C H A P T E R   7

Language

Key Themes in Language

- **Nature/Nurture**   What roles do nature and nurture play in language development?

- **Sociocultural Influence**   How does the sociocultural context influence language development?

- **Child's Active Role**   How does the child play an active role in the process of language development?

- **Continuity/Discontinuity**   Is language development continuous or discontinuous?

- **Individual Differences**   How prominent are individual differences in language development?

- **Interaction Among Domains**   How does language development interact with development in other domains?

The family reunion had been scheduled for months, and Jennifer and Bill were looking forward to showing off their one-year-old son, Devon, to aunts, uncles, and cousins who had not yet met him. They were especially eager to compare notes with Jennifer's cousin Gayle, who had a little girl born two days after Devon. Although they had seen pictures of little Meagen on e-mail, they hadn't yet officially met her. As they pulled into the driveway of the family cottage, they could see a distant figure holding a child in her arms. Sure enough, it was Gayle walking carefully down the driveway with Meagen. As they got closer, Jennifer rolled down her window and was met with Meagen's eager squeals, "Baby! Mama! Baby!" as she pointed to Devon in the back seat. Jennifer was surprised, to say the least. Their own son Devon, while a real pro at walking, was not saying much more than a few "Dadas." Could two children the same age really be so different in their ability to speak?

Parents often compare their children's latest feats with other parents, and, aside from walking, there are few accomplishments they focus on more than their baby's first use of language. At about one year of age, most children make their formal entrance into the world of human communication by saying their first words, and parents respond with equal delight and amazement. As in many domains of development, there can be noticeable differences in the accomplishments of two children who are the same age. Nonetheless, by age five, most children have moved from Meagen's effective but rudimentary mix of verbal and nonverbal messages to more complex achievements. They have mastered the bewildering variety of sounds in their native language to produce thousands of recognizable words, and they understand the meanings of words reasonably well. They also become aware of the interactive and sociocultural rules of communication.

By age five, in fact, most children have become highly proficient listeners and speakers, a marvel indeed given the overwhelming abundance of sounds, vocabulary words, grammatical rules, and social conventions that go into producing mature, adult-sounding speech. You probably do not have a vivid memory of how you learned to speak; most of us have little specific recall of this extremely complex, yet entirely natural process. But if you have ever tried to learn a foreign language, you probably have some sense of how remarkable children's mastery of communication is. How do infants and children manage such a seemingly overwhelming task?

In this chapter, we will first examine the major milestones in the acquisition of communication and language skills from infancy through childhood, the sequence of events that unfolds as the child comes to comprehend and produce language. Next, we will look at the most important theories of language development and how they account for our observations of children's language attainments. Of all the themes of development, none has been more central to theories of language development than the nature-versus-nurture debate, the extent to which either biological predispositions or environmental influences dictate the child's developing linguistic

competence. Finally, we will briefly examine the functions of language, particularly as they interact with children's growing cognitive skills and ability to regulate their own behavior.

The Course of Language Acquisition

A baby's contact with language is—initially, at least—noticeably one-sided. Although she may gurgle or coo, most of her experience is as a listener. Among her first tasks is to learn to identify the myriad sounds that make up her native language. That is, she must distinguish specific sounds in the stream of spoken language, note the regularities in how they are combined, recognize which combinations constitute words, and eventually, when she makes the transition from listener to speaker, form the consonant-vowel combinations that are the building blocks of words and sentences. The fundamental sound units and the rules for combining them in a given language make up that language's **phonology.** If you have studied a foreign language, you will recognize that some sounds appear only in certain languages, such as the prolonged nasal *n* sound in Spanish and the French vowel that is spoken as though *e* and *u* are combined. Furthermore, each language has its own rules for combining sounds. In English, for example, the *sr* combination does not occur, whereas *sl* and *st* appear frequently. An important task for the child is to absorb the sounds and combinations of sounds that are acceptable in her native language and, eventually, to detect which of these sounds form words.

Another basic language skill the child must master is linking the combinations of sounds he hears to the objects, people, events, or relationships they label. **Semantics** refers to the meanings of words (sometimes called the *lexicon*) or combinations of words. For example, *cookie* is an arbitrary grouping of sounds, but speakers of English use it to refer to a specific class of objects. The child thus attaches words to conceptual groups, learning when it is appropriate to use them and when it is not (for example, *cookie* does not refer to all objects or edible goods found in the bakery). The child also learns that some words describe actions (*eat*), whereas others describe relationships (*under or over*) or modify objects (*chocolate cookie*). Mapping combinations of sounds to their referents (that is, the things to which words refer) is a central element of language acquisition.

As the child begins to combine words, she learns the principles of **grammar,** the rules pertaining to the structure of language. Grammar includes two components, *syntax* and *morphology*. **Syntax** refers to the rules that dictate how words can be combined. The order in which words are spoken conveys meaning; for example, "Eat kitty" and "Kitty eat" do not mean the same thing, even in the simplified language of the young child. A word's position in a sentence can signify whether the word is an agent or the object of an action, for example. The rules of syntax vary widely from one language to another, but within a given language they operate with consistency and regularity. **Morphology** refers to the rules for combining the smallest meaningful units of language to form words. For example, the word *girl* has one morpheme. Adding *-s* to form *girls* makes the number of morphemes two and changes the meaning from singular to plural. Similarly, morphemes such as *-ed* and *-ing* create a change in the tense of words. One of the most remarkable features of language acquisition is the child's ability to detect the rules of syntax and morphology and use them to create meaningful utterances of his own with little direct instruction.

The process of acquiring language also includes learning **pragmatics,** the rules for using language effectively and appropriately according to the social context. The effective use of language includes a host of nonverbal behaviors, rules of etiquette, and even changing the content of speech according to the identity of the listener and the situation surrounding the communication. How do you ask someone for a favor? Not, the child soon learns, by saying, "Hey, you, get me that ball!" The child also learns that if someone did not hear what she said, she can sometimes add a gesture to complete the communication. And the proper way to speak to an adult who has

phonology   Fundamental sound units and combinations of units in a given language.

semantics   Meanings of words or combinations of words.

grammar   Rules pertaining to the structure of language.

syntax   Grammatical rules that dictate how words can be combined.

morphology   Rules for how to combine the smallest meaningful units of language to form words.

pragmatics   Rules for using language effectively within a social context.

some authority will probably include more polite forms and fewer terms of familiarity than when speaking to a peer. As they acquire language, then, children also absorb the equally important sociocultural dimension of pragmatics.

Clearly, language is a multifaceted skill with many overlapping dimensions, from understanding and uttering sounds to appreciating the sometimes subtle rules of social communication. Despite the complexities, by the time they are four or five years old, most children speak much as adults do. Their progress in mastering vocabulary, syntax, and pragmatics continues during the school years and thereafter, but they acquire the essential elements of the language system in an impressively brief period.

Phonology

What does it take to learn a language? The infant's first steps consist of attending to the sounds of speech as a special type of auditory stimulation, deciphering the units of sound that occur in her language, and discerning which clusters of sounds constitute words, clauses, and phrases. Thus, during much of the infant's first year, the emphasis is on phonological development, both in receiving messages from others and in being able to produce them on his own.

● **Early Responses to Human Speech**   Right from birth, the human infant has a special sensitivity to the sounds other human beings make. Newborns show a distinct preference for human voices over other sounds and like to hear their own mothers' voices more than a stranger's (DeCasper & Fifer, 1980; Gibson & Spelke, 1983). Most important, however, infants respond in specific ways to small acoustic variations in human speech that distinguish one word or part of a word from another.

As we discuss in the chapter titled "Basic Learning and Perception," the basic building blocks of spoken language are called *phonemes,* the smallest units of sound that change the meanings of words. In the words *pat* and *bat,* for example, the phonemes /p/ and /b/ make a big difference in the meaning of the word. Recall also that infants as young as one month can discriminate different phonemes and do so categorically, ignoring small acoustic variations in a sound unless the sound pattern crosses a phonemic boundary (Aslin, Pisoni, & Jusczyk, 1983; Kuhl, 1987). At two months of age, infants add to their repertoires the ability to discriminate vowels (Marean, Werner, & Kuhl, 1992). Remarkably, young infants show an ability to detect phonemes and vowel sounds from a variety of languages. However, by six to ten months of age, infants show a decline in the ability to distinguish those basic sounds that do not appear in their native language (Kuhl et al., 1992; Polka & Werker, 1994; Werker & Tees, 1984). That is, their experiences with the language spoken around them quickly begin to constrain the small units of sound to which they are sensitive.

Infants also show an early sensitivity to **prosody,** the patterns of intonation, stress, and rhythm that communicate meaning. One example of a prosodic feature is the pattern of intonation that distinguishes questions from declarative statements. When you raise your voice at the end of a question, you are signaling a different communicative intent than when you let your voice fall at the end of a declarative sentence. Researchers have found that infants prefer the prosodic features associated with the high-pitched, exaggerated, musical speech, often called "baby talk," that mothers typically direct to their young children. Figure 7.1 illustrates some of the acoustical properties of mothers' speech to infants. In one study, Anne Fernald (1985) trained four-month-olds to turn their heads to activate a loudspeaker positioned on either side of them. The infants were more likely to make this response if their "reward" was a female stranger's voice speaking as the woman would speak to a baby than if she used normal adult speech. Other research has shown that it is the positive affective tone of "baby talk" that infants are particularly attracted to (Singh, Morgan, & Best, 2002). In light of these preferences, it seems fitting that mothers from cultures as diverse as France, Italy, Germany, Britain, Japan, China, and the Xhosa tribe of southern Africa have been found to raise their pitch when they speak to their young infants (Fernald, 1991; Papoušek, 1992).

prosody   Patterns of intonation, stress, and rhythm that communicate meaning in speech.

**These two samples of maternal
speech show the special
acoustical qualities that make
speech to infants (bottom)
distinct from speech to adults
(top). The vertical axis repre-
sents fundamental frequency,
a measure of auditory pitch.
Note the frequent use of mod-
ulation of pitch and the pre-
dominance of high pitch in
maternal speech to infants.
Babies seem to be especially
responsive to the qualities of
this type of speech.**
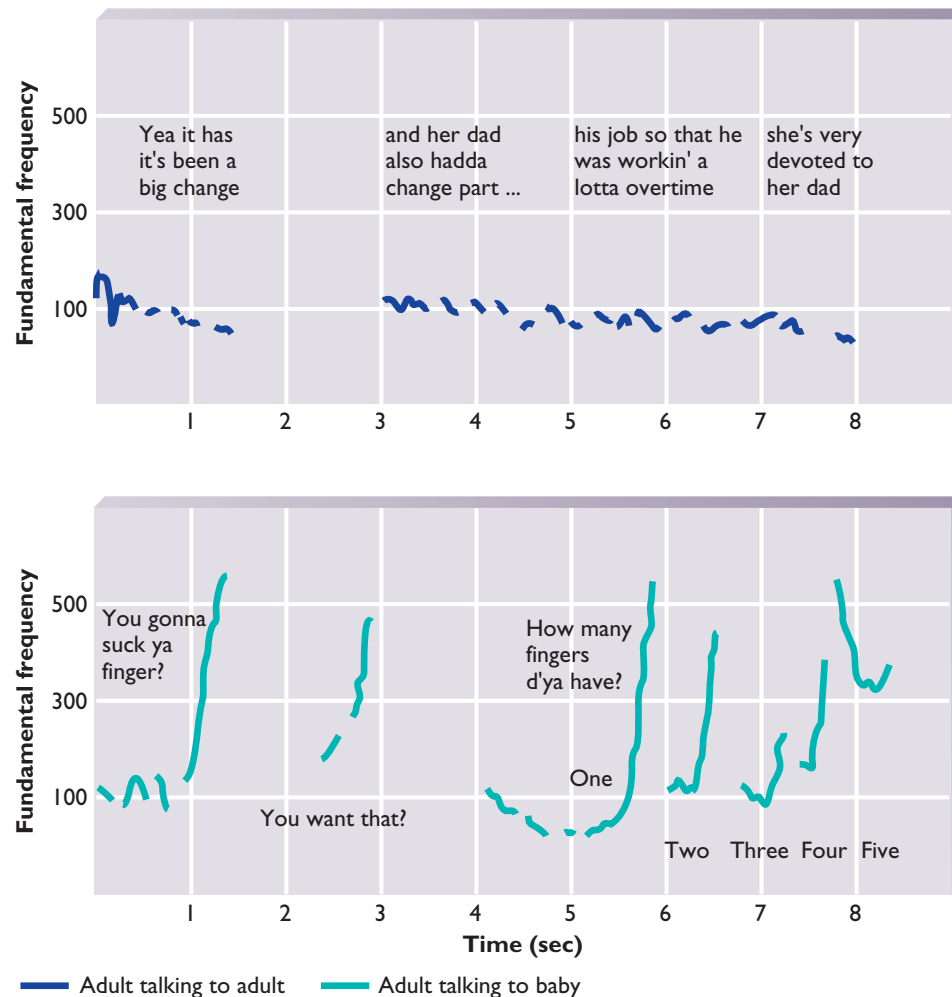
Source: Adapted from Fernald, 1985.

Infants' sensitivity to the prosodic features of speech prepares them for the more complex aspects of language learning that lie before them. As early as two days of age they show a clear preference for hearing a stream of speech from their native language as opposed to a foreign language (Moon, Cooper, & Fifer, 1993). Sometime between six and nine months of age, infants begin to show a preference to listen to unfamiliar isolated words from their native language. For example, American infants prefer unfamiliar English words over Dutch words. At ten months of age, they also prefer words with a strong-weak stress pattern (e.g., *crossing* versus *across*) that are more common in English (Jusczyk, Cutler, & Redanz, 1993; Jusczyk, Friederici, et al., 1993). Young infants thus seem to be especially tuned in to the rhythmic properties that distinguish one language from another (Nazzi, Bertonciui, & Mehler, 1998).

Perhaps most impressive is the finding that by about eight months of age, infants show that they can detect the beginnings and endings of specific words in a stream of their native speech (Jusczyk & Aslin, 1995), a skill that should strike you as remarkable if you have ever tried to detect the presence of particular words when listening to someone speak a foreign language. To explore this ability, Sven Mattys and Peter Jusczyk (Mattys & Jusczyk, 2001) first familiarized infants with a single word such as *dice*. Next, infants heard the target word within a passage, such as "Two dice can be rolled without difficulty," or they heard the same sound pattern but across two different words, as in "Wired ice no longer surprises anyone." Infants showed a clear preference for the first type of correctly segmented passage, probably using rhythmic cues, as well as noting the different acoustic properties that phonemes have at the be-

ginnings versus the ends of words (e.g., /*d*/ sounds slightly different at the beginning than at the end of a word). Words starting with vowels, though, are much harder for infants to locate in speech segments than words starting with consonants. Only sixteen-month-olds could locate words such as *ice* or *eel.*

Once infants can locate words, the pathway is prepared for the next critical aspect of learning a language, namely, learning the meanings of words. Word recognition skills improve dramatically in the second year, especially as infants begin to use their knowledge of word meanings to decipher the sounds they hear. At eighteen months of age, for example, toddlers need to hear only the very first portion of a word, such as *daw* in *doggie*, in order to look at the picture the word represents (Fernald, Swingley, & Pinto, 2001). This relationship between meaning and sound is only one example of how the various facets of language are, in fact, very much interrelated.

● **Cooing and Babbling: Prelinguistic Speech**   Well before the child utters her first word, she produces sounds that increasingly resemble the language spoken in her environment. At birth, the infant's vocal capabilities are limited to crying and a few other brief sounds such as grunts, sighs, or clicks. Between six and eight weeks, a new type of vocalization, **cooing,** emerges. These brief, vowel-like utterances are sometimes accompanied by consonants, usually those produced in the back of the mouth, such as /*g*/ or /*k*/. Infants coo when they are in a comfortable state or when a parent has made some attempt to communicate, either with speech or coos of his or her own. In the weeks that follow, the infant's vocalizations become longer and begin to include consonants formed at the front of the mouth, as in /*m*/ or /*b*/.

The next significant accomplishment is the emergence of **babbling,** the production of consonant-vowel combinations such as *da* or *ba*. Most children begin to babble at about three to six months and refine their skills in the succeeding months. To many listeners, the infant's babbling sounds like active experimentation with the production of different sounds. These vocalizations are especially likely to occur in the context of mutually coordinated caregiver-child interactions (Hsu & Fogel, 2001), and they are often accompanied by facial expressions such as smiles or frowns (Yale et al., 1999), perhaps to emphasize the child's communicative intent. At about seven months, the infant will repeat well-formed syllables, such as *baba* or *dada,* a phenomenom called **canonical babbling.** It is almost as if the infant is trying to say words. At nine or ten months, the child's babbling includes more numerous and complex consonant-vowel combinations, as well as variations in intonation (Davis et al., 2000).

The changes in children's productive capabilities are linked to physiological changes in their vocal apparatus and central nervous systems that occur during the first year. In the months after birth, the infant's larynx descends farther into the neck, the oral cavity grows, and the baby can place her tongue in different positions in her mouth (not just forward and backward as at birth). At the same time, the cortex of the brain replaces the brain stem in controlling many of the child's behaviors. In general, early reflexlike vocalizations, such as cries, fade as more controlled voluntary utterances, such as coos and babbles, enter the child's repertoire (Stark, 1986).

The fact that most infants, regardless of their culture, begin to coo and babble at similar ages suggests that biological factors direct the onset of these behaviors. Even deaf children vocalize with coos and babbles in the first few months of life (Stoel-Gammon & Otomo, 1986), and both deaf and hearing children exposed to sign language make repetitive, rhythmic hand gestures akin to babbling prior to full-fledged signing (Petitto et al., 2001; Petitto & Marentette, 1991; Takei, 2001). Nature thus plays a distinct role in the emergence of the child's utterances. But even at this early stage of language development, the form the child's vocalizations take is influenced by the language spoken around her. Studies have shown identifiable differences in babbling among infants from varying cultures. One group of researchers conducted a spectral analysis of the vowel sounds made by ten-month-olds in Paris, London, Algiers, and Hong Kong. The procedure involved translating the acoustic properties of speech into a visual representation of the intensity, onset, and pattern of vocalization. Infants from different countries varied in the average frequencies of the sounds

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Children's Speech

| KEY THEME |
| **Interaction Among Domains** |

| KEY THEME |
| **Nature/Nurture** |

cooing   Vowel-like utterances that characterize the infant's first attempts to vocalize.

babbling   Consonant-vowel utterances that characterize the infant's first attempts to vocalize.

canonical babbling   Repetition of simple consonant-vowel combinations in well-formed syllables.

they produced; the differences paralleled those of adult speakers from the same countries (Boysson-Bardies et al., 1989). Thus the child's linguistic environment has a distinct effect on his own speech before he can speak true words.

● **Later Phonological Development**   At around one year of age, some of the child's babbles begin to sound like words, a major achievement that is discussed in greater detail later. From the perspective of phonology, though, the infant's ability to make different sounds is still somewhat restricted. Infants say a limited number of consonants and vowels, usually the same ones that appear in their babbles (Ingram, 1999). Some sounds, such as /*m*/ and /*b*/, are more common than others, such as /*l*/ and /*r*/ (Leonard, Newhoff, & Meselam, 1980). As the child's ability to speak improves, she adds consonants to the ends of words (e.g., *bite* instead of *bi*), although not consistently (Sternberger, 1992). Perhaps the best characterization of this phase is that infants say words, and sometimes change them, in accordance with the sounds they are capable of articulating.

Once children enter a period of rapid vocabulary acquisition, between eighteen months and two years of age, the range of sounds they produce expands. Certain kinds of errors are common, though, and may persist until children are in preschool or even elementary school. They might replace a *k* sound with a *t* to say *tootie* instead of *cookie* or substitute *w* for *r* in the word *rabbit*. Or children might delete a syllable that is unstressed, for example, saying *nana* for *banana*, or use reduplication, calling a bottle *baba* (Vihman, 1998).

By about age five, the speech of most children sounds like that of adults. In addition, they are beginning to understand the components of sound in the language they speak, especially as they learn to read. Phonology is something children can both use and think about in a conscious and reflective manner.

ATYPICAL DEVELOPMENT

Language-Impaired Children

About 7 percent of children fail to develop normal speech and language despite having normal hearing and general intellectual skills (Leonard, 1998). They may have trouble pronouncing words, have a limited spoken vocabulary, and show poor language comprehension. For many of these children, delayed language skills can mean severe reading difficulties, called *dyslexia,* once they enter school. Many researchers now believe that this wide array of problems is due to phonological processing deficits (Olson, 1994; Siegel, 1993; Stanovich, 1993; Whitehurst & Fischel, 2000). These children have particular difficulty in discriminating phonemes, precisely the type of skill at which many infants are so adept. Compared with normal children, these children are slower and less accurate when asked to read nonsense words such as *calch* and *tegwop*; they also have difficulty when asked to make words into a familiar children's language called Pig Latin (e.g., making the word *pig* into *igpay*) (Connors & Olson, 1990). These processing deficits can persist well into adulthood (Bruck, 1993). They also occur among poor readers from a wide variety of language backgrounds, including Arabic, Chinese, Punjabi, and Norwegian (Chiappe & Siegel, 1999; Høien et al., 1995; Siegel, 1998).

Paula Tallal and her colleagues (1996) have found that many of these children can be helped by being trained with taped exercises in which speech has been modified to help them identify auditory sounds that change quickly. In these exercises, the speech signal was slowed down by 50 percent, but its natural quality was preserved. In addition, the elements of speech that typically change rapidly were amplified in volume. The children had to act out commands they heard in the exercises or repeat syllables, words, and phrases. The program was intensive; children worked on the exercises three hours each weekday and were also given homework every night. At the

end of only one month, the children's scores on several measures of language development improved by two years on average.

Just why language-impaired children lag behind in phonological processing skills is still not completely understood. Tallal and her colleagues believe that the problem lies in a general deficit in processing auditory stimuli of any sort, be they speech sounds or not (Tallal et al., 1997). Another ingredient may be poor executive processing skills, such as the ability to maintain two pieces of information in memory at once or to select the best strategy from a number of competing options in a task (Swanson, Mink, & Bocian, 1999). Other experts argue that the problem is not cognitive but rather is specific to processing linguistic stimuli, because children from a wide range of intellectual levels—even those with high IQs—can show dyslexia (Siegel, 1998). Whatever the explanation, this body of research makes very clear the importance of mastering phonology in the acquisition of language and reading for all children, not just those who have dyslexia. The ability to decipher the basic sound units of language is now a widely recognized predictor of children's eventual skill in reading (Comeau et al., 1999; Ehri, 1998; Ho & Bryant, 1997).

Semantics

Few moments in life rival the excitement parents feel when they hear their children say their first words, typically at about one year of age. "Cookie," "Mama," and "Dada" are joyfully entered into the baby book alongside other momentous events, such as the infant's first steps. Certainly the uttering of first words is a major accomplishment, marking the visible entry of the child into the world of spoken, shared communication. The child's comprehension and production of words also signal a new focus in the mastery of language: semantic development.

● **Gesture as a Communication Tool**   Late in the first year, before or as they speak their first words, many children begin to use such gestures as pointing, showing, or giving as a means to communicate with other people (Bates, Camaioni, & Volterra, 1975). Carlotta, a ten-month-old infant observed by Elizabeth Bates and her colleagues, provides some good examples of several kinds of nonverbal communication that seem to express meaning. In one observation, Carlotta held up her toy and extended her arm in a showing motion to an adult. Here she was using a **protodeclarative communication** that, much as a declarative sentence does, called the adult's attention to the object. Another time, Carlotta pointed to the kitchen sink and said, "Ha!," a **protoimperative communication** intended to get the adult to do something (Bates, 1979). Often children's gestures are accompanied by direct eye contact with the communication's recipient. As children get older, they may add a vocalization to the gesture for added emphasis (Messinger & Fogel, 1998), much as Carlotta did when asking for water. Children may also repeat their communications if the messages are not understood. This constellation of behaviors and the context in which they occur suggest that children use gestures as a purposeful means to an end (Scoville, 1983).

Linda Acredolo and Susan Goodwyn (1988) found that a child between eleven and twenty-four months of age uses gestures not just to show or request but also to symbolize objects or events. The child may signify a flower, for example, by making a sniffing gesture or the desire to go outside with a knob-turning motion. A significant number of children's gestures recreate the functions of objects rather than their forms or shapes. For example, participants in the study would put their fist to one ear to signify a telephone or wave their hands to represent a butterfly.

Acredolo and Goodwyn believe a strong relationship exists between the development of symbolic gestures and verbal abilities because both appear at approximately the same point in development, with gestures usually preceding words by a few weeks (Acredolo & Goodwyn, 1988; Goodwyn & Acredolo, 1993). Recognizing that one thing

protodeclarative communication   Use of a gesture to call attention to an object or event.

protoimperative communication   Use of a gesture to issue a command or request.

Late in the first year, many young children use gestures to communicate, either to call an adult's attention to an object or to get an adult to do something. Gestures typically drop out of the child's repertoire, though, as spoken language develops.

can symbolize another represents a major cognitive advance, one that is essential for the use of both gestures and spoken language. By the middle of the second year, however, children are less likely to use gestures as their sole means of communication. Gestures unaccompanied by verbalization are less useful when the "listener" is out of view and they are usually correctly understood by only a limited number of adults. Parents also probably tend to encourage the child's verbalizations more than they do the use of gestures (Acredolo & Goodwyn, 1990a). So oriented do hearing children become to words as a means of expression that by two years of age, they are much more likely to learn new names for objects as opposed to new gestures to represent them (Namy & Waxman, 1998).

All of this is not meant to say that children stop using gestures entirely. In fact, quite the contrary is true. Both adults and children tend to use gestures as an accompaniment to their speech, giving emphasis to what they are saying or elaborating on a concept visually. Children begin to use gesture in these ways as their speech gets more complex, at ages two and three (Mayberry & Nicoladis, 2000). Even blind children gesture while they speak to others, suggesting that this behavior is not merely an imitation of the communication styles of adults (Iverson & Goldin-Meadow, 2001). Rather, gesture seems to be very much intertwined with the communicative process.

● **The One-Word Stage**   From about twelve to twenty months of age, most children speak only one word at a time. Children's first words are most frequently **nominals,** labels for objects, people, or events, although action words (*give*), modifiers (*dirty*), and personal-social words (*please*) also occur (Bates et al., 1994; Nelson, 1973). Children's early words usually refer to people or objects important in their lives, such as parents and other relatives, pets, or familiar objects. Children are also

nominals   Words that label objects, people, or events; the first type of words most children produce.
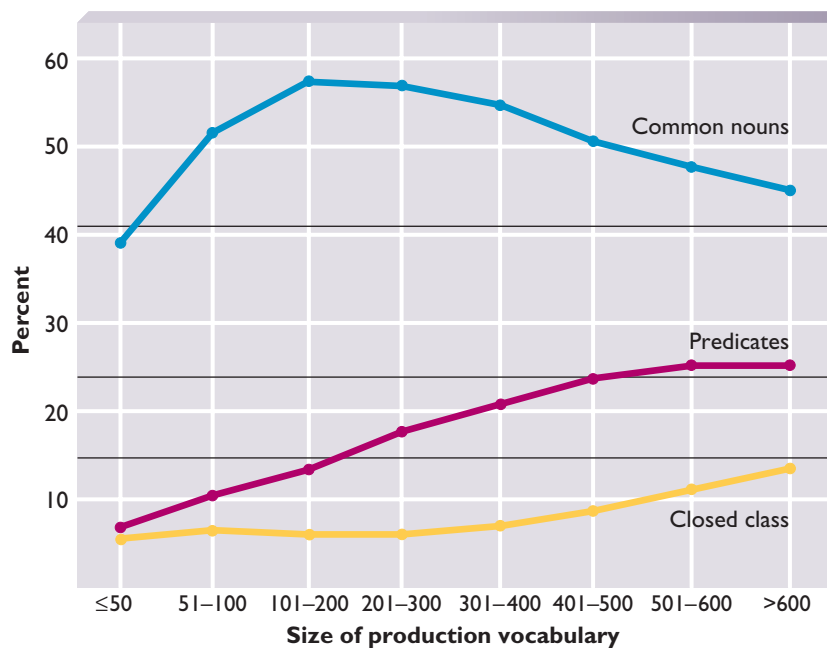
FIGURE 7.2
Changes in the Proportion of Word Types in Children's Vocabularies

As children's vocabularies grow from only a few words to several hundred (the horizontal axis on the graph), the proportion of nouns rises and remains high. The proportion of other types of words children learn, such as predicates (verbs and adjectives) and closed-class words (prepositions, conjunctions, and other relational words), remains lower. The children in this study ranged in age from sixteen to thirty months.

Source: Bates et al., 1994.

more likely to acquire labels for dynamic objects (*clock, car, ball*) or those they can use (*cup, cookie*) than for items that are stationary (*wall, window*). Figure 7.2 shows how the proportion of word types changes in the vocabularies of children between one and two-and-a-half years of age.

Children acquire their first ten words slowly; the typical child adds about one to three words to his or her repertoire each month (Barrett, 1989). From about age eighteen months onward, however, many children show a virtual explosion in the acquisition of new words. This remarkable period in language development is called the **vocabulary spurt** (Barrett, 1985; Bloom, 1973). In one longitudinal study of vocabulary growth in one- to two-year-olds, some learned to say as many as twenty new words, mostly nouns, during each week of the vocabulary spurt (Goldfield & Reznick, 1990). Figure 7.3 shows the rapid rate of vocabulary growth for three children in the middle of their spurt. Within the same period, children also typically show a spurt in the number of words they understand (Reznick & Goldfield, 1992). When rapid vocabulary growth first begins, children also show a temporary increase in the number of errors they make in naming objects, forgetting words they recently learned. The influx of new words may temporarily interfere with knowledge that has been recently stored, a finding that is perhaps to be expected at this transitional time in language development (Dapretto & Bjork, 2000; Gershkoff-Stowe, 2001; Gershkoff-Stowe & Smith, 1997).

Some of the child's first words are bound to a specific context: that is, the child uses the word to label objects in limited situations. Lois Bloom (1973) observed that one nine-month-old used the word *car* only when she was looking out the living room window at cars moving on the street. She did not say "car" to refer to parked cars, pictures of cars, or cars she was sitting in. This type of utterance, used when the child applies a label to a narrower class of objects than the term signifies, is called an **underextension.** Over time, the child begins to use single words more flexibly in a wider variety of contexts (Barrett, 1986).

Children may also show **overextension,** applying a label to a broader category than the term signifies. For example, a toddler may call a horse or a cow "doggie." The child often applies the same word to objects that look alike perceptually (Clark, 1973). At other times, the child may misuse a word when objects share functions, such as calling a rolling quarter a "ball" (Bowerman, 1978). As with underextensions, the child's use of overextensions declines after the second year.

vocabulary spurt Period of rapid word acquisition that typically occurs early in language development.

underextension Application of a label to a narrower class of objects than the term signifies.

overextension Tendency to apply a label to a broader category than the term actually signifies.

FIGURE 7.3
The Vocabulary Spurt in
Three Young Children

**Many children show a vocabu-
lary spurt, a sharp rise in the
number of new words they
learn, as they approach two
years of age. However, children
may begin their spurts at dif-
ferent ages, as the graph clearly
shows. Child A showed an
early spurt, beginning at fifteen
months. Child B's spurt began
at the more typical age of eigh-
teen months. Child C showed
a late spurt at twenty-one
months.**
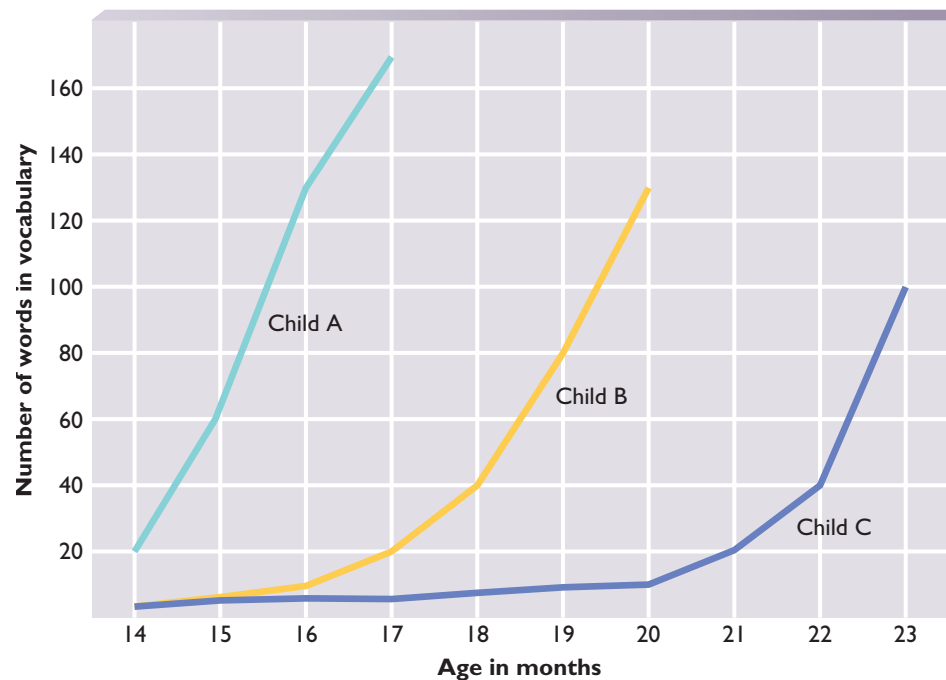
Source: Adapted from Goldfield & Reznick, 1990.

Most noticeable at this phase of language learning is the child's intense desire to communicate her thoughts, feelings, and desires. Even though her language skills are limited to one or at most two words at a time, the young child is enormously eager to find ways of talking about favorite people, toys, and objects (Bloom, 1998; Dromi, 1999).

● **Comprehension Versus Production**   If you have ever tried to learn a new lan-guage, you undoubtedly found it easier to understand what another speaker was say-ing than to produce a sentence in the new language yourself. An important point to remember about children's early language is that their **receptive language,** what they comprehend, far exceeds their **productive language,** their ability to say and use the words. In one study, parents reported an average of 5.7 words produced by their ten-month-olds but a comprehension average about three times greater, 17.9 words (Bates, Bretherton, & Snyder, 1988).

Infants show distinct signs of comprehending words as early as six months of age, well before they utter their first words. In one study, infants heard the word "mommy" or "daddy" produced by a synthetic voice in a gender-neutral frequency. As each word was repeated, they also saw side-by-side videos of their parents. Infants showed a clear preference for looking at the video of the parent who matched the spoken word. This preference was not evident in another group of infants who viewed strange men and women on videotape while listening to the words (Tincoff & Jusczyk, 1999). Thus six-month-old infants show that they know the specific meanings of words, at least for people who are important in their lives.

In general, infants comprehend the labels for nouns before they understand the labels for verbs (Tomasello & Farrar, 1986). For example, although eighteen-month-olds show that they can learn what it means for a Lego car to *neem* (push), fourteen-month-olds have difficulty (Casasola & Cohen, 2000). One hypothesis for this delay in understanding verbs has to do with the notion that many verbs denote the actions or motions of objects. Thus, in order to understand a verb, the child has to first un-derstand something about the object involved and the actions and motions it is capable of (Kersten, 1998). In fact, when young children are learning new verbs

receptive language   Ability to comprehend spoken speech.

productive language   Mean-ingful language spoken or other-wise produced by an individual.

(e.g.,. "This one is *spogging*"), they often attend to how objects look as much as what they do (Kersten & Smith, 2002).

That young children understand so much of what is said to them means they have acquired some important information about language before they actually speak. They know that people, objects, and events have names. They know that specific patterns of sounds represent objects and events in their environment. Most important, they begin to appreciate the usefulness of language as a means of expressing ideas, needs, and feelings.

● **Individual and Cultural Differences in Language Development** Although children show many common trends in the way they acquire language, they also show significant individual differences in rates and types of language production. You may have heard a family member or friend report that her child said virtually nothing for two or three years and then began speaking in complete sentences. Although such dramatic variations in language milestones are not frequent, children sometimes show unique patterns in their linguistic accomplishments, patterns that still lead to the attainment of normal language by later childhood.

One example of wide individual variation is the age at which children say their first word. Some children produce their first distinguishable word as early as nine months, whereas others may not do so until sixteen months (Barrett, 1989). Similarly, some children show good pronunciation, whereas others have difficulty making certain sounds, consistently substituting *t* for *k* or *b* for *v,* for example (Smith, 1988). In addition, not all children display the vocabulary spurt (Acredolo & Goodwyn, 1990b), or they may start their spurts at different ages, as Figure 7.3 indicates. The results of a study of more than eighteen hundred children underscore just how variable the size of children's vocabularies can be: at sixteen months of age, some children spoke 10 or fewer words, whereas others spoke as many as 180 words (Fenson et al., 1994).

Children may also differ in the content of their one-word speech. Most one-year-olds tend to use nominals predominantly, displaying what Katherine Nelson (1973) termed a **referential style.** Other children show a different pattern: rather than naming objects, they frequently use words that have social functions, such as *hello* or *please,* thus displaying an **expressive style.** Expressive children use words to direct or comment on the behavior of other people. According to some research, referential children tend to have larger vocabularies and show more rapid advances in language development, at least in the early stages (Bates et al., 1988; Nelson, 1973).

How do we explain these individual differences in the rates and styles with which children acquire language? There are several hypotheses. Perhaps individual differences result from differences in the neurological structures that control language or from inborn differences in temperament. For example, referential children tend to have long attention spans, smile and laugh a lot, and be easily soothed (Dixon & Shore, 1997). Children who are more advanced in language comprehension and production show a similar profile (Dixon & Smith, 2000). This style might allow them to profit from incoming information about the names of objects. Another possibility is that parents influence the rate and form of children's vocabulary development. Some parents, for example, may spend a great deal of time encouraging their infants to speak, focusing especially on labeling objects. Others may be more relaxed about letting the infant proceed at his or her own pace. Researchers have confirmed that the overall amount and variety of speech parents produce to their infants is related to the acceleration of vocabulary growth (Hoff & Naigles, 2002; Huttenlocher et al., 1991).

Cultural differences in how children speak in the one-word stage bolster the idea that what children hear others say influences what they themselves say. Unlike American children, Korean toddlers show a "verb spurt" before a "noun spurt" (Choi, 1998; Choi & Gopnik, 1995); similarly, Mandarin-speaking toddlers utter more verbs than nouns as they and their mothers play with toys (Tardif, 1996; Tardif, Gelman, & Xu, 1999). Mothers from both Asian groups pepper their speech with many more verbs

KEY THEME
Individual Differences

KEY THEME
Nature/Nurture

referential style Type of early language production in which the child uses mostly nominals.

expressive style Type of early language production in which the child uses many social words.

Chinese mothers use more verbs and action sequences in their speech to children than American mothers. It is interesting to note that Chinese-speaking toddlers use more verbs than nouns in their early speech. Thus, the form of early speech is influenced by the sociocultural context in which the child lives.

fast-mapping   Deriving meanings of words from the contexts in which they are spoken.

and action sequences, saying things such as "What are you doing?" and "You put the car in the garage"; American mothers, in contrast, use far more nouns (e.g., "That's a ball") and ask questions that require a nominal as an answer (e.g., "What is it?").

● **Deriving the Meanings of Words**   The number of new words the child learns grows rapidly from age eighteen months through the preschool years. By the time they enter school, children know more than fourteen thousand words (Carey, 1978); by age ten, they comprehend almost forty thousand words. These numbers translate into an astonishing rate of learning of between six and twelve new words per day among school-age children (Anglin, 1993)!

Many researchers believe that certain biases operate in the child's literal "search for meaning." Consider the toddler who hears a new word such as *eggbeater*. What does that word mean? Logically, it could refer to a host of objects or perhaps an action instead of an object. Testing the numerous hypotheses could take an inordinate amount of time. Several researchers argue that children are biased to form more restricted hypotheses about the meanings of words; if they were not, they would not learn language so rapidly and with so few errors. *Constraints* on word learning give young children an edge in figuring out the meanings of words from the vast array of possibilities.

One way that the child acquires word meanings is by a process called **fast-mapping,** in which the context in which the child hears words spoken provides the key to their meanings. Often the child's initial comprehension of a word is an incomplete guess, but a fuller understanding of its meaning follows from successive encounters with it in other contexts (Carey, 1978). Upon hearing the word *eggbeater* while watching someone unload various implements from the dishwasher, the child may think it is some kind of cooking tool; hearing the word again as someone uses a specific object to stir a bowl of eggs refines the meaning of the word in the child's mind. Children are often able to derive the meanings of words quickly, even when the exposure is brief, if the context in which they hear those words is meaningful (Rice & Woodsmall, 1988).

Young children also tend to assume that new words label unfamiliar objects, a phenomenon called the **mutual exclusivity bias** (Littschwager & Markman, 1994; Markman, 1987, 1990). Researchers have been able to demonstrate that children tend to treat new words as labels for new objects rather than as synonyms for words they already know. For example, Ellen Markman and Gwyn Wachtel (1988) showed three-year-olds pairs of objects; in each set, one object was familiar and the other was unfamiliar (for example, a banana and a pair of tongs). When children were told, "Show me the *x*" where *x* was a nonsense syllable, they tended to select the unfamiliar objects. The mutual exclusivity bias emerges at about age three and is evident even in deaf children who use American Sign Language (Lederberg, Prezbindowski, & Spencer, 2000).

Other biases in word learning include the child's assumption that a new word labels an entire object, specifically its shape. Young children learning that a new object is called a *zup*, for example, apply that word to other objects similar in shape, but not in color, rigidity, or other characteristics (Graham & Poulin-Dubois, 1999; Samuelson & Smith, 2000). Children extend new words to objects that come from a similar conceptual category, too. Consider a study conducted by Ellen Markman and Jean Hutchinson (1984). Four- and five-year-olds looked at a picture as the experimenter labeled it with a nonsense syllable. For example, a cow was called a *dax*. Then two other pictures were presented, in this case a pig and milk. When asked, "Can you find another *dax*?" most children pointed to the pig, not the milk. In contrast, when children heard no label for the cow and were simply instructed to "find another one," they tended to associate the cow with milk.

Where do constraints on word learning come from? Some researchers believe they are innate and unique to word learning (e.g., Waxman & Booth, 2000). Others suggest they arise from growth in general knowledge about objects and their relationships to one another (Smith, 1995; Smith, 1999). It may also be that some word learning biases, such as the "whole object bias," are more important in the early stages of semantic development, whereas others, such as the "category bias," play a larger role in later stages (Golinkoff, Mervis, & Hirsh-Pasek, 1994). Another set of hypotheses, called the *social-pragmatic approach*, focuses on children's ability to interpret the rich cues about word meaning provided in early parent-child interactions. For example, parents of infants tend to label many objects, often in the context of joint book reading or the child's manifest interest in a particular object or person in her surroundings (Ninio & Bruner, 1978). A typical scenario goes like this: The infant turns his head, points, and maybe even coos as the family dog enters the room. The mother also turns and looks, and says "Doggie." Such interactions, in which the parent follows the child's attention and labels the target of her interest, are common between nine and eighteen months of age. Researchers have noted that these are precisely the conditions under which infants seem to remember the words that name objects. Children's vocabulary development is strongly related to the tendency of parents to label objects at which the child points (Masur, 1982).

Young language learners are also able to use more subtle social cues to figure out which objects labels map onto. Suppose an adult says, "Let's find the *gazzer*" and looks at an object, rejects it, and excitedly picks up another object without naming it. The infant assumes the second object is the *gazzer* (Tomasello, Strosberg, & Akhtar, 1996). Or suppose an adult and an infant are playing with several unfamiliar, unnamed objects; then the adult introduces a new object, saying, "Look, I see a *modi*!" without pointing to any object. Again, the infant assumes the newest object is the *modi* (Akhtar, Carpenter, & Tomasello, 1996). These studies demonstrate that infants have an impressive ability to interpret social cues in deciding how labels and objects match up. They also show that episodes of **joint attention,** those times in which child and caregiver share the same "psychological space," are important contexts for language acquisition. In fact, researchers have found that the amount of time infants spend in joint attention with their caregivers predicts their early language skills (Carpenter, Nagell, & Tomasello, 1998). According to Paul Bloom (2000), studies such as these indicate that the child is actively seeking to find out what is on the minds of the

KEY THEME
Nature/Nurture

KEY THEME
Child's Active Role

mutual exclusivity bias
Tendency for children to assume that unfamiliar words label new objects.

joint attention   Episodes in which the child shares the same "psychological space" with another individual.

Episodes of joint attention between child and caregiver are important contexts for the acquisition of language and particularly for learning the meaning of words. Research shows that the amount of time infants spend in joint attention with their caregivers predicts their early language skills.

adults with whom she is interacting—what their words refer to and what they are intending to communicate.

Even though researchers continue to debate vigorously the specifics of how word meanings are acquired, the general consensus today is that children arrive at semantic understanding as a result of a multitude of factors (Hollich, Hirsh-Pasek, & Golinkoff, 2000; Woodward, 2000). Constraints and social-pragmatic cues, along with developments in memory and attention (Samuelson & Smith, 1998) and the child's own internal motivations and efforts (Bloom & Tinker, 2001), all play important roles, with any one of these rising in importance depending on the developmental phase or the particular context.

Grammar

Around the child's second birthday, another significant achievement in language production appears: the child becomes able to produce more than one word at a time to express ideas, needs, and desires. At first, two-word utterances such as "Doggie go" and "More juice" prevail, but the child soon combines greater numbers of words in forms that loosely resemble the grammatical structure of his or her native language. When children combine words, they are stating more than just labels for familiar items; they are expressing relationships among objects and events in the world. Most impressive is that most of this process is conducted with relatively little deliberate instruction about grammar from adults. All of this represents no small feat for a two-year-old.

● **Early Grammars: The Two-Word Stage**   At first, children's two-word utterances consist of combinations of nouns, verbs, and adjectives and omit the conjunctions, prepositions, and other modifiers that give speech its familiar flow. In addition, young talkers use very few morphemes to mark tense or plurals. Because speech at

no bed	boot off	more car	airplane all gone
no down	light off	more cereal	Calico all gone
no fix	pants off	more cookie	Calico all done
no home	shirt off	more fish	all done milk
no mama	shoe off	more high	all done now
no more	water off	more hot	all gone juice
no pee	off bib	more juice	all gone outside
no plug		more read	all gone pacifier
no water		more sing	salt all shut
no wet		more toast	
		more walk	
		outside more	

TABLE 7.1
One Child's Early Grammar

This table shows several examples of one two-year-old's two-word speech. Frequently, one word—the pivot word—is repeated while several other words fill the other slot. The pivot word can occupy either the first or second position in the child's utterances.

Source: Adapted from Braine, 1976.

this stage usually contains only the elements essential to getting the message across, it has sometimes been described as **telegraphic speech.**

In his systematic observations of the language of three children, Martin Braine (1976) noted that speech at this stage contained a unique structure that he dubbed *pivot grammar*. The speech of the children he observed contained noticeable regularities: one word often functioned in a fixed position, and other words filled in the empty slot. For example, one child said, "More car, more cookie, more juice, more read." Table 7.1 contains several other examples of a two-year-old's early word combinations.

More recent research has confirmed that children use nouns, in particular, in these pivot-type constructions, even when the noun is a nonsense word such as *wug*. Thus, if a caregiver says, "Look! A wug!" children would say "More wug" or "Wug gone" (Tomasello et al., 1997). Children do not yet produce utterances according to a well-developed grammar, though; their constructions are probably based on the phrasings they hear as the adults around them speak (Tomasello & Brooks, 1999).

Roger Brown (1973) also studied the regularities of child speech in the two-word stage in ten different cultures. Table 7.2 summarizes some of the results. In children's verbalizations, agents consistently precede actions, as in "Mommy come" or "Daddy sit." At the same time, inanimate objects are usually not named as agents. The child rarely says, "Wall go." To avoid making this utterance, the child must know the meaning of *wall* and that walls do not move. Thus the child's semantic knowledge is related to the production of highly ordered two-word utterances.

Many experts believe that no one syntactic system defines the structure of early language for all children (Maratsos, 1983; Tager-Flusberg, 1985). Some children speak with nouns, verbs, adjectives, and sometimes adverbs, whereas others pepper their speech with pronouns and other words such as *I, it,* and *here* (Bloom, Lightbown, & Hood, 1975). Most researchers agree, however, that individual children frequently use consistent word orders and that their understanding of at least a small set of semantic relationships is related to that word order. Moreover, numerous detailed observations of children's language indicate that they never construct "wild grammars"; some utterances, such as "Big he" or "Hot it," are simply never heard (Bloom, 1990). Such observations have distinct implications for explanations of syntactic development.

As we saw with semantics, children just starting to use more complex speech are able to comprehend more information conveyed by different grammatical structures than they are able to produce. Two-year-olds, for example, demonstrate an understanding of the difference between past, present, and future tenses, even though these

KEY THEME
Individual Differences

telegraphic speech Early two-word speech that contains few modifiers, prepositions, or other connective words.

Semantic Relation	Examples
agent + action	Mommy come; Adam write
action + object	eat cookie; wash hand
agent + object	Mommy sock; Eve lunch
action + location	sit chair; go park
entity + location	lady home; baby highchair
possessor + possession	my teddy; Daddy chair
entity + attribute	block yellow; box shiny
demonstrative + entity	dat book; dis doggie

Source: Adapted from Brown, 1973.

distinctions do not typically appear in their own speech (Wagner, 2001). They also show that they understand the different meanings conveyed by transitive versus intransitive verbs (those with and without objects, respectively). In one study, twenty-five-month-old children saw a video of a duck bending a bunny over as both animals made arm circles. The experimenter said either, "The duck is blicking the bunny" or "The duck and the bunny are blicking," constructions that are more complex syntactically than the child's own spontaneous utterances. Then children saw two screens, one that portrayed bending and one that portrayed arm-circling. When asked to "Find blicking!" children who had heard the term as a transitive verb looked at bending, and those who had heard the term as an intransitive verb looked at arm-circling (Naigles, 1990). What cues are children using to make this correct distinction? Two-year-olds can detect the difference between transitive and intransitive verbs when subject and object are represented by nouns and also when they are made more ambiguous in the form of pronouns, as in "She pilks her back and forth" versus "She pilks back and forth." These results suggest that information denoted by the number of arguments or relationships expressed in the sentence helps children decipher its meaning (Fisher, 2002).

● **Later Syntactic Development**   At age two-and-a-half, children's speech often exceeds two words in length and includes many more of the modifiers and connective words that enrich the quality of speech. Adjectives, pronouns, and prepositions are added to the child's repertoire (Valian, 1986). Between ages two and five, the child's speech also includes increasingly sophisticated grammatical structures. *Morphemes,* such as *-s, -ed,* and *-ing,* are added to words to signal plurals or verb tense, and more articles and conjunctions are incorporated into routine utterances. Also, the child comes to use negatives, questions, and passives correctly.

Several other sophisticated forms of speaking emerge after age two, one of which is the use of negatives. In her examination of language acquisition in four children, Lois Bloom (1991) found a predictable sequence in the use of negatives. Initially, children use the negative to express the *nonexistence* of objects, as in "no pocket," said as the child searches for a pocket in her mother's skirt. In the second stage, children use the negative as they *reject* objects or events. For example, one of Bloom's participants said "no sock" as she pulled her sock off her foot. Finally, negatives are used to express *denial*, such as when the child states "No dirty" in response to his mother's comment about his dirty sock. This sequence has also been observed cross-culturally, among Chinese children learning to speak Cantonese (Tam & Stokes, 2001). Young children form negatives not just by putting the negative marker at the beginning of an utterance but also by embedding it deep within a statement, as in "My sweetie's no gone" (de Villiers & de Villiers, 1979).

Questions too are formed in a fairly consistent developmental sequence, although not all children display the pattern we are about to describe (Maratsos, 1983). Chil-

dren's earliest questions do not contain inverted word order but consist instead of an affirmative sentence or a declarative preceded by a *wh-* word (*who, what, why, when, where*), with a rising intonation at the end of the statement ("Mommy is tired?"). Subsequently, children form questions by inverting word order for affirmative questions ("Where will you go?") but not negative ones ("Why you can't do it?"). Finally, by age four, children form questions for both positive and negative instances as adults do (Klima & Bellugi, 1966).

One of the more difficult linguistic constructions for children to understand is the passive voice, as in "The car was hit by the truck." Children typically begin to comprehend the meaning of a passive construction by the later preschool years, but they may not use this grammatical form spontaneously and correctly until several years later. Prior to age four, children are also limited in their ability to generate sentences using subject-verb-object (the transitive) with novel verbs they have just learned, as in "He's meeking the ball" (Tomasello & Brooks, 1998). Michael Tomasello maintains that when two- and three-year-olds do use more complex syntactic constructions such as the passive and transitive voices, they are initially imitating what adults say. Only later in the preschool and early school years do they have a deeper appreciation for the forms that grammatical constructions can take (Brooks & Tomasello, 1999; Tomasello, 2000).

One particularly interesting phenomenon of the preschool and early school years is the child's tendency to use **overregularizations,** the application of grammatical rules to words that require exceptions to those rules. From time to time, for example, young children use words such as *goed* or *runned* to express past tense even if they previously used the correct forms, *went* and *ran*. Perhaps children make these mistakes because they forget the exception to the general rule for forming a tense (Marcus, 1996). Whatever the reason, these constructions suggest that the child is learning the general rules for forming past tense, plurals, and other grammatical forms (Marcus et al., 1992).

How exactly do children master the rules of syntax? Some clues may come from the phonology or sounds of language. Is the word *record* a noun or a verb, for example? The answer depends on which syllable is stressed; if the first, the word is a noun; if the second, it is a verb. Children may pick up cues from stress, the number of syllables in a word, or other tips from the sounds of language to help them classify words as nouns, verbs, or other grammatical categories (Kelly, 1992). Other cues about syntax may come from the meanings of words. According to the **semantic bootstrapping hypothesis,** for example, when children learn that a certain animal is called a *dog,* they also notice that it is a thing (noun) and, later in development, that it is an agent (subject) or a recipient (object) of action (Pinker, 1984, 1987). Noticing that adults use certain patterns of speech and understanding their contents may help, too. For example, when young children hear adults say, "Look! The dog's hurling the chair. See? He's hurling it," the pronouns in the pattern "He's [verb] -ing it!" may help children understand the unfamiliar verb *hurling* and its use with a subject and object in a transitive sentence. In other words, children's knowledge of semantics influences their mastery of grammar (Childers & Tomasello, 2001).

Pragmatics

Just as important as semantic and syntactic rules are cultural requirements or customs pertaining to the proper use of speech in a social context. Is the child speaking with an elder or a peer? Is the context formal or informal? How does the speaker express politeness? Each situation suggests some unique characteristics of speech, a tone of voice, a formal or more casual syntactic structure, and the choice of specific words. In the context of playing with a best friend, saying "Gimme that" might be perfectly appropriate; when speaking with the first-grade teacher, saying "Could I please have that toy?" will probably produce a more favorable reaction. These examples demonstrate the child's grasp of pragmatics.

overregularization Inappropriate application of syntactic rules to words and grammatical forms that show exceptions.

semantic bootstrapping hypothesis Idea that children derive information about syntax from the meanings of words.

● **Acquiring Social Conventions in Speech**   When do children first understand that different situations call for different forms of speech? When Jean Gleason and Rivka Perlmann (1985) asked two- to five-year-olds and their parents to play "store," they observed that at age three some children modified their speech depending on the role they were playing. For example, one three-and-a-half-year-old boy who was the "customer" pointed to a fake milk bottle and said, "I want . . . I would like milk." His revision showed an understanding that an element of politeness is required of a customer. Preschoolers also have some limited understanding that different listeners are typically spoken to in different ways. In a study in which four- and five-year-olds were asked to speak to dolls portraying adults, peers, or younger children, the participants used more imperatives with dolls representing children and fewer with dolls representing adults and peers (James, 1978).

The child's facility with social forms of politeness increases with age. Researchers in one study instructed two- to six-year-olds to *ask* or *tell* another person to give them a puzzle piece. Older children were rated by adults as being more polite than the younger children, particularly when they were asking for the puzzle piece. Usually, older children included such words as *please* in their requests of another person (Bock & Hornsby, 1981).

Parents undoubtedly play a significant role in at least some aspects of the acquisition of pragmatics, especially because they deliberately train their children to speak politely. Esther Greif and Jean Gleason (1980) observed the reactions of parents and children after children had received a gift from a laboratory assistant. If the child did not say "thank you" spontaneously (and most of the preschoolers in the sample did not), the parent typically prompted the child with "What do you say?" or "Say thank you." Parents also serve as models for politeness routines; most parents in the study greeted the laboratory assistant upon entry and said goodbye when the assistant departed. In cultures such as Japan, in which politeness is a highly valued social behavior, children begin to show elements of polite language as early as age one year (Nakumura, 2001), probably because parents model and reinforce these verbal forms.

Incorporating social conventions into language often involves learning subtle nuances in behaviors, the correct words, vocal intonations, gestures, or facial expressions that accompany speech in different contexts. Children may get direct instruction on the use of verbal forms of politeness, but it is not yet clear exactly how they acquire the other behaviors that accompany socially skilled communication.

KEY THEME
Nature/Nurture

KEY THEME
Sociocultural Influence

When speaking to children younger than themselves, four- and five-year-olds often repeat their utterances and use attention-getting devices. These behaviors indicate that young children are sensitive to the requirements of the listener, an important aspect of *referential communication*. Thus, during the preschool years, children show progress in understanding the pragmatic aspects of language.
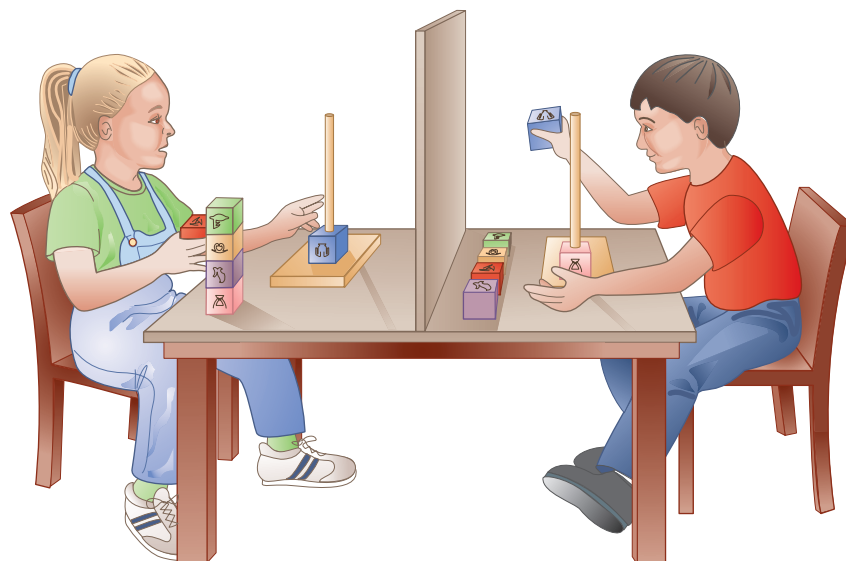
Source: Adapted from Krauss & Glucksberg, 1969.

In Krauss and Gluckberg's (1969) study of referential communication, four- and five-year-olds had to describe a series of unfamiliar geometric forms (pasted on blocks) to other children who could not see them. In this illustration, for example, the speaker on the left must explain to the listener on the right which forms to place on the stacking peg. The results showed that children this age are generally ineffective in transmitting this type of information. Research in more naturalistic settings, however, demonstrates that preschoolers can engage in effective referential communication.

● **Referential Communication** A group of experiments that has been especially useful in providing information on children's awareness of themselves and others as effective communicators centers on **referential communication,** situations that require the child to either talk about a topic specified by the experimenter or evaluate the effectiveness of a message describing some sequence of events. Researchers note whether the child's message is sufficient to communicate his or her intent or, alternatively, whether the child is able to detect ambiguous or uninformative components in the messages heard.

In a classic study of referential communication, Robert Krauss and Sam Glucksberg (1969) asked four- and five-year-olds to describe a series of unfamiliar geometric forms to another child who could not see them (see Figure 7.4). The speaker had to provide the listener with enough information to duplicate an array the speaker was constructing. The results showed that children this age often rely on personal descriptions of the stimuli (e.g., "It looks like Daddy's shirt"), messages that are not at all helpful to the listener. Thus young children's ability to understand the requirements of the listener and to adjust their speech accordingly is limited when they are describing unfamiliar items and when the interaction is not face to face.

On the other hand, observations of children in more natural interactions with one another suggest that well before they enter school, children appreciate at least some of the requirements of the listener and can modify their speech to make their communication effective. In a study of the communication skills of preschool-age children, Marilyn Shatz and Rochel Gelman (1973) asked four-year-olds to describe a toy to either an adult or a two-year-old listener. When the children spoke to the younger child, they shortened their utterances, used simple constructions, repeated utterances, and employed more attention-getting devices than when they spoke to the adult. Other researchers have also observed that even two-year-olds use techniques to make sure their messages get across during the normal interactions that occur in a nursery school. Children point, seek eye contact with listeners, and use verbal attention-getters such as "hey" to ensure that listeners hear what they have to say (Wellman & Lempers, 1977). In addition, when a listener somehow indicates that he has misunderstood or says "What?" two- and three-year-olds attempt to make their communication more effective. They may repeat their statement or restate the utterance with a better choice of words, a change in a verb form, or some other linguistic correction (Ferrier, Dunham, & Dunham, 2000; Levy, 1999; Shwe & Markman, 1997).

referential communication
Communication in situations that require the speaker to describe an object to a listener or to evaluate the effectiveness of a message.

Children ages seven to thirteen show wide individual differences in the ability to interact effectively with others (Anderson, Clark, & Mullen, 1994). The mature use of language involves the ability to understand the demands of the situation, be sensitive to the needs of the listener, and employ subtle nuances in speech that are compatible with the situation. The child's failure to acquire the social skills that are a part of effective communication can have broad consequences for the qualities of relationships she or he establishes with parents, teachers, and peers, among others.

Metalinguistic Awareness

During the period of most rapid language learning, from about eighteen months through age five, children may lack a full understanding of what it means for a sentence to be grammatical or how to gauge their linguistic competencies, even when their speech is syntactically correct and effective in delivering a communication. The ability to reflect abstractly on the properties of language and to conceptualize the self as a more or less proficient user of this communication tool is called **metalinguistic awareness.** By most accounts, the child does not begin to think about language in this way until at least the early school years. However, there are some indicators that a rudimentary ability begins sometime before that.

● **Reflecting on Properties of Language**   One of the first studies to explore children's ideas about the function of grammar was conducted by Lila Gleitman and her colleagues (Gleitman, Gleitman, & Shipley, 1972). The investigators had mothers read grammatically correct and incorrect passages to their two-, five-, and eight-year-old children. After each sentence, an experimenter said "Good" at the end of an acceptable passage, such as "Bring me the ball," or "Silly" at the end of an unacceptable one, such as "Box the open." When the children were given the opportunity to judge sentences themselves, even the youngest children were generally able to discriminate between correct and incorrect versions. They were not able, however, to correct improper constructions or to explain the nature of the syntactic problem until age five.

Not until age six or seven do most children appreciate that words are different from the concepts to which they are linked. For example, four-year-olds frequently believe *train* is a long word because its referent is long (Berthoud-Papandropoulou, 1978). Some changes in metalinguistic understanding are undoubtedly linked to advances in cognition, particularly the development of more flexible and abstract thought.

● **Humor and Metaphor**   One visible way in which children demonstrate their metalinguistic awareness is through language play: intentionally mislabeling objects, creating funny words, telling jokes or riddles, or using words in a figurative sense. The earliest signs of humor have been documented shortly after the child begins speaking. Researcher Carolyn Mervis noted that her son Ari, at age 15 months, called a hummingbird a "duck" (a word he had previously used correctly) and then looked at his mother and laughed (Johnson & Mervis, 1997). However, the ways in which children comprehend and produce humorous verbalizations undergo clear developmental changes from the preschool to later school years. Three- to five-year-olds frequently experiment with the sounds of words, altering phonemes to create humorous facsimiles (for example, *watermelon* becomes *fatermelon*) (McGhee, 1979). By the early school years, the basis of children's humor expands to include riddles or jokes based on semantic ambiguities, as in the following:

Question: How can hunters in the woods find their lost dogs?
  Answer: By putting their ears to a tree and listening to the bark.

metalinguistic awareness
Ability to reflect on language as a communication tool and on the self as a user of language.

Still later—as every parent who has ever had to listen to a seemingly endless string of riddles and jokes from a school-age child can testify—children begin to understand and be fascinated by jokes and riddles that require them to discern syntactic ambiguities (Hirsch-Pasek, Gleitman, & Gleitman, 1978), as in the following:

> *Question*: Where would you go to see a man-eating shark?
> *Answer*: A seafood restaurant.

Thus children's appreciation of humor mirrors their increasingly sophisticated knowledge of the various features of language, beginning with its fundamental sounds and culminating with the complexities of syntactic and semantic rules.

Similarly, children's understanding of **metaphor,** figurative language in which a term that typically describes one object or event is applied to another context (for example, calling a shadow a "piece of the night" or skywriting a "scar in the sky"), undergoes developmental change. Even preschoolers show a rudimentary ability to understand and produce figurative language, especially when it refers to perceptual similarities between two objects (Gottfried, 1997). A four-year-old understands expressions such as "A string is like a snake," for example (Winner, 1979). In later childhood and adolescence, children understand and even prefer metaphors grounded in conceptual relationships, such as "The volcano is a very angry man" (Silberstein et al., 1982).

The development of metalinguistic skills necessarily follows the acquisition of phonological, semantic, and syntactic knowledge (the sequence of which is described in the Language Development chronology). After all, the ability to reflect on and even play with the properties of language demands that a person first possess a basic understanding of those properties. In addition, metalinguistic skill is probably tied to advances in thinking skills in general. Just how children move from concrete to abstract thinking and come to reflect on their thought processes are topics to which we will return in the next chapter, when we discuss the development of cognition.

KEY THEME
Interaction Among Domains

FOR YOUR REVIEW

- What are four different kinds of skills that children master in the course of language development?

- What kinds of phonological skills and preferences have researchers observed among infants? Among toddlers and preschoolers?

- What kinds of processing deficits do language-impaired children display?

- What are some of the features of infants' early vocalizations? What do they suggest about the roles of nature and nurture in language development?

- How do young children use gestures as tools for communication?

- What are the important features of children's language during the one-word stage?

- What are some of the individual and cultural variations in language acquisition that have been observed by researchers?

- What are the two main sets of hypotheses concerning how children derive the meanings of words? Identify research findings that provide support for each position.

- What are the major grammatical accomplishments of children in the two-word stage of language acquisition? What syntactic accomplishments follow the two-word stage?

- What aspects of pragmatics do children acquire in the preschool years?

- What are some examples of children's metalinguistic awareness?

metaphor Figurative language in which a term is transferred from the object it customarily designates to describe an object or event in another context.

CHRONOLOGY: *Language Development*

Newborn

Newborn

■ Prefers human voices.
■ Discriminates among phonemes.
■ Discriminates own language from other languages.
■ Cries.

1–5 Months

■ Discriminates among vowels.
■ Is sensitive to prosodic features of speech.
■ Coos.

6–12 Months

■ Babbles.
■ Prefers unfamiliar words in own language to other languages.
■ Detects words in a stream of speech.
■ Produces gestures to communicate and to symbolize objects.
■ Comprehends many words.

12–18 Months

■ Produces single-word utterances.
■ Comprehends fifty-plus words.

Newborn

1 Mo.
2 Mos.
3 Mos.
4 Mos.
5 Mos.
6 Mos.
7 Mos.
8 Mos.
9 Mos.
10 Mos.
11 Mos.
12 Mos.
13 Mos.
14 Mos.
15 Mos.
16 Mos.
17 Mos.
18 Mos.

Newborn
1 Yr.
2 Yrs.
3 Yrs.
4 Yrs.
5 Yrs.
6 Yrs.
7 Yrs.
8 Yrs.
9 Yrs.
10 Yrs.
11 Yrs.
12 Yrs.
13 Yrs.
14 Yrs.
15 Yrs.
16 Yrs.
17 Yrs.
18 Yrs.

18–24 Months

■ Displays vocabulary spurt.
■ Begins to use two-word utterances.
■ Comprehends tense and transitivity.

2$1/2$–5 Years

■ Produces multiword utterances.
■ Uses morphemes, negatives, questions, and passive voice.
■ Shows growth in vocabulary and use of syntax.
■ Displays overregularizations.
■ Appreciates humor and metaphor.
■ Shows growth in referential communication skills and other aspects of pragmatics.

6+ Years

■ Shows metalinguistic awareness.

This chart describes the sequence of language development based on the findings of research. Children often show individual differences in the exact ages at which they display the various developmental achievements outlined here.

Explaining Language Acquisition

When you consider the sequence of language acquisition we have just described, three points are especially noteworthy. First, language development proceeds in an orderly fashion. Although individuals may vary in the ages at which they attain language milestones or in the precise form of those achievements, children do not acquire language in a haphazard fashion. Second, children learn language rapidly and with seemingly little effort. With the exception of those with some serious physical or psychological problem, all children learn to speak within only a few years, despite the diverse range of skills required. Third, children produce *generative* language; that is, they do not merely duplicate what others say but create novel and unique expressions of their own. Any theoretical explanation of language must account for these remarkable achievements. Although we have already alluded to some possibilities in describing language development, it is time to more closely examine several major theoretical positions.

There are two fundamental questions that divide the various camps. First, to what extent are the child's language skills based on innate capabilities? Although most developmental researchers staunchly insist that nature and nurture interact, some posit a fairly substantial role for innate factors, whereas others emphasize the role of experience. Second, are the processes that children use to learn language unique to human speech, or are they the result of more general capabilities for processing information? Some experts believe that language skills are modular packages of skills dedicated to language processing. Others maintain that the attention, memory, and problem-solving skills that children apply to a wide array of thinking problems are used in the service of language acquisition as well. We should not be surprised if each of the following theories makes some contribution to our full understanding of language development. On some issues, though, there are still debates remaining to be settled.

The Role of Biology

The human brain contains several areas associated with the understanding and production of language. As we saw in the chapter titled "Brain, Motor Skill, and Physical Development," the right and left hemispheres of the brain have specialized functions, a phenomenon called *lateralization*. The primary regions that control language processing in most people are found in the left hemisphere. A major question arising from knowledge of the brain's involvement in language is the extent to which the milestones of language acquisition are controlled by physiological maturation of brain structures and, more specifically, by lateralization.

● **The Brain and Language** *Neuropsychological studies* reveal that several portions of the temporal, prefrontal, and visual areas of the brain are involved in language processing (Neville et al., 2001). However, studies of individuals who have suffered brain damage due to stroke, traumatic injury, or illness have pinpointed two specific regions in the left hemisphere that play a special role in the ability to use language. The first is **Broca's area,** located in the left frontal region near the motor cortex (see Figure 7.5). Patients who have damage in this region evidence **expressive aphasia,** or the inability to speak fluently, although their comprehension abilities remain intact. The second region, **Wernicke's area,** is in the temporal region of the left hemisphere, close to the areas of the brain responsible for auditory processing. Damage to Wernicke's area results in **receptive aphasia,** in which speech seems fluent—at least on the surface—but contains nonsense or incomprehensible words; the ability to understand the speech of others is also impaired. An important finding is that children are more likely than adults to recover language functions following injury to the left hemisphere (Annett, 1973; Basser, 1962), an illustration of the brain's greater *plasticity* during childhood.

KEY THEME

Nature/Nurture

Broca's area Portion of the cerebral cortex that controls expressive language.

**expressive aphasia** Loss of the ability to speak fluently.

Wernicke's area Portion of the cerebral cortex that controls language comprehension.

receptive aphasia Loss of the ability to comprehend speech.

FIGURE 7.5

The Two Portions of the Left Cortex of the Brain Responsible for Language Processing

Broca's area governs the production of speech, and Wernicke's area is responsible for the comprehension of speech. Damage to the former produces expressive aphasia, whereas damage to the latter leads to receptive aphasia.
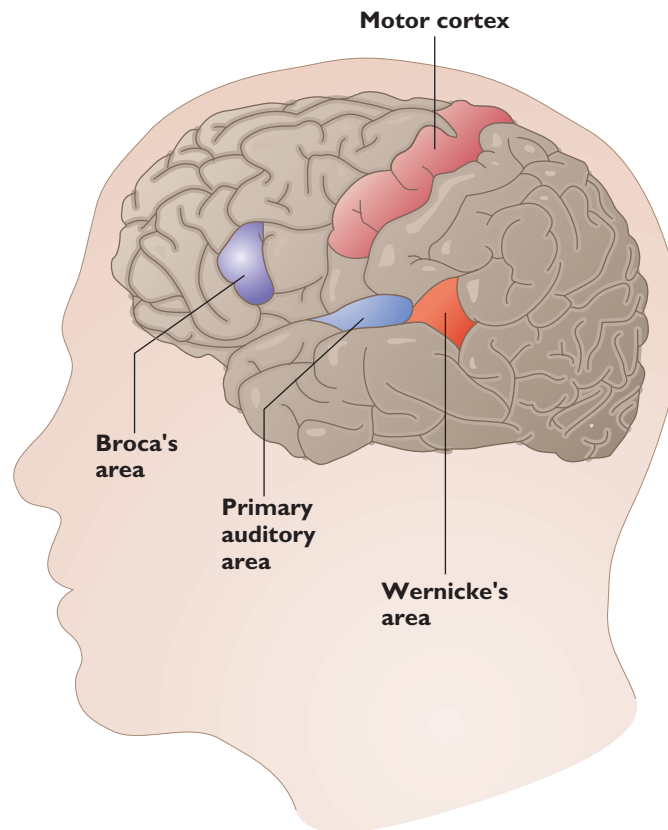
Recent advances in the ability to record electrical activity and blood flow in the brain have yielded further information on the brain's involvement in language. Before young children begin speaking, brain wave activity as they listen to words they comprehend is distributed across many regions of the brain. Once they start speaking, brain waves become more focused in the left hemisphere (Mills, Coffey-Corina, & Neville, 1993, 1994, 1997). In addition, children for whom fMRI data (see the chapter titled "Brain, Motor Skill, and Physical Development) indicate left hemisphere damage at sixteen to twenty-four months of age show delayed language acquisition at age four years (Chilosi et al., 2001). Studies such as these suggest that some (but not all) language processing is localized in the left hemisphere shortly after the first year. By the time children reach age seven years, patterns of brain activation indicate adultlike lateralization of language in the left hemisphere (Lee et al., 1999). Even deaf individuals learning sign language show brain activity in the left hemisphere similar to that of hearing individuals (Corina et al., 1999; McGuire et al., 1997).

Several other features of language acquisition suggest a strong biological component. Like motor milestones, language milestones are attained in a predictable sequence, regardless of the environment in which the child grows up (except for a few rare cases of extreme environmental deprivation). In addition, all languages share such features as phonology, semantics, and grammar, elements that Erik Lenneberg (1967) and others believed derive from the biologically determined capabilities of human beings. Indeed, children do seem to be driven to learn language, even in the absence of linguistic stimulation. One group of researchers studied a group of congenitally deaf preschool-age children who had not been taught sign language because parents were led to believe it would impede their ability to learn oral communication. None of them had learned to speak yet. Even so, the children had developed a unique gestural system of communication that followed the same sequence used by hearing children, that is, a one-symbol stage, followed by a two-symbol stage, and so forth (Feldman, Goldin-Meadow, & Gleitman, 1978). For these children, language literally "dripped" out of their fingers.

● **Critical Periods and Language Learning**   Lenneberg (1967) claimed that to speak and comprehend normally, children must acquire all language basics by adolescence, when physiological changes in the brain make language learning more difficult. He thus proposed a *critical period* for the acquisition of language. A few rare case studies of children who have been isolated from social contact or linguistic experience for protracted periods support his position. One girl, Genie, had minimal human contact from age twenty months until thirteen years due to isolation imposed by her parents. She did not speak at all. After she was found and received extensive therapy, Genie made some progress in learning words but never learned to speak normally, showing special difficulty in completely mastering the rules of syntax (Curtiss, 1977). Another nineteen-year-old boy from rural Mexico, deaf since birth but given hearing aids at age fifteen years, spoke only in one- or two-word utterances and had difficulties with verb tenses, negation, and other elements of syntax despite three years of exposure to language (Grimshaw et al., 1998). Studies of deaf people who learned American Sign Language (ASL) at different times in life provide additional support for the critical-period hypothesis. Elissa Newport (1990) found that individuals who learned ASL after age twelve showed consistent errors in the use of grammar, whereas those who were exposed to ASL from birth displayed a normal course in the development of the language.

Lenneberg's hypothesis also implies that children will find it difficult to learn a second language if they begin during or after adolescence. Here too there is evidence to support his ideas. Jacqueline Johnson and Elissa Newport (1989) assessed the ability of Chinese and Korean immigrants who learned English as a second language to judge the grammatical correctness of more than two hundred English sentences. Some participants started to learn English as early as age three, others not until age seventeen or later. The older they were before learning English, the poorer were their scores on the grammar test. Moreover, factors such as length of experience with English, amount of formal instruction in English, or identification with American culture could not account for the findings. Early exposure to a second language can also affect one's ability to pronounce it. One recent study found that when individuals merely overheard Spanish before age six, they sounded more like native speakers when they went on to study Spanish as adults, as compared with individuals without that early experience (Au et al., 2002). Newport (1990) aptly summarizes findings like these by stating that "in language . . . the child, and not the adult, appears to be especially privileged as a learner" (p. 12).

Neuropsychological findings with bilingual speakers complement the preceding findings. Participants in one recent study were Chinese adults who had acquired English as a second language at different points in their lifetimes. While participants read sentences that were either correct or violated semantic or syntactic rules, the researchers monitored their brain wave activity. Brain wave patterns suggested that the age of second-language acquisition made a special difference for syntactic tasks; if English had been acquired after age four, electrical activity in the left hemisphere showed a different pattern than if English had been acquired earlier in childhood (Weber-Fox & Neville, 1996). In another study, magnetic resonance imaging was used to study patterns of brain activation as bilingual individuals performed linguistic tasks in their native and second languages. When the second language was learned in adulthood, images of brain functioning showed that two adjoining but separate regions in Broca's area were activated (see the left panel of Figure 7.6). In contrast, when the second language was learned during infancy, overlapping regions in Broca's area showed activity (see the right panel of Figure 7.6) (Kim et al., 1997). Thus the brain seems to respond, and perhaps become organized, differently depending on when the second language was learned.

Critics point to problems in interpreting some of the research cited in support of the critical-period hypothesis. Genie, for example, may have suffered serious cognitive, physiological, and emotional deficits because of her prolonged isolation from other humans, deficits that could well account for her lack of mature language. Furthermore, most studies of second-language learning, although controlling for many

KEY THEME
Continuity/Discontinuity

? WHAT DO YOU THINK?

Should Deaf Children Receive Cochlear Implants?
psychology.college.hmco.com

| FIGURE 7.6 | Brain Functioning in Bilingual Individuals |

These two panels show activity patterns in the brains of two bilingual individuals as they engage in linguistic tasks in their native and second languages. The panel on the left shows brain activity for a native speaker of English who learned French in adulthood. Notice that two adjacent areas show activation. The panel on the right shows brain activity for a native speaker of Turkish who learned English in infancy. Here the areas activated for each language overlap. Neuropsychological findings such as these provide support for the critical-period hypothesis of language acquisition.
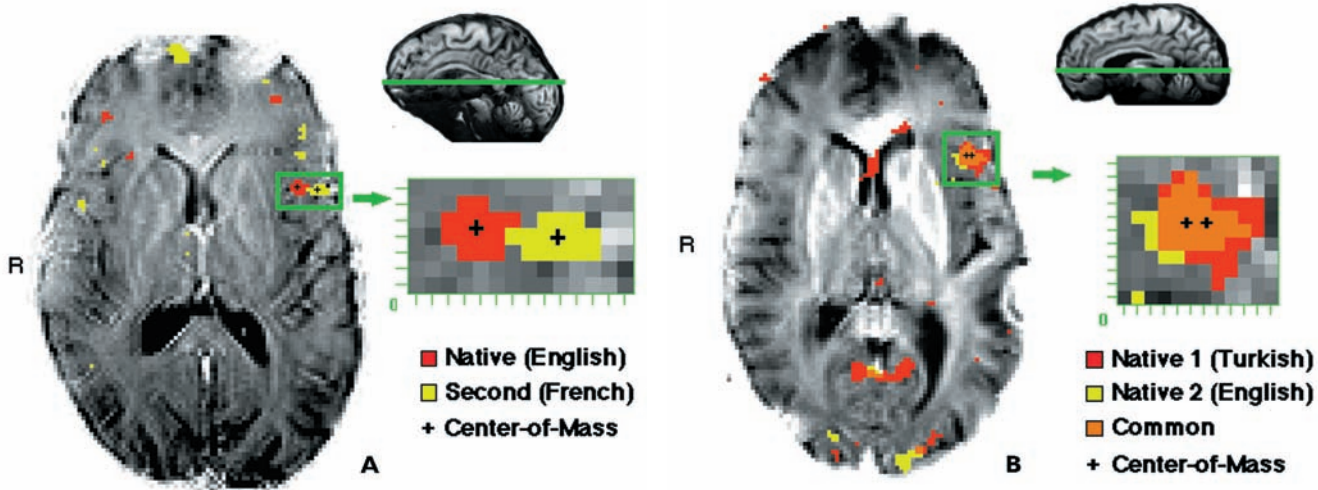
Source: Kim et al., 1997.

relevant variables, have not taken into account how much the later-learned second language is actually used (Bruer, 2001). One recent study showed that even though they were learning English at age seventeen or later, the amount of English spoken by native Spanish speakers used in speaking to others predicted their facility with English (Birdsong & Molis, 2001). Finally, some individuals who learn a second language in adulthood acquire the phonology, vocabulary, and syntax of that language with nativelike proficiency (Birdsong & Molis, 2001; Bongaerts, 1999; Snow, 1987). Thus the window of opportunity for learning language may not be as restricted by biology as initially thought. Nonetheless, most experts would probably agree that children have a distinct advantage over adults in language learning, which makes early childhood an ideal time to acquire a second language.

Ample and convincing evidence exists for the role of biology in language acquisition—few would debate that claim. Yet a biological account, although necessary for a comprehensive understanding of language development, is not sufficient. The world's languages often differ, for example, in how they express ideas, some using patterns of intonation instead of words for a given concept (Maratsos, 1989). How would brain structures account for such cultural variations? In addition, knowing that biology is involved still does not reveal the details of many aspects of language development that we reviewed earlier in this chapter—children's early facility with nouns in one culture versus verbs in others, for example. In other words, we need to be able to explain how the language environment to which the child is exposed feeds into whatever biological language structures exist.

KEY THEME
Sociocultural Influence

The Linguistic Perspective

Noam Chomsky (1980, 1986) and other linguists emphasize the structures that all languages share, those syntactic regularities that the young language learner quickly identifies in the course of everyday exposure to speech, such as when the child learning English notices that nouns representing agents precede verbs and nouns representing the objects of actions follow verbs. According to Chomsky, children possess

an innate system of language categories and principles, called *universal grammar,* that predisposes them to notice the general linguistic properties of any language. As children are exposed to a specific language, a process called *parameter setting* takes place; that is, "switches" for the grammatical rules that distinguish English from Japanese or Arabic from French are set. After abstracting the general rules of language, children apply them to form their own novel and creative utterances. Language learning, say most linguists, is different from other forms of learning; there are constraints on what the child will be predisposed to learn, and language learning is governed by its own set of principles. In other words, language learning is *modular,* separate and distinct from other kinds of processing. Furthermore, many linguists believe language is a uniquely human enterprise, one that is not part of the behavioral repertoire of other species.

Research evidence generally supports the idea that learning and applying rules is part of the process of learning language. Children learn syntactic rules for forming plurals, past tense, and other grammatical forms rapidly in their first five years and can even apply them to words they have never heard before. In a famous experiment, Jean Berko (1958) demonstrated this phenomenon by presenting children with several nonsense words such as *wug.* Children were able to state correctly that the plural form of *wug* is *wugs,* although they had never heard made-up words such as these. Even seven-month-old infants show evidence of being able to learn rules that can help them to learn language. In one study, infants heard several three-word sentences from an artificial language until they showed a decline in interest in them. For example, they heard constructions that had an ABA form such as "ga ti ga" and "li na li." During the test phase, though, they showed a distinct preference for sentences with an ABB construction, such as "wo fe fe." Likewise, infants who were habituated to the ABB structure preferred sentences with the ABA structure during the test phase. (Marcus et al., 1998). Moreover, linguistic theories provide a plausible explanation of the occurrence of overregularizations; these can be seen as the product of a language learner who has done too good a job, implementing rules even in cases in which exceptions exist. The drive to find structure in language is evident in another interesting way—in the development of *creole* languages, in which children in a particular cohort permanently embellish or expand the organization of the language they hear. Researchers have discovered a deaf community in Nicaragua in which individuals created their own version of sign language. With each new generation of children, the complexity of that language's structure has increased (Senghas & Coppola, 2001). The implication is that children do not simply pattern their speech after what they hear; rather, they use language in creative and highly organized ways.

Linguistic approaches help to explain just how children can master the complex, abstract rules that characterize all languages, given what some have called the "impoverished input"—the incomplete or ungrammatical utterances—that they typically hear (Lightfoot, 1982). They also help us understand how children learn language without explicit teaching of the rules of grammar or lists of vocabulary words. However, critics point out that linguistic approaches may reflect more closely the biases of adult theoreticians who attempt to describe the logical necessities of language achievements than the actual processes children use. Michael Tomasello (2000), for example, maintains that young children's use of language does not always reflect an appreciation of abstract principles of syntax. When children first learn how to use verbs, they use some in very restricted ways (e.g., "cut paper," "cut it") and others in varied types of constructions (e.g., "I draw on man," "Draw it by Santa Claus"). This lack of consistency suggests that children are not using general rules about how verbs work to produce their utterances.

What about the linguists' claim that language is uniquely human? In the past several decades, numerous attempts have been made to train members of the ape family to use language, all with some apparent success (Gardner & Gardner, 1971; Premack, 1971; Rumbaugh, Gill, & von Glasersfeld, 1973), although many early studies were criticized on methodological grounds (Terrace et al., 1979). Nevertheless, in one

well-controlled study, an ape named Kanzi was raised from infancy with exposure to human speech similar to that provided to a young girl named Alia. When Kanzi was eight years old and Alia was two, they were tested on their ability to comprehend an assortment of novel sentences, such as "Take the potato outdoors." On many of the sentences, ape and child performed equally well (Savage-Rumbaugh et al., 1993). Scientists have also identified areas in the left hemisphere of the chimpanzee brain that seem to correspond to Broca's area and Wernicke's area in humans (Cantalupo & Hopkins, 2001; Gannon et al., 1998). However, compare the ages of Kanzi and Alia; it took many more years to bring the ape to the two-year-old child's level of mastery. Furthermore, although apes may be able to use visual props or sign language to form two-word communications, they rarely generate more complex grammatical structures. Perhaps most important, when observed in their natural habitats, apes do not point to or show objects to other apes. That is, although they do use highly patterned signals to communicate with one another, they do not use signs or gestures in referential or symbolic ways (Tomasello, 1998). Perhaps their limitation is a cognitive rather than a linguistic one, so questions about the modularity of language skills in humans cannot be answered from these observations. Even so, apes are evidently limited in their ability to use language despite intensive efforts to teach them.

Learning and Cognition

B. F. Skinner (1957) and other behaviorists regarded language as a behavior like any other, whose appearance and development could be accounted for by the basic principles of learning. Learning theorists believe productive language is initially shaped through the selective reinforcement of the child's earliest vocalizations. At first, utterances that even remotely resemble the child's native language are rewarded by caregivers with smiles, hugs, or an enthusiastic "Good!", whereas other, random sounds are ignored or discouraged. Gradually, parents and others expect the child's verbalizations to conform more closely to the phonological and syntactic structure of their language before they will reward her. Imitation also plays a significant role, according to learning theorists. As parents and other more experienced users of language label objects for children and speak in syntactically correct sentences, they provide models of competent and mature language use for young language learners. Children do, after all, learn the phonology, syntax, and conversational rules of the culture into which they are born.

Traditional learning theory plays a lesser role in current explanations of language development than it did a few decades ago. As an alternative way to capture how general knowledge acquisition might account for language, some theorists emphasize changes in the child's cognitive, or thinking, processes. Elizabeth Bates found that abilities such as imitation, tool use, and the complex manipulation of objects predict language attainments (Bates, 1979). Alison Gopnik and Andrew Meltzoff (1986) have identified still other skills that seem to emerge just before certain language accomplishments. For example, children who can find a hidden object after it has been moved from one location to another begin within a few weeks to use words such as *gone* to signify disappearance. Similarly, they begin to use words representing success and failure (for example, *there* and *uh-oh*) after learning to solve a complex means-ends task, such as using a stick to obtain an object. Gopnik and Meltzoff (1987, 1992) also noted that children who are able to sort groups of toys into two distinct categories, such as dolls and cars or boxes and balls, have more words in their vocabulary. According to these researchers, children develop linguistic labels consistent with cognitive problems that interest them at a given stage of development. In addition, it may be no accident that children's first words tend to be nouns such as *dog* and not *animal* or *collie*. Learning to organize objects at this intermediate level seems to be easier for young children than using either broader or more specific categories (Mervis, 1984; Mervis & Crisafi, 1982; Rosch et al., 1976), and the child's language reflects this cognitive preference.

KEY THEME
Nature/Nurture

KEY THEME
Interaction Among Domains
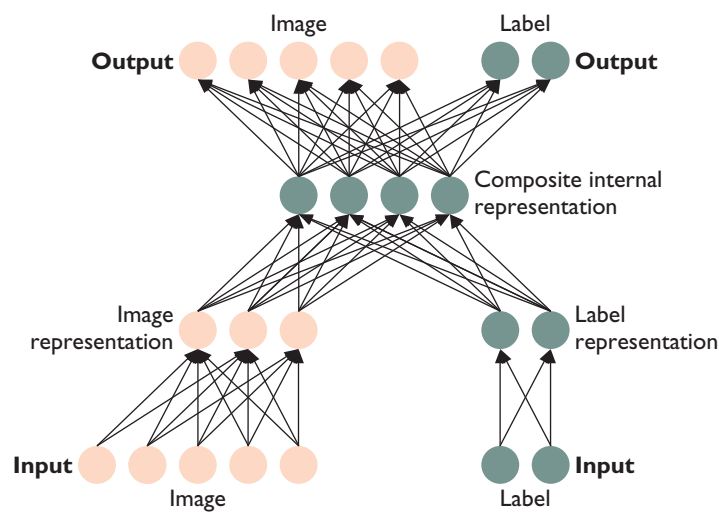
Source: Nobre & Plunkett, 1997.

Connectionist models emphasize the formation of elaborate networks of associations between incoming stimuli (images and labels, in this case) and internal representations, as well as associations of internal representations with outputs (e.g., saying a word). Connectionist models have been successful in simulating many aspects of language acquisition, including vocabulary development and syntax acquisition, suggesting that general cognitive processes may underlie the child's language achievements.

Recent studies are also beginning to specify how memory capabilities are involved in language acquisition. For example, at eight months of age, infants show a remarkable ability to remember particular words from stories they had heard two weeks earlier (Jusczyk & Hohne, 1997). This is precisely the age at which infants begin to show an increase in their comprehension of words spoken by others. Among older children, short-term memory skills, such as the ability to repeat a string of digits, are related to the ease with which children learn the sound patterns of new words (Gathercole et al., 1997).

Finally, infants have been shown to be capable of extracting information about the probability that one sound will follow another in a stream of speech, a phenomenon called *statistical learning*. In one experiment, researchers exposed eight-month-olds to an unbroken stream of speech, such as *tibudopabikudaropigolatupabikuti*, for two minutes. In this example, every instance of *pa* was followed by *bi*. On the other hand, *pi* was followed by *go* only one-third of the time. When later presented with *pabiku* versus *pigola*, infants showed a clear attentional preference for *pigola*, suggesting that they were sensitive to the likelihood that one sound follows another (Saffran, Aslin, & Newport, 1996). This process may be an important part of infants' ability to detect words as they listen to ongoing streams of natural speech (Saffran, 2001).

Some researchers now argue that language acquisition is less modular and rule-based than originally thought. These theorists maintain that many apparently uniquely linguistic phenomena actually have their roots in broader cognitive processing abilities such as the ones we have just described. One contemporary approach that emphasizes the role of general learning processes includes *connectionist models* of language acquisition. Connectionist models describe language development in terms of networks of associations that are organized in interconnected layers, much like the associations that form among neurons (see Figure 7.7 for one example). Repeated experiences with the linguistic environment are responsible for forming and strengthening associations between stimuli and the network of associations, among items within the network, and between the network and the individual's output or response (Klahr & MacWhinney, 1998; Plunkett, 1995). So far, connectionist models have done a good job of simulating some aspects of children's language acquisition, such as vocabulary and syntactic development (MacWhinney, 1998; Nobre & Plunkett, 1997; Plunkett & Marchman, 1996).

KEY THEME
Nature/Nurture

The Social Interaction Perspective

Many researchers of child language hold as a central tenet that language is a social activity, one that arises from the desire to communicate with others and that is nurtured

KEY THEME
Interaction Among Domains

KEY THEME
Nature/Nurture

in social interactive contexts. Though these researchers acknowledge the biological and innate predispositions of the young human organism to learn language, they emphasize the role that experiences with more mature, expert speakers play in fostering linguistic skill. Children, they say, need models whose speech does not exceed their processing abilities. Many qualities of parental speech directed at children are well suited to the child's emerging receptive and productive skills, providing a *scaffolding* or framework from which the child can learn.

As we saw earlier in this chapter, parents have a unique way of talking to their young children. Most parents present a scaled-down version of spoken language as they interact with their young offspring, a version that contains simple, well-formed sentences and is punctuated by exaggerated intonation, high pitch, and clear pauses between segments of speech (Newport, 1977). Caregivers describe concrete events taking place in the present and often refer to objects with diminutives such as *kitty* or *doggie*. **Motherese, or parentese,** as this form of communication is called, also includes repetitions of what the child has said, as well as many questions. Questions in particular serve to facilitate the occurrence of **turn taking,** the alternating vocalization by parent and child. Some questions are also used as **turnabouts,** elements of conversation that explicitly request a response from the child, as in "You like that, don't you?" or "What did you say?" Also, parents often follow the child's verbalization with a **recast,** repeating what the child has said but correcting any errors. **Expansions**—more elaborate verbal forms—may be added, too. Thus, when a child says, "Ball fall," his mother might reply, "Yes, the red ball [expansion] fell [recast]." Recasts and expansions provide children with cues that their verbalization needs improvement and a model for how to improve. Children, in fact, often imitate and retain their parent's recasts (Farrar, 1992; Saxton, 1997).

When caregivers talk to infants and young children, they employ simple sentences, exaggerate their intonation, and speak with a high pitch. Infants are especially responsive to these qualities of "motherese," which seem to provide a helpful framework for learning language.

motherese/parentese   Simple, repetitive, high-pitched speech of caregivers to young children; includes many questions.

turn taking   Alternating vocalization by parent and child.

turnabout   Element of conversation that requests a response from the child.

recast   Repetition of a child's utterance along with grammatical corrections.

expansion   Repetition of a child's utterance along with more complex forms.

The following exchange between one seven-month-old, Ann, and her mother illustrates several of these concepts (Snow, 1977):

MOTHER	ANN
Ghhhhh ghhhhh ghhhhh ghhhhh	
Grrrrr grrrrr grrrrr grrrrr	
	(protest cry)
Oh, you don't feel like it, do you?	
	aaaaa aaaaa aaaaa
No, I wasn't making that noise.	
I wasn't going *aaaaa aaaaa*.	
	aaaaa aaaaa
Yes, that's right.	

Notable in the exchange is the mother's pattern of waiting for her child's vocalization to end before she begins her response, an example of turn taking. If the child had spoken actual words, a real conversation would have taken place. The mother also repeated the child's vowel-like sound but embedded it in more elaborate speech. By the time the infant reaches eighteen months, the mother's tendency to expand or explain her utterances becomes even more pronounced, as in the following brief episode (Snow, 1977):

MOTHER	ANN
	(blowing noises)
That's a bit rude.	
	Mouth.
Mouth, that's right.	
	Face.
Face, yes, mouth is in your face.	
What else have you got in your face?	
	Face. (closing eyes)
You're making a face, aren't you?	

According to Snow (1984), two general principles operate during caregiver-child interactions. First, parents generally interpret their infants' behaviors as attempts to communicate, even when that interpretation may not seem warranted to an objective observer. Second, children actively seek relationships among objects, events, and people in their world and the vocal behaviors of their caregivers. The result of these two tendencies is that parents are motivated to converse with their children and children have a mechanism for learning language.

Parentese may serve a number of functions in the child's growing competence with language. First, this form of speech may assist the child's acquisition of word meaning. Mothers tend to say the names for objects more loudly than other words in their speech to infants, and often they place the object label in the last position in their sentence, as in "Do you see the *rattle*?" (Messer, 1981). Mothers also tend to highlight new words by raising their pitch as they say them (Fernald & Mazzie, 1991) or moving an object as they label it (Gogate, Bahrick, & Watson, 2000). Second, the intonations of motherese may facilitate the child's acquisition of syntax. One study demonstrated that seven- to ten-month-olds oriented more frequently to motherese that contained pauses at clausal boundaries (e.g., "Cinderella lived in a great big house/but it was sort of dark . . .") than to motherese that was interrupted within clauses (e.g., "Cinderella lived in a great big house but it was/sort of dark . . ."). Infants did not show these differential preferences in response to regular adult speech (Kemler Nelson et al., 1989). Infants show a similar sensitivity to even smaller grammatical units, the phrases and even the words within a sentence, but only when sentences are spoken in motherese (Jusczyk et al., 1992; Myers et al., 1996; Nazzi et al., 2000). The prosodic features of motherese may thus assist the infant in identifying syntactically relevant elements of language. Finally, exposure to motherese may provide lessons in conversational turn taking, one aspect of pragmatics that governs speech in interactions with others.

Are there any other effects of interactions with caregivers on child language development? Researchers have observed that the more mothers talk with their children, the more words their children acquire (Huttenlocher et al., 1991; Olson, Bayles, & Bates, 1986). It is not just how much mothers talk to their children that makes a difference, however; *how* they talk also matters. When mothers use many directives to control their children's behaviors and are generally intrusive, language development is slowed. When mothers (or teachers) use questions, expansions, and conversational turn taking to elicit language from children or follow the children's vocalizations with a response, language development proceeds more rapidly (Hoff-Ginsberg, 1986; Nelson, 1973; Tamis-LeMonda, Bornstein, & Baumwell, 2001; Valdez-Menchaca & Whitehurst, 1992). Among older children, about age five, exposure to sophisticated words (e.g., *cholesterol, gulping,*) at mealtimes and play times predicts vocabulary development in the early school years (Weizman & Snow, 2001).

As important as motherese may seem, it is not a universal phenomenon. Although features of motherese have been observed in many languages and even among deaf mothers signing to their deaf infants (Gleason & Weintraub, 1978; Masataka, 1996), mothers in some cultures adopt a distinctly different style in talking with their infants. Consider the following two examples of maternal speech, one American and the other Japanese, as observed by Anne Fernald and Hiromi Morikawa (1993):

American mother: That's a car. See the car? You like it? It's got nice wheels.
Japanese mother: Here! It's a vroom vroom. I give it to you. Now you give it to me. Give me. Yes! Thank you.

Whereas American mothers tend to name objects and focus on the exchange of information, Japanese mothers rarely name objects, using them instead to engage their infants in social routines. Perhaps it is not surprising, then, that American infants use substantially more nouns in their speech at nineteen months of age. Similarly, other researchers have noted that Japanese mothers ask fewer questions but use more nonsense sounds and songs than American mothers (Bornstein et al., 1992; Toda, Fogel, & Kawai, 1990). Thus mothers may have different agendas as they speak with their children, and their style of speech may subtly shape the children's utterances.

Another example of variation in the use of motherese can be found in the Kaluli society of Papua New Guinea. In this culture, talking with others is a highly valued social skill, yet few adult verbalizations are directed to infants. Infants may be called by their names, but until they pass their first year, little else is said to them. When mothers do begin to talk to their babies, their speech contains few of the elements of motherese. Turn taking, repetitions, and elaborations are absent; usually mothers simply make directive statements that require no response from the child. Nevertheless, Kaluli children become proficient users of their language within developmental norms (Schieffelin & Ochs, 1983). Joint linguistic interactions between caregiver and child thus may not be essential to the emergence of language.

Linguistic exchanges with other interaction partners—fathers, siblings, peers, and others—may uniquely influence the child's eventual level of linguistic skill. For example, when fifteen-month-olds "converse" with their fathers, they experience more communication breakdowns than when they talk with their mothers. Fathers more often request clarification, change the topic, or do not acknowledge the child's utterance after they fail to understand what she or he said (Tomasello, Conti-Ramsden, & Ewert, 1990). Thus, in communicating with fathers, children are challenged to make adjustments to maintain the interaction. Children also learn language by overhearing it on educational television (Wright et al., 2001), in conversations between mothers and older siblings (Ashima-Takane, Goodz, & Derevensky, 1996), or even between two strangers (Akhtar, Jipson, & Callanan, 2001). Children are normally exposed to a rich and varied range of linguistic stimuli from different sources in the environment; many theorists believe this fact ensures that children will learn the details of linguistic structures that may not be present in the verbalizations of a single conversation partner, such as the mother (Gleitman, Newport, & Gleitman, 1984; Wexler, 1982).

RESEARCH APPLIED TO PARENTING

Reading to Children

*I*t was several months later before Devon began to say a few different words. But after that his vocabulary expanded rapidly, and he started stringing words together. Jennifer marveled at the progress Devon was making as she prepared her son's bed and eavesdropped on Devon and his father in their evening ritual. This was Bill's favorite time of day. Every night, just before Devon was put to bed, Bill would pull him up in his lap and take a picture book from the shelf. At first, he just pointed to and named things in the book, often encouraging Devon to participate by asking, "What's that?" As Devon's vocabulary increased, Bill elaborated on his answers and asked other questions: "What does the doggie say?" "Woof-woof!" squealed Devon, enjoying the ritual perhaps every bit as much, maybe even more, than his father.

The research findings discussed earlier show that how and how often parents speak to children can influence language development. One context in which mothers' speech tends to be particularly lavish is during book reading. Erika Hoff-Ginsberg (1991) found that when mothers and two-year-olds were reading books, mothers showed the greatest diversity in the vocabulary they used, the greatest complexity of syntax, and the highest rate of replies to their children compared with other contexts, such as mealtime or toy play. Other research has shown that the amount of time parents spent reading stories to their twenty-four-month-olds predicted children's language ability up to two years later (Crain-Thoreson & Dale, 1992). As a result of such findings, many child development experts encourage parents to read to their young children.

Grover Whitehurst and his colleagues have developed a program called *dialogic reading* to stimulate language development in preschool children at risk for academic failure, but the general principles can be applied by any parent interested in promoting his or her child's language development. Here is some advice the researchers have developed for parents of two- and three-year-olds:

1. *Ask* what *questions (such as "What is this?") to stimulate the child to speak.* Avoid yes/no questions that require only brief answers.
2. *Follow the child's answer with a question.* Ask, for example, what shape or color an object has or what it is used for.
3. *Repeat the child's utterance in the form of a recast.* For example, follow "Cow" with "Yes, that's right, it's a cow." This gives the child feedback that she is correct.

Researchers have identified several techniques that parents can use to promote language development in the context of reading to their children. Among them are asking "what" questions, following the child's answer with another question, and using recasts. Making the experience positive and fun for the child is also important.

4. *If the child doesn't have an answer, provide a model and ask him to repeat.*   For example, say "That's a bottle. Can you say *bottle*?"
5. *Be generous with praise and encouragement.*   Make comments such as "Good talking" or "Nice job."
6. *Be responsive to the child's interests.*   When the child expresses an interest in a picture or part of the story, follow her interest with encouragement to talk.
7. *Have fun.*   Do not pressure the child; take turns with the child, and even make the activity a game.

Dialogic reading has been shown to increase language skills in children from different social classes when used by daycare teachers as well as parents (Arnold & Whitehurst, 1994). Of course, children learn language skills in many other contexts, such as mealtime conversations (Snow, 1993). Thus children whose parents do not read to them often are not necessarily fated to have poor language skills (Scarborough & Dobrich, 1993). Nonetheless, reading to children, perhaps especially when they are infants, leads to desirable outcomes in language development (DeBaryshe, 1993).

FOR YOUR REVIEW

- What have neuropsychological studies revealed about the involvement of the brain in language acquisition?

- What evidence supports a critical period hypothesis of language acquisition? What evidence is inconsistent with a critical period hypothesis?

- How does a linguistic perspective account for language acquisition? What research findings are consistent with a linguistic perspective?

- How does learning theory account for the development of language?

- Which cognitive skills have been suggested as correlates of language acquisition?

- What are the unique features of a social interaction perspective on language acquisition? What research findings are consistent with a social interaction explanation? What parental activities can promote children's language skills?

The Functions of Language

Aside from its obvious usefulness as a social communication tool, what functions does language serve? Does the human propensity to learn and employ language affect other aspects of functioning, specifically, mental processes, the regulation of behavior, and socialization? At the very least, language enriches the human experience by providing a useful vehicle for enhancing cognition and behavior; it also exerts powerful influences on other areas of human activity. In this section, we will examine briefly some broad effects of language on the domains of cognition, behavior, and socialization.

Language and Cognition

KEY THEME
Interaction Among Domains

The relationship between language and cognition has been a controversial subject for many years, especially with respect to which activity precedes the other. Some psychologists and anthropologists have argued that language shapes thinking, whereas others contend that cognition paves the way for language. Most now acknowledge that the link between language and cognition is bidirectional and that each domain
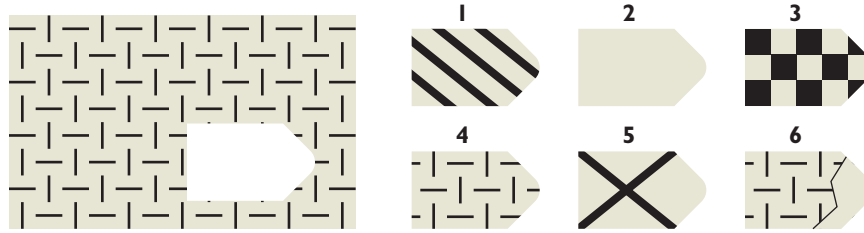
Source: Raven, 1962.

Bilingual children outperform monolingual children on nonverbal tests such as the Raven Progressive Matrices, which requires participants to select the segment that correctly fits into the larger pattern. Bilingual children generally seem to be more analytical than monolingual children in their approach to various problem-solving tasks.

influences the other. We have already pointed out some ways cognition might influence language. How might language have a powerful influence on the child's cognitive attainments?

● **Language, Memory, and Classification**   If you ask a child to perform a cognitive task, such as remembering a list of words or grouping a set of similar objects, you will notice that he will often spontaneously use language to aid his performance. The best examples of this behavior come from research findings on developmental changes in children's memory. There are distinct differences in the way preschool and school-age children approach the task of remembering. Older children are far more likely than younger children to employ deliberate strategies for remembering, strategies that typically involve the use of verbal skills. In one study, John Flavell and his colleagues (Flavell, Beach, & Chinsky, 1966) asked kindergarteners and second- and fifth-graders to watch as the experimenter pointed to three pictures in an array of seven. The children's job was to point to the same three pictures either immediately or after a delay of fifteen seconds. During the delay, the experimenters noticed that most children in the oldest group made spontaneous lip movements, suggesting that they were verbally repeating the items to be recalled. Moreover, the superior performance of the oldest group on the memory test was attributed to their spontaneous repetition of the names of the items. The use of verbal labels seemed to bridge the gap between the time the items were first seen and the time they were to be recalled.

Language can also influence how children categorize related groups of objects. Stan Kuczaj and his colleagues showed children twelve unfamiliar objects that could be grouped into three sets (Kuczaj, Borys, & Jones, 1989). Children who were taught the names of one category member from each group were more successful in sorting the objects than children who were not given labels. Language provides children with cues that classes of stimuli differ from one another, and these cues can influence how children form conceptual groups. If some four-legged animals are called *dogs* and others are called *cats,* the different linguistic labels will highlight for the child that the features of these two groups differ.

● **Bilingualism and Cognition**   One of the more interesting ways in which the influence of language on thought has been studied has been to compare, on a variety of tasks, the performances of bilingual children equally fluent in two languages with monolinguals fluent in only one. Bilingual children have been characterized as more analytic and flexible in their approach to different types of thought problems. For example, bilingual children perform better than monolinguals on certain nonverbal problems, such as the Raven Progressive Matrices (see Figure 7.8) (Hakuta & Diaz, 1985). Bilingual children have also been found to display greater metalinguistic awareness than monolingual children, even those who are chronologically older. When given sentences such as "Why is the cat barking so loudly?" bilingual children were more likely than monolingual children to ignore conflicting semantic information and state that the sentences were grammatically correct (Bialystok, 1986). Finally, bilingual children perform better than monolingual children on tasks that require selective attention. If instructed to sort a deck of cards based on one dimension, say color, and then re-sort the deck on the basis of a different dimension,

say shape, bilingual children are better able to inhibit responses from the first task (Bialystok, 2001).

One hypothesis to explain their superior performance is that bilingual children are forced to think more abstractly and analytically because they have had experience with analyzing the structure and detail of not just one language but two. A second possibility is that they are generally more verbally oriented in their thinking and have a greater tendency to produce verbalizations that enhance their performance even in nonverbal tasks. Finally, they may have more control over cognitive processing because they are constantly having to inhibit one language when they speak (Bialystok, 1999, 2001; Diaz & Klingler, 1991). Whatever the mechanism, these studies demonstrate that speaking a second language affects cognitive processes, often in a favorable way.

CONTROVERSY: THINKING IT OVER

How Should Bilingual Education Programs Be Structured?

Estimates are that almost 10 percent of school-age children in the United States have limited English proficiency (National Clearinghouse for English Language Acquisition, 2002), a characteristic that could understandably hinder success in school. Given the ease with which young children learn language and the apparent connection between bilingualism and certain cognitive processes, are there any implications for how children learning English as a second language should be taught?

What Is the Controversy?
Philosophies of teaching language-minority children have varied. Some believe that children should receive most of their education in their primary language, whether it is Spanish, Cambodian, or French, and make the transition to English only when they are ready. At the other extreme are the advocates of immersion, the idea that children should be totally surrounded by the second language, learning it in the same way the young child learns the first language. Immersion has been in the public spotlight as states such as California and Massachusetts have mandated this approach to teaching children with limited English proficiency. Many bilingual programs, in reality, fall in between these two extremes, such that English is taught as an extra subject by a bilingual teacher while children take their core academic subjects in their native languages.

What Are the Opposing Arguments?
Proponents of easing children into English by starting them in classes in their native languages say that this approach promotes basic language development, which in turn creates the foundation for acquiring the second language. In addition, children will develop a sense of belonging in the school, and their self-esteem will be high (Fillmore & Meyer, 1992). Advocates of immersion generally say that children will have to learn English eventually and that it is better not to delay. This view is also consistent with a belief that language learning is generally easier for younger than for older children.

What Answers Exist? What Questions Remain?
Some research findings suggest that allowing students to build their competence in their own native language assists in learning both core academic subjects and English (Bialystok, 2001; Meyer & Fienberg, 1992). On the other hand, immersion programs have been successful in Canada, Spain, and other countries (Artigal, 1991; Tucker & d'Anglejan, 1972). Unfortunately, evaluations of the effectiveness of bilingual education programs have been fraught with methodological difficulties (Willig & Ramirez, 1993). One issue is that many language-minority children come from backgrounds of poverty, the effects of which may contribute to difficulties with school (Hakuta, 1999). Another problem is that the goal of most bilingual education programs for language-minority children is not, in reality, to make them bilingual but to empha-

size speaking English (Hakuta & Mostafapour, 1996). In contrast, many successful immersion programs in Europe involve teaching *both* the native language and another highly valued language (Brisk, 1998).

What does the research on the process of language development suggest about the best way to structure bilingual education programs? Aside from economic status, what other variables should future research evaluating bilingual education take into account?

Language and Self-regulation

Language takes on an increasingly important role in regulating behavior as the child develops, according to prominent Russian psychologist Lev Vygotsky. Vygotsky (1962) believed the child's initial utterances serve an interpersonal function, signaling others about the child's affective state. In the preschool years, however, speech takes on a different function. Specifically, the child's **private speech,** or overt, audible "speech-for-self," comes to guide his or her observable activities. If you have ever observed a toddler coloring and simultaneously saying something like "Now, I'll use the blue crayon. I'll make the sky blue," you have seen an example of private speech. Eventually, speech-for-self becomes interiorized; **inner speech** dictates the direction of the child's thoughts.

How important is private speech in directing behavior? You may have noticed that you tend to talk to yourself when you are under stress or when you have a lot to do. Research has confirmed that children, like adults, use private speech when they find tasks difficult or when they make errors. In one recent study, researchers found that about 13 percent of three- and four-year-olds used private speech in some way during their spontaneous activities in preschool, but as Figure 7.9 shows, the older children were more likely to use private speech in the context of focused, goal-directed activities, such as doing a puzzle, rather than non-goal-directed activities, such as wandering around the classroom (Winsler, Carlton, & Barry, 2000).


Young children often use private speech when they are engaged in new or challenging tasks. This overt "speech-for-self" guides children's actions and eventually becomes interiorized into a form called *inner speech*. Language thus helps children to regulate their own behavior.

private speech Children's vocalized speech to themselves that directs behavior.

inner speech Interiorized form of private speech.

FIGURE 7.9
Private Speech in
Preschoolers

Both three- and four-year-olds use private speech in the natural context of preschool, but four-year-olds are more likely to use private speech when they are engaged in focused, goal-directed activities. Private speech is one way in which language can regulate children's behaviors.

Legend:
- Goal-directed
- Non–goal-directed
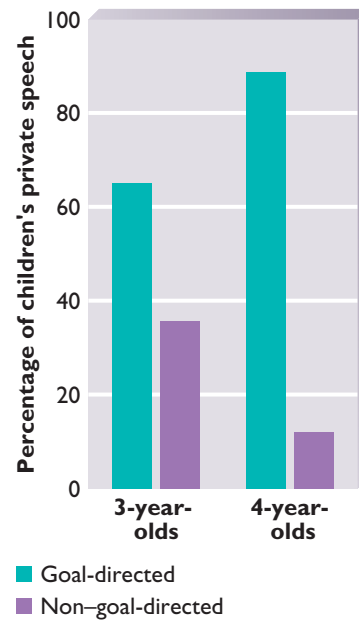
Source: Winsler, Carleton, & Barry, 2000.

Similarly, Laura Berk (1986) noted that when first-graders were solving math problems in school, they engaged in high levels of externalized private speech to guide their problem solving. Third-graders also showed evidence of private speech, but a more internalized form—through mutterings and lip movements—as they attempted to solve math problems. When children use task-relevant private speech, their performance on a variety of tasks improves (Berk, 1992). One longitudinal study demonstrated that as children progress from overt to more internal private speech, they also show fewer distracting body movements and greater sustained attention in school (Bivens & Berk, 1990). Such studies suggest that language becomes an increasingly powerful regulator of children's behavior as they develop.

Language and Cultural Socialization

KEY THEME
Sociocultural Influence

KEY THEME
Interaction Among Domains

Still another way in which language can have a broad influence on development is by helping children discern the social roles, relationships, and values of their culture. Many languages have specific grammatical forms that are used to convey gender, age, or social power. In acquiring language, children are sensitized to the specific ways their own culture creates social order. For example, in Japanese, the word particle *zo* signifies affective intensity and a male speaker, and the particle *wa* conveys hesitancy and a female speaker. Children learning Japanese are therefore likely to associate hesitancy with females and forcefulness with males (Ochs, 1990). In many other languages, specific words have formal and informal versions, with the formal used when speaking with individuals who have more authority or power and the informal with individuals who share equal status or are related. Again, such linguistic distinctions highlight important social relationships within the cultural group.

A good example of how language can influence socialization comes from traditional Samoan culture, which emphasizes community and group accomplishments over the attainments of individuals. In Samoan speech, few verbalizations include praise or blame for individuals. Most statements concern the success or failure of the group and emphasize the life of the community. When Samoan children are exposed to verbalizations of this type, they are being socialized into the collective orientation of their culture (Ochs, 1990).

Researchers are just beginning to explore the ways in which the words and social conventions within a specific language are related to cultural values and beliefs. However, it is apparent that through language, children learn far more than simply how to communicate; they also learn about the broader belief systems of their society.

FOR YOUR REVIEW

• In what ways does language influence cognitive processing? What are the particular effects of bilingualism on cognition?

• What are the functions of private speech for the developing child?

• In what ways does language provide cues about cultural values and socialization goals?

CHAPTER RECAP

SUMMARY OF DEVELOPMENT THEMES

■ **Nature/Nurture** *What roles do nature and nurture play in language development?*

There are several indicators that for humans, nature sets early predispositions to develop language: the infant's sensitivity to phonemes and prosody, the child's tendency to progress through language milestones in a predictable sequence, and the devotion to language functions of certain portions of the brain are just some examples. Nurture, in the form of the child's experiences with more mature language users, interacts with these biological tendencies to lead the child to acquire the phonology, semantics, and grammar of a particular language and to learn the social conventions that accompany spoken language in his or her culture.

■ **Sociocultural Influence** *How does the sociocultural context influence language development?*

Cultures vary in the extent to which caregivers use motherese with their growing children, a factor that may influence the rate of language acquisition. The specific elements of phonology, semantics, grammar, and pragmatics also vary across languages. Often the content and structure of a specific language provide cues to the culture's social order and values.

■ **Child's Active Role** *How does the child play an active role in the process of language development?*

Even in the earliest stages of language acquisition, children often influence which objects or people caregivers will label when they look at or point to specific items. Although children do benefit by merely listening to language use in the environment, they also actively use context to derive the meanings of words. In addition, their rapid acquisition of the rules of grammar suggest that children abstract the regularities in language to generate their own verbalizations.

■ **Continuous/Discontinuous** *Is language development continuous or discontinuous?*

Descriptions of early language production often seem stagelike because children appear to spend distinct periods of time in a babbling stage, a one-word stage, and so on. However, there are continuities among different events in language acquisition. For example, the sounds in infant babbling are related to the language the child will eventually speak.

■ **Individual Differences** *How prominent are individual differences in language development?*

Children frequently show striking differences in the rate at which they achieve language milestones. They may differ, for example, in the age at which they say their first words or when (even if) they show a vocabulary spurt. Some may develop a referential style of speech, whereas others may speak expressively. Nonetheless, there is a pronounced regularity in the sequence of language attainments among children, regardless of the culture in which they grow up.

■ **Interaction Among Domains** *How does language development interact with development in other domains?*

In early childhood, the ability to produce spoken language parallels the physiological maturation of the vocal apparatus and the central nervous system. The emergence of language also coincides with the onset of certain cognitive skills, such as conceptual understanding. Language is nurtured largely within the context of social interactions with caregivers. Thus physical, cognitive, and social factors affect the process of language acquisition. By the same token, language has a clear effect on other domains. Children's use of language enhances their ability to remember, form concepts, and, as studies of bilingual individuals suggest, may even promote analytic thinking and mental flexibility. In addition, children's ability to be successful communicators can have important repercussions for social relationships with parents, peers, and others.

SUMMARY OF TOPICS

The Course of Language Acquisition

- Language is a multifaceted skill with many overlapping dimensions. To learn language, children must master *phonology*, the basic sound units of a language; *semantics*, or the meanings of words; *grammar*, the rules pertaining to the structure of language (including *syntax* and *morphology*); and *pragmatics*, the rules for using language within a social context.

Phonology

- Newborns show a tendency to respond to language as a unique auditory stimulus.

- Young infants detect phonemes and vowel sounds from a variety of languages but show a decline in this ability by the second half of the first year.

- Infants show an early sensitivity to *prosody*, patterns of intonation, stress, and rhythm that mothers around the world include in their speech to young children. Children's sensitivity to rhythmic properties of language helps them to differentiate their native language from others and possibly to detect the presence of specific words in a stream of speech.

- Infants typically *coo* at six to eight weeks, *babble* at three to six months, and produce syllable-like *canonical babbling* at seven months. Biology seems to guide the emergence of these different types of vocalizations in universal sequence, although the environment also plays a role in shaping the acoustic properties of children's early speech.

- As children mature, the range of sounds they make expands, although certain pronunciation errors may persist until the elementary school years.

Semantics

- Many children start producing communicative behaviors by gesturing. They might use a *protodeclarative communication* to call attention to an object or a *protoimperative communication* to make a request. Sometimes children's gestures symbolize objects; later in development, gestures may accompany verbalization in order to elaborate a point.

- By one year of age, most children are speaking one-word utterances, usually *nominals*, or nouns. At about eighteen months or so, children may show a particularly rapid phase of growth in word acquisition called the *vocabulary spurt*. At the earlier stages of word learning, children may restrict their use of some words to particular contexts (*underextension*) or apply them to too broad a category (*overextension*).

- Children comprehend word meanings much earlier than they are able to produce words. Their *receptive language* exceeds their *productive language*. Labels for verbs are harder for children to understand than labels for nouns.

- Some children's early speech is *referential*; it includes mostly nominals. Other children are *expressive*; they use words with social functions. Fairly substantial individual differences also occur for the rate of language acquisition. Culture, too,

can have an influence on the types of words children produce in the early stages of acquisition.

- Some researchers believe that children learn the meanings of words by relying on constraints such as *fast-mapping*, the *mutual exclusivity bias*, the whole object bias, and the category bias. In contrast, the social-pragmatic view emphasizes children's ability to interpret the rich social cues about word meaning provided in early parent-child interactions, such as episodes of *joint attention*.

Grammar

- Two-year-olds begin to use two-word utterances, sometimes called *telegraphic speech* because it contains few modifiers, prepositions, and connective words. They also use few morphemes to mark tense or plurals. Although no single syntactic system defines the structure of language at this stage, acquisition for individual children is orderly and may rely on semantic knowledge.

- Children show that they understand more complex syntactic structures, such as transitive versus intransitive constructions, than they can produce.

- As children progress through the preschool years, they add morphemes, modifiers, prepositions, pronouns, and connective words. They begin to use negatives, questions, and eventually, the passive voice. One interesting type of error they sometimes make is called *overregularization*, the application of grammatical rules to words that are exceptions.

- Children seem to derive some information about syntax through phonology and *semantic bootstrapping*.

Pragmatics

- Children begin to show that different situations call for different forms of speech around age three. They adjust their speech, depending on the listener, and begin to use polite forms, probably because parents instruct them to.

- Although preschool children's *referential communication* skills are limited in some tasks, two-and three-year-olds show sensitivity to the needs of listeners by making adjustments to their speech to ensure successful communication.

Metalinguistic Awareness

- Children begin to show *metalinguistic awareness* in the preschool and early school years. They begin to use word play to create humor and show an understanding of *metaphor*.

Explaining Language Acquisition

- Two important questions are raised by theories of language development: the extent to which biology and experience are responsible for the sequence of acquisition and the degree to which language skills are either modular or based on broader cognitive skills.

The Role of Biology

- Specific brain structures are associated with *expressive aphasia* (*Broca's area*) and *receptive aphasia* (*Wernicke's area*). Children sustaining damage to these areas show a greater ability to recover language functions than adults do.

- Neuropsychological studies suggest that language functions begin to become lateralized shortly after the first year and look adultlike by age seven. The predictability of language milestones and the universality of certain language structures also support the role of biology.

- Research on later language learners and neuropsychological evidence support a critical period for language learning, although perhaps not a strong version of it.

The Linguistic Perspective

- Linguistic theorists emphasize the child's abstraction of general grammatical principles from the stream of speech. They tend to take a nativist stance and believe that language skills are modular.

- Data showing that children are able to learn rules, that they creolize language, and that animals are limited in their ability to learn language are consistent with linguistic theory, but some aspects of children's verb learning are not.

Learning and Cognition

- Learning theorists have emphasized the roles of shaping, reinforcement, and imitation in language acquisition.

- The cognitive perspective adds that certain advances in thinking, such as classification skills, memory, and statistical learning, are involved in language attainment.

- Connectionism is a recent approach that emphasizes networks of associations.

The Social Interaction Perspective

- Social-interaction theorists highlight the characteristics of caregiver-child speech, called *motherese* or *parentese*, that facilitate development. Specific techniques include *turn taking, turnabouts, recasts,* and *expansions.*

- The amount and content of maternal speech to children predicts the rate and form of children's language acquisition.

The Functions of Language

Language and Cognition

- Language has been shown to influence specific cognitive processes such as memory and classification.

- Bilingual children are more flexible and analytic in certain cognitive tasks. They also perform better than monolingual children on tasks that require response inhibition.

Language and Self-regulation

- Children often use *private speech*, and later, *inner speech*, to direct their behavior. They tend to use private speech when tasks are difficult or goal directed.

Language and Cultural Socialization

- Language can be a vehicle to transmit to children the specific values and expectations of their native culture.