

The Development of **Language**

TENTH EDITION

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PREFACE

This is the tenth edition of *The Development of Language*, which we have written for anyone with an interest in how children acquire language from infancy through the later school years. As always, there have been many new developments since our last edition, and we are very pleased to present new perspectives and new findings that have emerged over the past several years. This edition also includes some new topics that we think are interesting and important for a broader understanding of the basic features of language development from both historical and cross-cultural perspectives.

Our goal in writing this book is to provide an authoritative, interesting text that includes concepts and research findings that are both important and useful. The tenth edition places an increased emphasis on language development in children who are learning languages other than, or in addition to, English as well as on children with risk factors for language delay or disorder. As in prior editions, the chapters address cultural influences that lead to group and individual variation in children's language. The book focuses on language acquisition from the early months, even before children begin to speak, through the school years, to adolescence, when children achieve mastery of adultlike language skills.

New to This Edition

This edition continues to have many digital features that will make the concepts and material more accessible, more complete, and more invitingly interactive. The chapters have media clips that illustrate information and introduce students to some of the leaders in our field. Links are also provided to a vast number of online resources. A brief list of some of the new features of this edition includes the following:

- Each chapter has been updated and streamlined to more effectively highlight the most important concepts, theories, and findings that we believe are central to understanding the discipline and its applications to education, clinical practice, and real-life experiences.
- Each chapter continues to integrate typical development in its topic areas (e.g., speech, vocabulary, reading) with the most commonly observed difficulties seen in acquiring this skill. Benefit: With new Response to Intervention (RTI) approaches to treatment, all teachers and therapists must be prepared to recognize the most common delays or problems in children; this discussion is not limited to a single chapter, where students may not appreciate these differences fully. Location in text: All chapters, especially Chapters 2, 3, 4, 5, 6, 8, and 10.
- The chapter on atypical development has been reframed to concentrate on crosscutting concepts in child communication delay and disorder. Readers are now able to understand common themes across the many causes and manifestations of delay in learning critical communication skills, such as genetics, environmental deprivation, and the common features of developmental disabilities that impair language learning. Location in text: Chapter 9.
- Each chapter contains a variety of media links to examples of concepts, first-hand expert interviews, and illustrations that deepen student appreciation of concepts. Benefit: Concrete examples improve student understanding of concepts and deepen student mastery of material. Location in text: All chapters.

- We continue to deepen coverage of socioeconomic disparities and their impacts on children's communication development across almost all areas of skill. Benefit: Students will gain additional understanding of how socioeconomic disparities can influence children's language development. Location in text: Integrated throughout all chapters.
- Children's language development does not occur in a vacuum. We continue to provide updated coverage of neurological, genetic, and anthropological research that places children's language development in a larger context. Benefit: Major advances in mapping the brain, understanding the genetic contributions to language and language disorders, and clarifying the unique capacity for human language contextualize what enables children to succeed in the process of learning language. Location in text: Primarily Chapter 1, but interwoven through almost all chapters.

As in the past, each chapter is written by outstanding scholars who are known for their expertise in the areas that they discuss. For students, each chapter provides a helpful summary and a list of suggested course papers and projects. In response to instructor requests, we have put references at the end of each chapter.

We wrote this text for use in upper-level undergraduate or graduate courses in language development or as readings for courses in psycholinguistics, cognition, developmental psychology, speech pathology, education, and related subjects. Our streamlined coverage in this edition makes the book a readable resource for professionals (and nonprofessionals) in all of these fields.

In this spirit, readers do not need previous knowledge of linguistics; each chapter presents its material along with whatever linguistic background information is relevant. This means that there will be some repetition of major concepts, which will help to reinforce them and make them clearer. Many language development texts are concerned only with language acquisition by young children and have tended to assume that development is complete by the early primary grades. But linguistic development, like psychological development, continues over the school years and beyond, and so we have included development through adolescence, with the understanding that language development continues over the life span.

This book is written by a number of authors, and we believe that is one of its strengths: The study of language development continues to grow rapidly. Not many researchers are experts in all areas of this expanding field. For instance, there are few investigators who are authorities on both speech perception in infants and learning to write in a second language, yet both topics are covered here. Fortunately, a number of leading researchers in their fields continue to contribute to the book. The chapters, therefore, are written by authors who are known for their research in the topic area and their ability to clearly explain complex topics to a broad audience. Each presents a survey of the salient ideas and the most recent and relevant studies in their own specialty area.

Since development is always the result of an interaction between innate capacities and environmental forces, we take an interactive perspective, one that takes into account both the biological endowment that makes language possible and the environmental factors that foster development. Throughout the text we also highlight factors that may impede development but may be responsive to intervention.

As always, a new instructor's manual accompanies this edition. The manual provides Internet resources, sample exam questions, and helpful outlines of the chapters that can be used in structuring lectures. It emphasizes key points and provides suggestions for classroom activities.

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CHAPTER 1

THE DEVELOPMENT OF LANGUAGE

An Overview and a Preview

Jean Berko Gleason and Brenda Caldwell Phillips

LEARNING OBJECTIVES AND OUTCOMES

After reading this chapter, the student will be able to

- summarize the broad areas of language knowledge that children must master in order to become competent listeners, speakers, readers, and writers of a language;
- describe the rule systems that apply to all human languages by defining what is meant by phonology, morphology, syntax, semantics, and pragmatics;
- compare and contrast communication systems used by nonhuman animals with the rule systems and knowledge that characterize human languages and their use;
- describe the features of language acquisition that provide evidence of its biological basis; and
- briefly summarize how the study of child language acquisition has changed since its earliest accounts, concluding with a discussion of modern research and its methods and questions.

By the time they are 3 years old or 4 years old, children everywhere in the world have acquired the major elements of the languages spoken around them, regardless of how complex they may be. The development of language is an amazing, yet basically universal, human achievement. Societies around the world differ in many ways, but every society has language, just as every society has music (Mehr et al., 2019). Language poses some of the most challenging theoretical and practical questions of our times: Do infants, or even developing fetuses, attend to language? If so, what aspects of speech and language can they perceive? How do young children acquire complex grammar? Are humans unique, or do other animals have language as we define it? What if we raised a chimp or a parrot as if it were our own child—would it learn to use language in the same way that a human child does? Do parrots who talk know what they are saying? Are there theories that can adequately account for language development? Is language a separate capacity, or is it simply one facet of our general cognitive ability? What is it that individuals actually must know in order to have complete adult language, and to what extent is the development of language representative of universal processes, like learning to walk? What about individual differences? What happens when language develops atypically, and is there anything we can do about it? Can children acquire two or more languages with natively like proficiency? Can adults? Or is there a point when it is too late to learn a second language? These are some of the questions that intrigue researchers in language development, and they have led to the plan of this book.

Once children begin to acquire language, they make rapid progress. By the time they are of school age and even before they can read, they can vary their speech to fit the needs of the situation; they know the meaning and pronunciation of literally thousands of words, and they use the major sentence types and grammatical forms—subjects, objects, verbs, plurals, and tenses—of their language quite correctly. Language development does not cease when people reach school age, nor, for that matter, adolescence or maturity; language development continues throughout our lives. This book is written from a developmental perspective that concentrates on language development through the school years in detail and discusses later development in many appropriate places. We have also included information on what can happen when development does not proceed typically.

This chapter is divided into four major sections. The first section provides a brief overview of the course of language development from early infancy through the school years. It serves as a preview of the chapters that follow.

The second section describes the major linguistic systems that individuals must acquire. We present descriptive information that has provided the framework for much basic research in language acquisition. More technical linguistic material is presented in the chapters devoted to particular topics such as the acquisition of the sound system (Chapter 3) or of syntax (Chapter 5). The unifying perspective that the authors of this book share is that individuals acquire an **internalized representation of language** that is systematic in nature and amenable to study.

The third section notes some of the unique biological foundations for language that make its development possible in humans. Our biological endowment is necessary but not sufficient to ensure language development, which does not occur without social interaction.

The fourth and final section of this chapter focuses on the history of the study of language development and on current research methods.

An Overview of the Course of Language Development

Communication Development in Infancy

Even before babies are born, they are listening to the language spoken around them: Research shows that newborns prefer to hear the language or languages they heard while in utero. During their first months, infants have communicative abilities that underlie language, long before they say their first

words. Babies are intensely social beings: They gaze into the eyes of their caregivers and are sensitive to the emotional tone of the voices around them. They pay attention to the language spoken to them. They take their turn in conversation, even if that turn is only a burble. If they want something, they learn to make their intentions known. Infants are also physiologically equipped to process incoming speech signals and can make fine distinctions among speech sounds. In fact, they are better at it than we are! By the age of about 11 months, many babies understand 50 or more common words and point happily at the family pet when someone asks, “Where’s the kitty?”

At approximately the same age that they take their first steps, many infants produce their first words. Like walking, early language appears at around the same age and in much the same way all over the world. The precursors of language development are discussed in Chapter 2.

Phonological Development: Learning Sounds and Sound Patterns

Midway through their first year, infants begin to babble, playing with sound much as they play with their fingers and toes. Typically, the babbling of the prelinguistic infant gives way to words as babbling blends into early speech during the second year. The infant who babbled “ba ba” may now use *baba* as an early word for bottle. Once infants have begun to speak, the course of language development also has universal characteristics. Toddlers’ early utterances often contain only one word, which is usually simple to pronounce and concrete in meaning. It is important to recognize that children may comprehend things more complex than what they are able to produce. Some sounds are more difficult to pronounce than others, and combinations of consonants may prove particularly problematic. Within a given language, or when acquiring more than one language, children solve the phonological problems they encounter in varying ways. A framework for the study of children’s acquisition of the phonology, or sound system, of their language is provided in Chapter 3.

Semantic Development: Learning the Meanings of Words

The ways in which speakers connect words to their referents and their meanings are the subject matter of semantic development. Just as there are constraints on the phonological shapes of children’s early words, there appear to be limits on the kinds of meanings of those early words; for instance, very young children’s vocabularies are more likely to contain words that refer to objects that move (bus) than objects that are immobile (bench). Their vocabularies reflect their daily lives and are unlikely to refer to events that are distant in time or space or to anything of an abstract nature. Early words like *hi*, *doggie*, *Mommy*, and *juice* refer to the objects, events, and people in the child’s immediate surroundings. As they enter the school years, children’s words become increasingly complex and interconnected, and they also gain a new kind of knowledge: metalinguistic awareness—the ability to think about language itself, to understand what words are, and even to answer a question like, “Is *pumpnickel* a word?” Investigations of children’s early words and their meanings as well as the ways that meaning systems develop into complex semantic networks are discussed in Chapter 4.

Putting Words Together: Comprehension and Production of Morphology and Syntax in the Preschool Years

Sometime before their second birthday, after they know about 50 words, most children progress to a stage of two-word combinations. Words that they said in the one-word stage are now combined into these simple utterances, without the grammatical modifications that adult language requires. The child can now say such things as “That doggie,” meaning “That is a doggie” and “Mommy juice,” meaning “Mommy’s juice” or “Mommy, give me my juice” or “Mommy is drinking her juice.”

An examination of children's two-word utterances in many different language communities has shown that everywhere in the world children at this age are expressing the same kinds of thoughts and intentions in the same kinds of utterances. They ask for more of something; they say no to something; they notice something or they notice that it has disappeared. This leads them to produce utterances like "More milk!" "No bed!" "Hi, kitty!" and "All-gone cookie!"

A little later in the two-word stage, another dozen or so kinds of meanings appear. For instance, children may name an actor and a verb: "Daddy eat." They may modify a noun: "Bad doggie." They may specify a location: "Kitty table." They may name a verb and an object, leaving out the subject: "Eat lunch." At this stage, children are expressing these basic meanings, but they cannot use the language forms that indicate number, gender, and tense. Toddler language is about what is happening now; there is no tomorrow and no yesterday at the two-word stage. What children can say is closely related to their level of cognitive and social development, and a child who cannot conceive of the past is unlikely to speak of it. As the child's utterances grow longer, grammatical forms begin to appear. In English, articles, prepositions, and inflections begin to be heard. Although the two-word stage has some universal characteristics, what is acquired next depends on the features of the language being learned. English-speaking children learn the articles *a* and *the*, but in a language such as Russian, there are no articles; Russian has other features that English grammar does not. One remarkable finding has been that children acquiring a given language do so in essentially the same order (but not at the same rate). In English, for instance, children learn *in* and *on* before other prepositions such as *under*. After they learn regular plurals and pasts, like *juices* and *heated*, they create some overregularized forms of their own, like *gooses* and *eated*.

Researchers account for children's early utterances in varying ways. However, children's ability to acquire complex grammar, regardless of how and why they do it, remains at the heart of linguistic inquiry. Early grammar is examined in Chapter 5.

Language in Social Contexts: Development of Communicative Competence

Language development includes acquiring the ability to use language appropriately in many different situations. An individual who acquires the phonology, morphology, syntax, and semantics of a language has acquired **linguistic competence**. A sentence such as, "Pardon me, sir, but might I borrow your writing instrument for a moment?" certainly shows that the speaker has linguistic competence, since it is perfectly grammatical. If, however, this sentence is addressed to a kindergartner, it is just as certainly inappropriate. Linguistic competence is not sufficient; speakers must also acquire **communicative competence**, which goes beyond linguistic competence to include the ability to use language appropriately in many different situations. In other words, it requires knowledge of the social rules for language use, or pragmatics. During the preschool years, young children learn to make polite requests and clarify their own utterances. Their parents are typically eager that they learn to be polite. Parents' intuitions about the importance of using language in socially appropriate ways are borne out by research that shows that children who use language inappropriately are often unpopular or disliked. Speakers ultimately learn variations in language that mark their gender, regional origin, social class, and occupation. Other necessary variations are associated with such things as the social setting, topic of discourse, and characteristics of the person being addressed. The development of communicative competence is discussed in Chapter 6.

Theoretical Approaches to Language Acquisition

Explaining what it is that children acquire during the course of language development is easier than explaining how they do it. Do parents shape their children's early babbling into speech through reinforcement and teaching strategies? Or is language perhaps an independent and **innate** faculty built into the

human genome? Learning theorists and formal linguistic theorists do not agree on these basic principles. Between the theoretical poles represented by learning theorists, on the one hand, and linguistic theorists, on the other, lie various interactionist perspectives. Historically, for instance, these include the following: Cognitive interactionists, who rely primarily on the theories of Jean Piaget and believe that language is just one facet of human cognition and that children in acquiring language are basically learning to pair words with concepts they have already acquired. Other recent work by cognitive interactionists has studied language from the perspective of the neural architecture that supports it. They see children as processors of information, and they use computers to model the ways neural connections supporting language are strengthened through exposure to adult speech. Social interactionists emphasize the child's motivation to communicate with others. They emphasize the role that the special features of **child-directed speech (CDS)** may play in facilitating children's language acquisition. Social interactionists also include gestural and usage-based theorists, who are more concerned with the roots of language that are demonstrated when even very young children begin to communicate through gestures, pointing, shared attention, and other nonverbal but goal-directed and social behaviors. A discussion and an evaluation of these language development theories, and more recent ones, are included in Chapter 7.

Variation in Language Development: Implications for Research and Theory

It is important to know that individual differences have been found in almost every aspect of language acquisition, even during the earliest period of development. In the acquisition of phonology, for instance, some children are quite conservative and avoid words they have difficulty pronouncing; others are willing to take a chance. Early words and early word combinations reveal different strategies in acquiring language. Although much research has been devoted to finding commonalities in language acquisition, there is also variation in the onset of speech, the rate at which language develops, and the style of language used by the child. This should not surprise us; we know that babies differ in temperament, cognitive style, and in many other ways. In addition, children's early language may reflect their social class, their gender, whether they are growing up mono- or bilingual, and preferences of adults in their society; for instance, American parents stress the names of things, but nouns are not so important in all societies. Any comprehensive theory of language development must account for individual differences; those who work with children must be aware of them. Individual differences are the topic of Chapter 8.

Atypical Language Development

Each of our topical chapters has a section outlining some of the problems that language learners may have when acquiring the aspects of language under discussion—for instance, when learning to read is difficult. Chapter 9 puts these diverse findings into perspective. Language has been a human endowment for so many millennia that it is exceptionally robust. There are conditions, however, that may lead to atypical language development—for instance, sensory problems such as deafness. In this case, the capacity for language is intact, but lack of accessible auditory input makes the acquisition of oral language difficult. In some cases, technology can provide access to the auditory signal using hearing aids or cochlear implants; in other cases, children with hearing impairment who learn a manual language such as **American Sign Language (ASL)** are able to communicate in a complete and sophisticated language.

Children who are diagnosed with an intellectual disability, such as most children with **Down syndrome**, may show standard patterns of language development, but at a slower rate than typically developing children. On the other hand, children on the **autism spectrum** often exhibit patterns of language development that are atypical in multiple ways; they may have particular problems, for instance, in understanding what other people know and in adjusting their language accordingly. Occasionally, children suffer from **developmental language disorder**, problems in language development accompa-

nied by no other obvious physical, sensory, or emotional difficulties. Still, other children have particular problems producing speech, even though their internal representation of language is intact: They may stutter or have motor or physical impairments. Atypical language development is presented in Chapter 9.

Language and Literacy in the School Years

By the time they get to kindergarten, children have amassed a vocabulary of about 8,000 words, and they can handle questions, negative statements, dependent clauses, compound sentences, and a great variety of other constructions. They have also learned much more than vocabulary and grammar—they have learned to use language in many different social situations. They can talk baby talk to babies, tell jokes to their friends, and speak politely to strangers. Jokes, riddles, and play with language constitute a substantial portion of schoolchildren's spontaneous speech.

As they approach the task of learning to read, children call upon two evolving language skills: One is their growing ability to produce **discourse**—language that contains many connected utterances, for example, in stories they tell. The second is that, as Chapter 4 emphasizes, a new cognitive attainment in the school years, metalinguistic awareness, makes it possible for children to think about language itself. For instance, what is a word? And what sound does a particular word begin with? To succeed in school, children must also learn to use **decontextualized language**: language that is not tied to the here and now. They develop the ability to provide explanations and descriptions using decontextualized language. Study of the cognitive processes involved in reading and the development of models that represent the acquisition of this skill are topics that are explored in this chapter.

Children who come from literate households know a great deal about reading and writing before formal instruction begins and thus are at an advantage in school. Children who are bilingual may have some advantages in the acquisition of the metalinguistic knowledge that develops in the school years. Once children have acquired the ability to read and write, these new skills, in turn, have profound effects upon their spoken language. Learning to read is not an easy task for all children; this complex activity requires intricate coordination of a number of separate abilities. Humans have been speaking since the earliest days of our prehistory, but reading has been a common requirement only in very modern times; we should not be surprised, therefore, that reading skills vary greatly in the population. Reading problems, such as dyslexia, pose serious theoretical and practical problems for researchers and educators. The acquisition of literacy skills and increasingly complex language during the school years and through adolescence are the main topics of Chapter 10.

Bilingual Language Development

In the early decades of language acquisition research in the United States, researchers tended to concentrate on acquisition by monolingual English-speaking children. It has become increasingly clear, however, that understanding the development of language among bilingual children and adults, and how it is both similar to and different from single language acquisition, is important from both theoretical and practical perspectives. Researchers often make a distinction between simultaneous bilingual acquisition (the acquisition of two languages at the same time) and second-language (L2) acquisition, which implies that a second language is learned after a first one, but when we say an individual is bilingual, we generally mean that the person can speak two languages.

Bilingualism is a common phenomenon all over the world, and a growing trend in the United States: About 33% of children under the age of 9 years in the United States speak a language other than English at home (Migration Policy Institute, 2019). Although Spanish is the most common language spoken at home by children whose families do not speak English, nearly 400 different languages are spoken in the homes of school-age children in the United States. Our schools have children who arrive knowing languages as diverse as Hmong, Cantonese, Russian, Vietnamese, and Haitian Creole.

The study of bilingualism and L2 acquisition has been undertaken by researchers from a number of different fields. These include child language researchers, linguists, sociocultural researchers, and psycholinguists. What are the best conditions for acquiring two languages? Does age matter? Is bilingual development just like monolingual development? Is it possible to be a “perfect” bilingual? What are the advantages and disadvantages of learning two languages? These are some of the questions that will be answered in Chapter 11.

The Structure of Language: Learning the System

Competence and Performance

A speaker who knows the syntactic rules of a language is said to have linguistic competence. Competence in this case refers to the inner, largely unconscious, knowledge of the rules, not to the way the person speaks on any particular occasion. The expression of the rules in everyday speech is performance. In the normal course of events, speakers produce utterances that include false starts, slips of the tongue, and various other errors. These are performance errors and are not thought to reflect the speakers’ underlying competence. There is also a general assumption among linguists that, within a given linguistic community, all adults who are native speakers of the language and not neurologically impaired in some way share linguistic competence; this claim, however, has never been substantiated, and there is increasing evidence that though all typically developing children acquire language, they do not all do so in the same way, nor do they all arrive at the same level of competence (Arnon & Clark, 2011). It is possible to find out a great deal about adults’ syntax by asking them to judge the grammatical acceptability of a sentence. However, in studying children, researchers must either rely on performance for clues to competence or design clever experiments to probe inner knowledge, since young children do not have the metalinguistic ability required to discuss questions of “grammaticality.”

When children learn language, what is it that they must learn? Language has many subsystems having to do with sound, grammar, meaning, vocabulary, and knowing the right way to say something on a particular occasion in order to accomplish a specific purpose. Knowing the language entails knowing its phonology, morphology, syntax, and semantics, as well as its social rules, or pragmatics. The speaker who knows all this has acquired communicative competence.

Phonology

What are the sounds of English? Although we all speak the language, without specific training, it is difficult to describe the sounds we make when we speak and even harder to explain the rules for their combination. For instance, can you think of any sounds in English that never appear at the beginning of a word or at the end of a word? (Answer is at the end of this paragraph.) **Phonetics** is the science of speech sounds. The **phonology** of a language includes all of the important speech sounds it uses, the rules for combining them to make words, and such things as the stress and intonation patterns that accompany them. Each language has its own set of important sounds, which are actually groups of sounds that include a number of variations. For instance, in English we pronounce the sound /t/ in many different ways. At the beginning of a word like *top* it is pronounced with a strong aspiration, or puff of air. We pronounce a word like *stop* without the puff of air, unaspirated. Some speakers produce a different, unreleased /t/ when they say a word like *hat* at the end of a sentence—they leave their tongues in place at the point of articulation. Many speakers pronounce yet another kind of /t/ in a word like *Manhattan* by releasing the air through their noses at the end. A phonetician would hear these /t/ sounds as four different sounds: aspirated, unaspirated, unreleased, and nasally released. For ordinary English speakers, however, these are all just one sound. Groups of similar sounds that are regarded as

all the same by the speakers of a language are called **phonemes**. The different /t/ sounds just described are all part of one /t/ phoneme in English. Children have to learn to recognize and produce the phonemes of their own language and to combine those phonemes into words and sentences with the right sorts of intonational patterns. Some parts of the system, such as consonant–vowel combinations, are acquired early on. Others are not acquired until well into the elementary school years; for instance, the ability to distinguish between the stress patterns of HOT dog (frankfurter, at the picnic) and hot DOG (Ruby, at the beach) when the words are presented without a context. (Answer to question at the beginning of this section: English words cannot begin with the “ng” sound that we pronounce at the end of words like sing; they never end with the actual sound represented by the letter “h,” even though it may be written. For instance, what is written hurrah does not end with the same breathy sound that begins it.)

Morphology

When a new word like *abdominoplasty* comes into the English language (what does it mean?) adult speakers can immediately tell that its plural is *abdominoplasties*; they do not have to look it up in a dictionary or consult with an expert at the Mayo Clinic. They are able to make the plural of a word they have never heard before because they know the English inflectional morphological system. A **morpheme** is the smallest unit of meaning in a language; it cannot be broken into any smaller parts that have meaning. Words are made up of one or more morphemes. The words *cat* and *danger* each consist of one morpheme, which is called a **free morpheme** because it can stand alone. **Bound morphemes**, on the other hand, cannot stand alone and are always found attached to free morphemes; *happiness*, *unclear*, and *singing* contain the bound morphemes *-ness*, *un-*, and *-ing*. Bound morphemes can be used to change one word into another word that may be a different part of speech; for instance, *-ness* turns the adjective *happy* into the noun *happiness*. In this case, they are called **derivational morphemes** because they can be used to derive new words.

Other bound morphemes do not change the basic word’s meaning so much as they modify it to indicate such things as tense, person, number, case, and gender. These variations on a basic word are inflections, and the morphemes that signal these changes are **inflectional morphemes**. Languages like Latin, Russian, and Hungarian are highly inflected. The verb to love (*amare*) in Latin has six separate forms in the present tense: the singular forms *amo*, *amas*, and *amat* (I love, you love, he/she loves) and the plural forms *amamus*, *amatis*, and *amant* (we love, you love, they love).

Compared with Latin, English has few verb inflections in the present tense: an added *-s* for the third person (he loves) and no inflection for other persons (I, we, you, they love). Latin indicates the subject and object of its sentences using case inflections—*agricola amat puellam* and *puellam amat agricola* both mean “The farmer [he’s the agricola] loves the girl [she’s the puella].” The endings of the words mark the subject and the object. English does not have case endings on its nouns: word order alone indicates whether the girl loves the farmer or the farmer loves the girl. Our old grammar teachers, perhaps influenced by their knowledge of Latin, tended to confuse the issue, and us, by referring to English nouns as being in the subjective or objective case when, in fact, there are no separate noun case forms in English. Pronouns, on the other hand, have subjective, objective, and possessive forms: I, me, and my.

English inflectional morphology includes the progressive of the verb (e.g., singing); the past, pronounced with /d/, /t/, or /əd/ (played, hopped, landed); and the third-person singular verb and the noun plural and possessive, all of which use /z/, /s/, or /əz/ in spoken language (dogs, cats, watches). The forms of the inflections vary depending on the last sound of the word being inflected, and there is a complex set of rules that adult speakers know (at some level) that enables them to make a plural or past tense of a word that they have never heard before.

One task for the student of language development is to determine whether children have knowledge of morphology and, if so, how it is acquired and to what extent it resembles the rule system that adults follow.

Syntax

The syntactic system includes the rules for how to combine words into acceptable phrases and sentences and how to transform sentences into other sentences. A competent speaker can take a basic sentence like, “The cat bites the dog” and make a number of permutations of it: “The cat bit the dog,” “The cat didn’t bite the dog,” “Did the cat bite the dog?” and “Wasn’t the dog bitten by the cat?” Knowledge of syntax allows the speaker to generate an almost endless number of new sentences and to recognize those that are not grammatically acceptable. If you heard a sentence like “The daksy Wug was miggled by the mimsy zibber,” you wouldn’t know what happened to the poor Wug because the vocabulary is unfamiliar. On the other hand, the morphology and syntax of the sentence convey a great deal, and with this information you could make a number of new, perfectly grammatical sentences, even if you don’t know what you are talking about: “The Wug is daksy,” “The zibber miggled the Wug,” and “The zibber is mimsy.”

There is controversy among researchers as to whether young children just learning language are acquiring syntactic structures, that is, grammatical rules, or whether it is more reasonable to characterize their early utterances in terms of the semantic relations they are trying to express. The child who says, “Mommy eat lunch” can be said to have learned to produce subject–verb–object constructions and to be following English syntactic rules specifying that the subject comes first in active sentences. To describe the language of young children, however, it may be more useful to note the kinds of semantic relations the children are using. In this case, the child is expressing knowledge that an action (eat) is taking place and that there is an agent (Mom) and an object (lunch).

Once children begin to produce longer sentences, however, they add the grammatical words of the language and begin to build sentences according to syntactic rules. They learn how to make negatives, questions, compound sentences, passives, and imperatives. Later, they add very complex structures, including embedded forms. The child who early on was limited to sentences like “Mommy eat lunch” can eventually comprehend and produce “The lunch that Grandpa cooked the babysitter was eaten by Mommy” in full confidence that the cherished babysitter was neither cooked by Grandpa nor eaten by Mom.

Semantics

The semantic system includes our mental dictionary, or **lexicon**. Word meanings are complicated to learn; words are related to one another in complex networks, and awareness of words—for example, the ability to think about words—comes later than does word use.

A very young child may use a word that occurs in adult language, but that word does not mean exactly the same thing, nor does it have the same internal status for the child as it does for the adult. Two-year-olds who say “doggie,” for instance, may call sheep, cows, cats, and horses “doggie,” or they may use the word only in reference to a particular dog, without knowing that it refers to a whole class of animals. Vocabulary is structured hierarchically, and words are attached to one another in semantic networks. Dogs are a class of animals, and the adult who knows the meaning of *dog* also knows, for instance, that it belongs to a group known as domestic animals, it is a pet, it is related to wolves, it is animate, and so on. Studying semantic development in children involves examining how they acquire the semantic system, beginning with simple vocabulary. Ultimately, it includes studying their metalinguistic knowledge, which enables them to notice the words in their language and comment on them.

The Social Rules for Language Use

Linguistic competence involves knowing how to construct grammatical sentences. Language, however, must be used in a social setting to accomplish various ends. Speakers who know how to use language appropriately have more than linguistic competence; they have communicative competence, a term

first used by the anthropologist Dell Hymes in 1972. Pragmatics, another term for the social uses of language, refers to the use of language to express one's intentions and get things done in the world. Adult pragmatics may include many interpersonal or social functions such as denying, refusing, blaming, offering condolences, and flattering, and even very young children use pragmatic functions such as labeling and demanding.

Communicative competence includes being able to express one's intent appropriately in varying social situations. The importance of knowing the right forms becomes obvious when social rules are violated. Consider the use of directives. If you are seated in an aisle seat of a bus, next to a stranger, and you are cold because the window is open, you can express your intent in a syntactically correct sentence: "Shut that window." This could lead to an angry reaction or the impression that you are a rude person. If, instead, you say, "I wonder if you would mind shutting the window?," things would be very different.

Knowing the politeness rules of language is part of communicative competence. Every type of interaction between individuals requires observance of social conventions, and adults do not leave children's development of these rules to chance: Whereas they may not correct syntactic violations except in the most superficial cases (see Chapter 5), they are active participants in their children's use of the appropriate (often polite) forms (Ely & Berko Gleason, 2006). Just as there are phonological and grammatical rules, there are also rules for the use of language in social context.

The Biological Bases of Language

Animal Communication Systems

Human language has characteristics that have led many researchers to conclude that it is both **species specific** and **species uniform**; that is, it is unique (specific) in the human species and essentially similar, or uniform, in all members of our human species (Friederici, 2012; Lenneberg, 1967). The characteristics that distinguish human language are illuminated when they are compared with those of nonhuman animal communication systems (Fitch, 2019). Other animals are clearly able to communicate at some level with one another as well as with humans.

Laila, the kitten, is learning to make nearly 100 different communicative sounds.



Cats and dogs, for instance, meow and bark and are able to convey a variety of messages to us by methods such as scratching at the door or looking expectantly at their dishes. These signals are limited in scope and clearly not language, however endearing. As we become more sophisticated in our study of nonhuman communicative abilities, those endearing sounds turn out to be more complex and communicative than we thought. Recent research by Susan Scholtz and her colleagues in Sweden, for instance, has shown that common house cats make about 97 distinctly different communicative sounds (Schötz & Kuras, 2018). More about dogs' ability to comprehend language later.

Bee Communication

Bees have been shown to have an elaborate communication system. The ethologist Karl von Frisch (2014) began to study bees in the 1920s and shared the Nobel Prize in Physiology or Medicine in 1973 for his work (Dyer & Arikawa, 2014). The communication system of the bee is **referential**—it tells other bees about, or refers to, something in the outside world. A bee returning to the hive after finding nectar-filled flowers collects an audience and then performs a dance that indicates

the direction and the approximate distance of the nectar from the hive. Other bees watch, join the dance, and then head for the flowers. Is this language? Although the movements of the dance have structure and meaning, there is only one possible conversational topic: Finding nectar! Even this repertoire is seriously limited; bees cannot, for instance, tell one another that the flowers are pretty or that they are thinking of quitting and moving to Boston.

Nonprimate Mammals and Birds

Many animals have ways of communicating with other members of their species. Dolphins, who are intelligent and social mammals, employ elaborate systems of whistles that can be heard at a distance by other dolphins under water. This vocal communication reflects highly developed skills on which dolphins rely in surroundings that would make visual interactions difficult. During the first year of its life, each baby bottlenose dolphin learns a “signature whistle” by which it can be recognized (Janik et al., 2013). Whistle-type vocalizations emerge during the first 30 days of life and increase in frequency and duration with development (Eskelinen & Jones, 2021). Later on, bottlenose dolphins display vocal learning behaviors that are seen in birds but not in other nonhuman mammals. They are able to imitate the whistles of other dolphins and use this “whistle matching” when they address one another (Janik, 2000; King et al., 2014). Bottlenose dolphins also have fairly sophisticated comprehension abilities, as demonstrated by their ability to recognize imperative sentences in an artificial language and carry out instructions based only on the information in the sentences (Schusterman et al., 2013).

African elephants communicate with one another in many ways, including seismically (Stoeger, 2021). They have as many as 25 different vocal calls and a number of “rumbles” that are below the threshold of human hearing. These subsonic communications are carried through the ground and can be sensed and understood by other elephants as much as a dozen miles away. In one study, Namibian elephants reacted to long-distance predator warnings given by members of their own group, but were unimpressed by similar warnings issued by unfamiliar Kenyan elephants (O’Connell, 2007).

Some birds use a variety of meaningful calls to court one another, to warn of danger, or to indicate that it is time to fly home. The eerie cry of the loon is just one of a number of distinct and meaningful calls made by these inhabitants of northern lakes. Recent research reveals that male loons convey information about their size to potential rivals through the auditory frequency of their yodels (Piper et al., 2011).

The communication systems that nonhumans use among themselves serve important purposes, and each one resembles human language in some respect, but they are all tied to the stimulus situation, limited to the “here and now” and to a restricted set of messages. Human language has characteristics not found in their entirety in these other systems.

Not all researchers agree on the list of criteria that should be used in describing true language. However, most would agree on at least these three, cited by Roger Brown (1973):

1. True language is marked by **productivity** in the sense that speakers can make many new utterances and can recombine or expand the forms they already know to say things they have never heard before. This feature is also called **recombination**, **recursion**, or **generativity**, depending on the author and emphasis.
2. It also has **semantics** (or **symbolism**); that is, language represents ideas, events, and objects symbolically. A word is a symbol that stands for something else. It doesn’t have to sound like the thing it represents, though some words like bark and meow might.
3. Language offers the possibility of **displacement**—messages need not be tied to the immediate context.

Human language is unique because it enables its users to comment on any aspect of their experience and to consider the past and the future, as well as referents that may be continents away or only in the imagination. The natural communication systems of nonhumans do not meet these criteria of language.

Alex could tell you what color these blocks are, and he could count them as well.



Attempts to teach human language to talking birds, however, have produced some extremely provocative results. An African grey parrot named Alex, who was trained by the American cognitive psychologist Irene Pepperberg, was the subject of perhaps the best-known set of language studies with birds. Alex knew the word *yummy* and he knew the word *bread*. When someone brought in a birthday cake, something he had never seen before, he tasted his portion and exclaimed, “Yummy bread!” The ability to combine communicative concepts as shown in this example has long been thought to be exclusive to humans (Clements et al., 2018). Alex could recognize the colors, shapes, and numbers of objects and answer novel questions about them in English. Faced with an array of blocks, he was asked, “How many blue blocks?” Alex correctly answered, “Six.” He was right about 80% of the time (Pepperberg, 2009). Alex died unexpectedly in

2007, but Dr. Pepperberg continues the research with several other young African greys. You can see some of Alex’s talents in Video 1–1.

▶ 1–1
Pathways—
Chapter 1—
Alex the Parrot

Experiments with a number of young grey parrots have shown that they can learn to label common objects if they have human tutors who provide interactive lessons; they do not learn from passive listening to lessons on audio recordings or from watching videos, but do best when the words are presented in context by a friendly and informative person. Interacting with a parrot can be an unnerving experience—one that makes us marvel that a bird whose brain is the size of a walnut can speak to us in clear and appropriate human language. Do African grey parrots have the same sort of linguistic skill human children do? One view is that they do not and that the birds are responding to complex learned cues. Another conclusion is that Alex had the skills of a 3-year-old child and language is not a unitary set of features but a continuum on which African grey parrots have clearly alighted.

Dogs have recently made their entrance into the comprehension side of the human language arena. Dogs are not able to produce human words, except, after much coaxing, some very limited approximations to expressions such as “I love you.” A version of this modified yowling by a husky named Mishka has been viewed approximately 111 million times on YouTube, which you can watch in Video 1–2.

▶ 1–2
Husky Dog
Talking,
“I Love You”

There is, however, some recent intriguing research on language comprehension by a breed often viewed as the smartest of all pups, the border collie. In one set of studies, Chaser, a border collie owned and trained by the late Professor John W. Pilley, acquired the names of 1,022 objects during a 3-year period and could very accurately select a toy with the right name from a large array. Even more impressive, Chaser was able to infer that a name she had never heard before belonged to a new, unnamed object among the ones she already knew. For instance, an unfamiliar doll was included among her toys. When asked to bring “Darwin,” a name she had not heard before, she correctly inferred that the unfamiliar name belonged to the unfamiliar object and promptly delivered the doll (Pilley & Reid, 2011). By inferring that a new name must belong to a novel object, Chaser was demonstrating a principle of vocabulary acquisition commonly ascribed to human children. In Video 1–3, you can view Chaser, who died in 2019, and see her demonstrate some linguistic and cognitive skills. Current research on dogs’ ability to comprehend language at the Canine Language Perception Lab at the University of Maryland has shown that dogs prefer their own names and can even differentiate their names from background noise when multiple people are speaking (Mallikarjun et al., 2019).

▶ 1–3
Dog
Understands
1,022 Words!

Primate Language

Researchers have long wondered if nonhuman primates are capable of learning human language. Chimpanzees, in particular, have been the subject of much research. Chimpanzees are intelligent, social, and communicative animals. They use a variety of vocal cries in the wild, including a food bark and a danger cry. There have been numerous attempts to teach language to chimpanzees, who possess genetic structures very similar to our own and are our closest relatives in the animal world. And there has been one major gorilla language project—Koko the gorilla, born in 1974, who knew thousands of signs and words. Her trainer, Dr. Francine Patterson, featured Koko, who died in 2018, in books and films and on her own website, <http://www.koko.org>.

Gua and Viki. In 1931 Indiana University professor Winthrop Kellogg and his wife, Luella, became the first American family to raise a chimpanzee and a child together (Kellogg, 1980). The Kelloggs brought an infant chimpanzee named Gua into their home; she stayed with them and their infant son, Donald, for 9 months. No special effort was made to teach Gua to talk, and although Gua was ahead of Donald in her motor development, she did not babble and did not learn to say any words. Some wonderful, somewhat unsettling, old films comparing Donald and Gua are available on the Internet. These can be found if you search for comparative tests of human and chimp infants.

In the 1940s, psychologists Catherine and Keith Hayes (Hayes, 1951) set out to raise a baby chimpanzee named Viki as if she were their own child. This included outfitting her in little dresses and introducing her to strangers as their daughter. The Hayeses tried to teach language to Viki. They assumed that chimpanzees were rather like children with developmental delays and that with love and patient instruction Viki would learn to talk. After 6 years of training, Viki understood a great deal, but she was able to produce, with great difficulty, only four words: *mama*, *papa*, *cup*, and *up*. She was never able to say more, and in order to pronounce a /p/, she had to hold her lips together with her fingers. The Hayeses' research with Viki showed that chimpanzees do not have the specialized articulatory and physiological abilities that make spoken language possible. You can see Keith Hayes and Viki in the archival film in Video 1–4.

After these failed experiments, other researchers began to realize that true language need not be spoken. The deaf community in the United States, for instance, uses a gestural language,

American Sign Language (ASL)

ASL is a complete language with its own grammar and a rich vocabulary, all of which can be conveyed by facial expression, movements of the upper torso, and the shape and movement of the hands in front of the body; it is the equal of vocal language in its capacity to communicate complex human thought (Valli & Lucas, 2000). A new appreciation of the richness of ASL led to innovative experiments with chimpanzees.

Washoe. The first attempt to capitalize on the ability to comprehend language and the natural gestural ability of a chimpanzee by teaching her signed human language was made by Beatrice and Allen Gardner at the University of Nevada (Gardner & Gardner, 1969). The Gardners moved a 10-month-old

Dominic knows the names of his toys and will bring you the right one if you ask him for the alligator.

