks in educational achievement because their dialect differs from the one used most commonly in schools, sometimes called School English (SE; Charity et al., 2004). One reason for this risk may be a mismatch between the AAE speaker's representation of linguistic features and the features prominent in the dialect of his or her teachers, which often (but not always) is GAE (Charity et al., 2004). Another possibility is that some teachers, particularly those who speak the GAE dialect, may have a negative bias toward pupils who speak AAE, holding lower expectations and providing less effective instruction to these pupils. However, because some research shows that the level of familiarity with SE among pupils who speak AAE is associated positively with their reading achievement (Charity et al., 2004), practitioners must improve their understanding of how dialectal variations both aid and inhibit children's success in school.



Fewer children are raised bilingually in the United States than in a number of other countries. Why? Why might this trend change in the future? Spanish–English child who is bilingual in the early stages of development will differ from those of a child who learned both Spanish and English from birth, and both children may show some differences in language form, content, and use from those of monolingual English-speaking children.

Although the language a child learns has clear influences on his or her language development—for instance, the stories Chinese-speaking children produce differ in their organizational structure from those of English-speaking children (Wang & Leichtman, 2000)—all languages are approximately equal in complexity. In other words, although some differences can be seen among children as a function of the language (or languages) they are learning, all languages use the same infrastructure of the human brain and thus are similar in complexity (Bickerton, 1995).

Gender

One relatively well-known fact is that girls have an advantage over boys in language development. Girls usually begin talking earlier than boys do (Karmiloff & Karmiloff-Smith, 2001) and develop their vocabulary at a faster rate than boys do in the early years of life (Rowe, Raudenbush, & Goldin-Meadow, 2012). Also, boys are more likely to have significant difficulties with language development, or language impairment; in fact, prevalence estimates show a ratio of about 2 or 3 boys to 1 girl (Dale, Price, Bishop, & Plomin, 2003; Spinath, Price, Dale, & Plomin, 2004). Despite these apparent differences between the genders, Kovas and colleagues (2005) pointed out that gender differences in language development are relatively minor, particularly as children move beyond toddlerhood into the preschool years.

Why such gender differences in language development occur is unclear. Experts point to the possibility of both biological and environmental influences (Kovas et al., 2005). For example, parents may talk more often to girls than to boys, which would help speed language development. Alternatively, hormonal factors may contribute to these differences.

Genetic Predisposition

Any preschool teacher is well aware that young children of about the same age show incredible variability in their language development. Some of this variability relates to genetic predisposition. As a complex human trait, language ability is unlikely to reside on a single gene. However, evidence points to the influence of different alleles from a set of genes on all aspects of language development, including syntax, vocabulary, and phonology (Stromswold, 2001). Twin studies are one method researchers use to estimate the contribution of genetics to language development, as well as the heritability of language disorders (see Research Paradigms: *Twin Studies*). In twin studies, researchers compare the language abilities of identical (*monozygotic*, or *MZ*) and fraternal (*dizygotic*, or *DZ*) twins; MZ twins are genetically identical, whereas DZ twins share 50% of their genetic material. Twin studies allow researchers to identify the exact contributions of genetic and environmental influences to language development.

How much of human language ability is inherited? The results of one study involving 787 pairs of twins revealed that about 16% of the variability in language ability in 4-year-old children could be attributed to heritability (Kovas et al., 2005). However, language disorders among twins seem to be more strongly influenced by genetic factors than do language disorders among children in the typical population; in fact, about 49% of variability in language ability can be attributed to heritability (Spinath et al., 2004). If one MZ twin has a language impairment, the other twin has about an 85% likelihood of also having the impairment.

Language-Learning Environment

The language-learning environment in which children are reared exerts considerable influence on their language development. Although children bring biologically

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RESEARCH PARADIGMS

Twin Studies

Both genetic and environmental influences play significant roles in language development. However, identifying the exact contributions of genetic influences relative to environmental influences can be difficult. One way to estimate the unique influences of genetics versus environment is twin studies, or the twin method (Kovas et al., 2005). When monozygotic (MZ) or dizygotic (DZ) twins grow up in the same household, they are assumed to share 100% of their environmental influences, both prenatally (in the womb) and postnatally (in the home environment; Kovas et al., 2005). Researchers interested in estimating the influence of genetic versus environmental influences on language development collect measures of language from sets of twins, often repeatedly across time. These researchers use a number of sophisticated statistical techniques to determine the genetic heritability of certain language skills by comparing MZ and DZ twins. They also can isolate environmental influences on language by carefully controlling the amount of variability in language skill that can be attributed to genetic influences.

One of the largest twin studies to date is the Twins Early Development Study (TEDS), conducted in the United Kingdom, and supported financially by the United Kingdom's Medical Research Council (Trouton, Spinath, & Plomin, 2002). This study involved 6,963 sets of twins; 2,351 were MZ twins, 2,322 were same-gender DZ twins, and 2,290 were opposite-gender DZ twins. All the twins were born in the United Kingdom between 1994 and 1996, and their language development was studied at ages 2, 3, and 4 years by using parent questionnaires. Twins born with severe medical or genetic problems or perinatal complications were not included in the sample, nor were twins whose zygosity could not be determined and those whose parents did not speak English at home (Spinath et al., 2004). Various studies have been conducted by using the data from these twins not only to examine genetic and environmental influences on language development, but also to compare language development for boys versus girls, and to estimate the heritability of language impairment. As a result of TEDS, researchers will be able to answer numerous questions in the next decade by using data from these nearly 14,000 children.

endowed abilities and propensities to the language-learning task, the neural architecture that supports language acquisition is an "open genetic program" (Cartwright, 2000, p. 195). This term means the neural architecture is calibrated on the basis of input from the environment, or the "actual evidence" children receive from the environment, concerning the form, content, and use of the language or languages to which they are exposed (Cartwright, 2000). In short, everything the child experiences in his or her environment will help calibrate his or her language-learning apparatus.

The environmental aspects that seem to figure most prominently in the young child's language development are the quantity and quality of language experienced. Quantity refers to the sheer amount of language a child experiences. Quality refers to the characteristics of the language spoken in the child's caregiving environment: the types of words (e.g., nouns, verbs, adverbs), the construction of sentences (e.g., simple, complex, compound), the intention of sentences (e.g., directives, declaratives, interrogatives), and the organization and specificity of stories (e.g., emotional expression, situational details). How often toddlers and preschoolers participate in conversations with their caregivers is significantly associated with language growth in the first few years of life, indicating that sheer volume of talk is important (Zimmerman et al., 2009). However, children who are exposed to an array of complex sentence forms (e.g., sentences with subordinate clauses, such as That boy who *bit me is not my friend*), in addition to simple sentence forms, (e.g., That boy is not *my friend*) will use more complex sentence forms than those used by children not exposed to such syntax (Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002). In short, characteristics of the language to which children are exposed in their prominent caregiving environments (home, preschool, etc.) contribute to the variability in children's language development.

DISCUSSION POINT

Young children who participate in many conversations at home have better language skills than children who participate in few conversations. Explain why there are differences in the conversational opportunities children experience in American homes.

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Studies of infants reared in mainstream United States communities have revealed one particularly important aspect of the language-learning environment: caregiver responsiveness. This term refers to the promptness, contingency, and appropriateness of caregiver responses to children's bids for communication through words or other means (Tamis-LeMonda, Bornstein, & Baumwell, 2001). Experts contend responsiveness provides a significant aid to children's language development because it reflects the child's current topic of interest, and provides sensitive input that promotes semantic and syntactic learning. Higher degrees of caregiver responsiveness during infancy and early toddlerhood are associated with accelerated rates of language development in children. For instance, the results of one study revealed children of highly responsive mothers achieved the 50-word milestone, on average, at age 15 months, whereas children of less responsive mothers were more likely to achieve this milestone at about age 21 months (Tamis-LeMonda et al., 2001). The contribution of caregivers' responsive and sensitive language input to children's language development indicates quality of language input is just as important as quantity. See Theory to Practice: Children Who Are Linguistically Reticent in the Classroom for a description of how the relation between temperament and language has influenced practice in the area of promoting linguistic interactions with children who are reticent.

Learn More About 1.7

As you watch the video titled "What is SLI?" consider how a language disorder may go undetected in an individual for a long period of time. https://www.youtube.com/ watch?v=Pqu7w6t3Rmo



As you watch the video titled "Speech & Language Therapy: Helping Michael," consider how all the areas of form, content, and use can be impacted by speech and language therapy. https://www.youtube. com/watch?v=MpdjP0zHeBc

Language Disorders

Like any complex human trait, the ability to develop language in a timely and effortless manner can be adversely influenced by heritable weaknesses in the language mechanism, as well as by the presence of certain developmental disabilities and brain injuries. Children with language impairment show significant difficulties in the development of language, typically achieving language milestones more slowly than other children, and exhibiting long-standing difficulties with various aspects of language form, content, and use. Next, we provide a brief overview of childhood language impairment, a topic we address in more detail in Chapter 10.

Heritable Language Impairment

Children with a heritable language impairment exhibit depressed language abilities, typically with no other concomitant impairment of intellect. Because of its specificity to the functioning of language, this condition is often called **specific language impairment** (SLI), and it affects about 7%–10% of children (Beitchman et al., 1989; Tomblin et al., 1997). SLI is the most common type of communication impairment affecting children. It is the most frequent reason for administering early intervention and special education services to toddlers through fourth graders.

Evidence suggests SLI is a heritable condition, as indicated by both twin studies and family pedigree studies (Lai, Fisher, Hurst, Vargha-Khadem, & Monaco, 2001; Spinath et al., 2004). The results of twin studies reveal a strong likelihood for an MZ twin to have SLI if his or her twin is affected. Family pedigree studies show a strong likelihood for a child to have SLI if a parent is affected.

Developmental Disability

Language impairment often co-occurs with certain developmental disabilities. In such cases, language impairment is considered a secondary disorder because it results secondary to a primary cause. Common causes of a secondary language impairment include intellectual disability and autism spectrum disorder. Intellectual disability is a "condition of arrested or incomplete development of the mind, which is especially characterized by impairment of skills manifested during the developmental period" (American Association on Mental Retardation [AAMR], 2002, p. 103). For intellectual disability to be diagnosed, an individual must also exhibit limitations in adaptive behavior, and the activities of daily living, such as difficulties with conceptual skills

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(communication, functional academics, self-direction, health and safety), social skills (social relationships, leisure), or practical skills (self-care, home living, community participation, work; AAMR, 2002). One cause of intellectual disability is Down syndrome, which is due to a chromosomal anomaly during the initial stages of fetal development. Whether intellectual disability occurs because of Down syndrome or other causes, it is often accompanied by significant language impairment.

Another type of secondary language impairment is *autism spectrum dis*order (ASD). *ASD* is an umbrella term describing a variety of developmental conditions characterized by significant difficulties in social relationships and communication with others, and restricted and repetitive behaviors. These difficulties are apparent within early childhood, but may become more apparent over time, as the demands to engage in complex communication with others increase (American Psychiatric Association, 2013). The number of children affected by ASD has increased over the last several decades, with current estimates indicating that about 1 in 68 children have ASD (Centers for Disease Control and Prevention, 2014). Children with autism spectrum disorder usually exhibit mild to profound secondary language impairment, and some children with this disability never develop productive use of language. A condition related to ASD is

THEORY TO PRACTICE

Children Who Are Linguistically Reticent in the Classroom

The frequency with which children use language as a tool to communicate with other people varies substantially among individual children. To some extent, frequency relates to a child's facility with his or her language, but it also relates to temperament. Temperament describes an individual's "innate way of approaching and experiencing the world" (Kristal, 2005, p. 5), and it is a theoretical construct of human behavior that helps researchers understand why some children are bold and energetic, others are sensitive and timid, and some are inflexible (Kristal, 2005). Given that language development requires a child to experience input from the environment to "calibrate" his or her language-learning mechanisms, a reasonable conclusion is that a child's temperament might influence the amount of language input he or she experiences. For instance, a child who is bold may solicit more language from parents and teachers, whereas the child who is reticent and shy may solicit less language.

Theoretical perspectives on the potential interaction of language development and temperament suggest that an *interaction* occurs between these two constructs or that they influence one another. The results of studies on the possible interaction of language and temperament provide support for this theory. For example, Evans (1996) found that 18 kindergartners characterized by teachers as very reticent (e.g., rarely asking for assistance when it was needed, seldom participating in class discussions) performed more poorly than their more talkative peers on a variety of language ability measures in first grade. What remains unclear is whether some children are less talkative because they have less developed language skills, or whether children with less developed language skills are less talkative.

Theory and research on the possibility of a temperament-language interaction have important implications for instruction in the preschool and kindergarten classroom, in which several important goals include fostering children's language skills, promoting socialization among children, and promoting children's ability to use language for a variety of purposes. Teachers may have difficulty helping children who are verbally reticent achieve these goals. One approach that has been tested for increasing children's language use and complexity in the preschool classroom is training teachers to use interaction-promoting responses (Cabell et al., 2011). Examples of interaction-promoting responses include (a) using a variety of questions, (b) inviting children to take turns, and (c) scanning the classroom and inviting uninvolved children to participate. Evidence shows that when teachers use these and other language-promoting techniques in the preschool classroom, the children talk more and use more complex vocabulary and grammar. Although the effects of these techniques have not been determined specifically for children who are verbally reticent, they provide a promising way to translate theory and research on the temperament-language interaction to inform practice.

social communication disorder (SCD), also called *pragmatic communication disorder* (American Psychiatric Association, 2013). Individuals with SCD have particular difficulty in the use of social communication, such as following the rules of conversation (e.g., taking turns, using eye contact) and comprehending more complex and abstract language (e.g., understanding a joke or idiom). SCD is distinctive from ASD in that individuals typically have higher levels of language skill and do not show the restrictive and repetitive behaviors characteristic of ASD. Historically, persons with SCD may have been referred to as having "high-functioning ASD," but in more recent years, it is recognized that SCD is best conceptualized as a particular type of disability that is distinct from that of autism.

Brain Injury

Language impairment can also occur as a function of damage or injury to the mechanisms of the brain involved with language functions. Brain injuries can occur in utero (before birth) and perinatally (during the birthing process), but they can also occur after birth; these injuries are called acquired brain injuries. Acquired brain injuries are a leading cause of death and disability among young children. Brain damage resulting from physical trauma, particularly blunt trauma to the head, is referred to as traumatic brain injury (TBI). Annually, about 500,000 children (0 to 14 years of age) in the United States experience TBI, with the highest rate among infants and toddlers (Langlois, Rutland-Brown, & Thomas, 2007). Causes of TBI in children include abuse (e.g., shaken baby syndrome), intentional harm (e.g., being hit or shot in the head), accidental poisoning through ingestion of toxic substances (e.g., prescription medications, pesticides), car accidents, and falls. Injuries may be *diffuse*, affecting large areas of the brain, or *focal*, affecting only one specific brain region. The frontal and temporal lobes of the brain, which house the centers for most executive functions (e.g., reasoning, planning, hypothesizing) and language functions, are often damaged in head injuries (Eden & Stevens, 2006).

Even though it is popularly believed that the brain of the young child can readily heal following brain injury (because of plasticity), this does not seem to be the case (Catroppa & Anderson, 2009). One possible reason for this misperception is that some young children may have delayed onset of impairment; problems sustained during a brain injury may not be evident until years later, when damaged areas of the brain are applied to complex skills and activities.

SUMMARY

Language is a complex and dynamic system of conventional symbols used in various modes for thought and communication. The human brain uses language as a representational tool to store information and to carry out many cognitive processes, such as reasoning, hypothesizing, and planning. As a communication tool, language provides a productive and efficient means for sharing information with other people. Some researchers consider the human capacity for language to reside in a particular module of the brain; others contend that a more general neural network serves language processes.

Language, speech, hearing, and communication are different albeit interrelated processes. Speech is the voluntary neuromuscular behavior that allows humans to express language and is essential for spoken communication. Hearing is the perception of sound, which includes both general auditory perception and speech perception. Speech perception involves specialized processors in the brain that have evolved specifically to respond to human speech and language. Communication is the act of sharing information among two or more people. Although communication need not involve speech, language, and hearing, the capacity for humans to use these processes to share information makes human communication the most sophisticated among all species.

Language comprises three major domains: form, content, and use. *Form* is how words, sentences, and

L.5 Check Your Understanding Click here to gauge your understanding of the concepts in this section. sounds are organized and arranged to convey content. Form includes phonology (rules governing the sounds used to make syllables and words), morphology (rules governing the internal organization of words and syllables), and syntax (rules governing the internal organization of sentences). *Content* is the meaning of language, including the specific words people use and the concepts words and groups of words represent. *Use* describes the functions language serves, or how people draw on language functionally to meet personal and social needs.

Five remarkable features of language make it particularly fascinating to both researchers and practitioners. First is the acquisition rate of language; young children exhibit a striking capacity for developing language rapidly and efficiently. Second is the universality of language. Language is ubiquitous among world communities, and every human culture has one or more languages that its members share. The third feature is species specificity. Language is a uniquely human capacity; no other animal species shares this aptitude. The fourth feature is semanticity. Human language allows people to represent events that are decontextualized, or removed from the present, including not only real events of the past or future, but also events and concepts that are wholly imaginary and abstract. The fifth feature is productivity—or the principle of combination—which is how the rule-governed code of language provides its users with a generative code by which they can combine a small number of discrete units (e.g., phonemes, morphemes) into seemingly infinite novel creations.

Comparing the language achievements of any two persons, whether children or adults, will reveal considerable individual differences in the content, form, and use of language. *Language differences* and *language disorders* are terms that describe this variability in language achievements among individuals. Language differences occur because of the natural variability in language achievement that results from different dialects, bilingualism, gender differences, genetic predisposition, and varied language-learning environments. A language disorder occurs when an individual shows significant difficulties in language achievement; such disorders result from heritable language impairment, developmental disability, and brain injury.

Apply Your Knowledge

Click here to apply your knowledge to practical scenarios.

BEYOND THE BOOK

- 1. Search http://www.youtube.com for a video of a toddler in a conversation with his or her parent. Prepare a transcript of all utterances the toddler produces. Classify each utterance according to its primary purpose (see Table 1.1). What purposes occur most often?
- **2.** With a classmate, discuss the pros and cons of adopting an official language or languages in the United States. (Currently, there is no official language.)
- **3.** Watch a video or live feed of a person being interviewed by a popular television personality During the interview, assess the types of linguistic,

nonlinguistic, and paralinguistic feedback the person provides. What types of feedback seem to characterize this person?

- **4.** Language is a rule-governed system. Communicating with friends via text-based systems, such as text messaging, seem to have their own set of rules. What are some of these rules? How did these rules come about and how do they spread?
- **5.** In small groups, discuss the benefits of teaching a very young child to use sign language (e.g., to learn "baby signs.") Also discuss why so many parents seem interested in helping their children to sign before they can talk.

Check Your Understanding

Gauge your understanding of the chapter concepts by taking this self-check quiz.





Building Blocks of Language

LEARNING OUTCOMES

After completion of this chapter, the reader will be able to:

- 1. Discuss important concepts related to early phonological development.
- 2. Discuss important concepts related to early morphological development.
- 3. Define the term syntactic development.
- 4. Identify major building blocks in early semantic development.
- 5. Explain important concepts related to early pragmatic development.

