10

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First language acquisition

The only language [people] ever speak perfectly is the one they learn in babyhood, when no one can teach them anything!

MARIA MONTESSORI

NOTHING IS MORE important to a child's development than the acquisition of language. Most children acquire language quickly and effortlessly, giving the impression that the entire process is simple and straightforward. However, the true extent of children's achievement becomes evident when we compare their success with the difficulties encountered by adults who try to learn a second language. Understanding how children the world over are able to master the complexities of human language in the space of a few short years has become one of the major goals of contemporary linguistic research.

This chapter provides a brief overview of the progress that has been made in this area. We will begin by considering the research strategies used by linguists and psychologists in the study of linguistic development. We will then describe some of the major findings concerning children's acquisition of the various parts of their language—phonology, vocabulary, morphology, syntax, and semantics. The chapter concludes with a brief examination of the contribution of the linguistic environment to language acquisition, the relationship between the emergence of language and cognitive development, and the possible existence of inborn linguistic knowledge.

10.1 The study of language acquisition

Although we commonly refer to the emergence of language in children as 'language acquisition', the end result of this process is actually a **grammar**—the mental system that allows people to speak and understand a language. There are at least two reasons for believing that the development of linguistic skills must involve the acquisition of a grammar.

First, mature language users are able to produce and understand an unlimited number of novel sentences. This can only happen if, as children, they have acquired the grammar for their language. Simple memorization of a fixed inventory of words and sentences would not equip learners to deal with previously unheard utterances—a basic requisite of normal language use.

A second indication that children acquire grammatical rules comes from their speech errors, which often provide valuable clues about how the acquisition process works. Even run-of-the-mill errors such as **doed*, **runned*, and **goed* can be informative. Since adults don't talk that way, such errors tell us that children don't just imitate what they hear. Rather, they create rules of their own to capture the regularities that they observe in the speech of those around them.

Because language acquisition involves the emergence of a grammar, its study is closely tied to the type of linguistic analysis with which we have been concerned in preceding chapters. Indeed, linguists and psychologists studying language acquisition must often look to the study of phonology, morphology, and syntax for help in identifying and describing the grammatical system that children acquire during the first years of life.

10.1.1 Methods

The majority of research on the acquisition of language focuses on children's early utterances, the order in which they emerge, and the kinds of errors they contain. Two complementary methods of data collection are used—naturalistic observation and experimentation.

Two approaches

In the **naturalistic approach**, investigators observe and record children's spontaneous utterances. One type of naturalistic investigation is the so-called **diary study**, in which a researcher (often a parent) keeps daily notes on a child's linguistic progress. Here's a short example, drawn from a diary tracking a child's early vocabulary development.

Date	Child's word	Adult word	Comment
June 9, 2003	krakuh	cracker	said several times to refer to Japanese crackers; used a few days later to refer to Graham crackers
June 24, 2003	G	MG	said on several occasions while pointing at the MG symbol on her father's shirt; used on July 24 to refer to an actual MG roadster

Language Matters Darwin the Linguist

One of the first language diarists was Charles Darwin, the founder of the theory of natural selection, who kept a detailed record of the development of his son. Among the observations in "A Biographical Sketch on an Infant" (1876) is the following anecdote: "At exactly the age of a year, he invented a word for food, namely *mum*. . . . And now instead of beginning to cry when he was hungry, he used the word in a demonstrative manner or as a verb, implying 'Give me food'."

In *The Descent of Man*, Darwin wrote (chapter 3) that language "has justly been considered as one of the chief distinctions between man and the lower animals."

A more systematic way to collect naturalistic data involves regular taping sessions, often at biweekly intervals, to gather samples (usually an hour at a time) of the child interacting with his or her caregivers. Detailed transcripts are then made for subsequent analysis. A great deal of data of this type is available through CHILDES (the Child Language Data Exchange System), which can be accessed online at http://childes.psy.cmu.edu/. Here is a small excerpt from a CHILDES transcript, containing a fragment of a conversation between Adam (aged 2 years, 4 months) and his mother:

ADAM: read book.
MOT: papa bear.
MOT: yes.
ADAM: bunny rabbit.
MOT: did you see bunny rabbit?
ADAM: bunny rabbit rabbit running.
MOT: bunny rabbit running?

The CHILDES data base includes thousands of hours of data from more than twenty languages.

Naturalistic studies tend to be **longitudinal** in that they examine language development over an extended period of time (sometimes as long as several years). As the name suggests, longitudinal studies take a long time to conduct, but they have the advantage of permitting researchers to observe development as an ongoing process in individual children.

Naturalistic data collection provides a great deal of information about how the language acquisition process unfolds, but it also has its shortcomings. The most serious of these is that particular structures and phenomena may occur rarely in children's everyday speech, making it difficult to gather enough information from natural speech samples to test hypotheses or draw firm conclusions. This problem is further compounded by the fact that speech samples from individual children capture only a small portion of their utterances at any given point in development (no more than 15 percent and usually far less). Because of the amount of time required to transcribe and analyze recordings, researchers typically have to be content with hour-long samples taken at weekly or biweekly intervals.

In **experimental** studies, researchers typically make use of specially designed tasks to elicit linguistic activity relevant to the phenomenon that they wish to study. The child's performance is then used to formulate hypotheses about the type of grammatical system acquired at that point in time.

Experimental research is typically **cross-sectional** in that it investigates and compares the linguistic knowledge of different children at a particular point in development. A typical cross-sectional study might involve conducting a single experiment with a group of two year olds, a group of four year olds, and a group of six year olds, taking each of these groups to be representative of a particular stage or 'cross-section' of the developmental process.

Types of experimental studies

Experimental studies usually employ tasks that test children's comprehension, production, or imitation skills. One widely used method for testing comprehension calls for children to judge the truth of statements that are made about particular pictures or situations presented to them by the experimenter. Figure 10.1 offers an example of one such task.

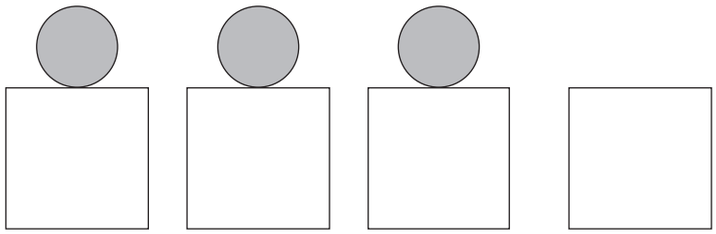


FIGURE 10.1
"Is every ball on a box?"

In this particular case, by the way, many preschool children respond by saying no, justifying their answer by noting that one of the boxes doesn't have a ball on it!

A second method for testing comprehension involves supplying children with an appropriate set of toys and then asking them to act out the meaning of a sentence—perhaps a passive structure such as *The truck was bumped by the car*. Children's responses can provide valuable clues about the type of grammatical rules being used to interpret sentences at various stages of development.

In a typical production task, the experimenter presents the child with a situation that calls for a particular type of statement or question. In order to determine whether three-year-old children correctly order the auxiliary verb and the subject when asking *yes-no* questions, for instance, a researcher might design a game in which the child asks a puppet for his opinion about various pictures, as in the example in figure 10.2.

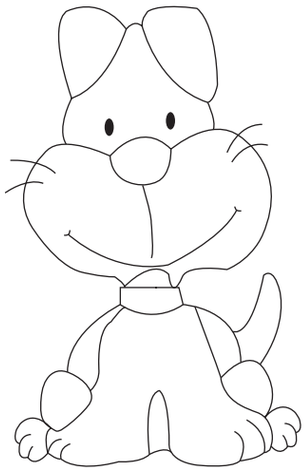


FIGURE 10.2
"Ask the puppet if the dog is smiling."

If all goes well, the child will respond by asking a question, which allows us to look for signs of Inversion—the operation that places the auxiliary verb to the left of the subject, as in *Is the dog smiling?*

Although production tasks can be useful for assessing certain types of linguistic knowledge, there are many structures that are hard to elicit, even from adults, because they are used only in special contexts. (Passive sentences such as *The house was painted by students* are quite rare and are reserved for situations in which the speaker wants to highlight the 'undergoer' of an action.) Moreover, because children's ability to comprehend language is often more advanced than their ability to produce sentences of their own, production tasks can

provide an overly conservative view of linguistic development unless they are accompanied by other types of tests.

Experiments that have children imitate model sentences can also provide important clues about grammatical development. Although imitation might appear to be easy, it has been found that children's ability to repeat a particular structure provides a good indication of how well they have mastered it. For instance, a child who has not yet acquired auxiliary verbs will repeat the sentence *Mickey is laughing* as *Mickey laughing*.

The principal advantage of the experimental approach is that it allows researchers to collect data of a very specific sort about particular phenomena or structures. Experimentation is not without its pitfalls, however. In addition to the difficulty of designing a good experiment, there is always the possibility that children's performance will be affected by extraneous factors, such as inattention, shyness, or a failure to understand what is expected of them. Nonetheless, by using experimental techniques together with naturalistic observation, linguists and psychologists have made significant progress toward understanding the language acquisition process. This chapter is devoted to a survey of this progress, beginning with the development of speech sounds.

10.2 Phonological development

Children seem to be born with a perceptual system that is especially designed for listening to speech. Newborns respond differently to human voices than to other sounds, they show a preference for the language of their parents over other languages by the time they are two days old, and they can recognize their mother's voice within a matter of weeks.

From around one month of age, children exhibit the ability to distinguish among certain speech sounds. In one experiment, infants were presented with a series of identical [ba] syllables. These were followed by an occurrence of the syllable [pa]. A change in the children's sucking rate (measured by a specially designed pacifier) indicated that they perceived the difference between the two syllables, and that they were therefore able to distinguish between [p] and [b].

10.2.1 Babbling

The ability to produce speech sounds begins to emerge around six months of age, with the onset of babbling. Babbling provides children with the opportunity to experiment with and begin to gain control over their vocal apparatus—an important prerequisite for later speech. Children who are unable to babble for medical reasons (because of the need for a breathing tube in their throat, for example) can subsequently acquire normal pronunciation, but their speech development is significantly delayed.

Language Matters Hearing It All

Infants are even able to distinguish between sounds in unfamiliar languages. In one experiment, six- to eight-month-old infants who were being raised in English-speaking homes could hear contrasts among unfamiliar consonants in Hindi and Nlaka'pmx (an Aboriginal language spoken on parts of Canada's West Coast). By the time they were ten to twelve months old, though, this ability had begun to diminish.

Despite obvious differences among the languages to which they are exposed, children from different linguistic communities exhibit significant similarities in their babbling. The tendencies in table 10.1 are based on data from fifteen different languages, including English, Thai, Japanese, Arabic, Hindi, and Mayan. (We focus here on consonant sounds, for which the data is somewhat more reliable than for vowels.)

TABLE 10.1 Cross-linguistic similarities in babbling

Frequently found consonants	Infrequently found consonants
p b m	f v θ ð
t d n	ʃ ʒ tʃ dʒ
k g	l r ŋ
s h w j	

Such cross-linguistic similarities suggest that early babbling is at least partly independent of the particular language to which children are exposed. In fact, even deaf children babble, although their articulatory activity is somewhat less varied than that of hearing children.

10.2.2 Developmental order

Babbling increases in frequency until the age of about twelve months, at which time it begins to give way to intelligible words. By the time children have acquired fifty words or so (usually by around eighteen months of age), they begin to adopt fairly regular patterns of pronunciation.

Although there is a good deal of variation from child to child in terms of the order in which speech sounds are mastered in production and perception, the following general tendencies seem to exist.

- As a group, vowels are generally acquired before consonants (by age three).
- Stops tend to be acquired before other consonants.
- In terms of place of articulation, labials are often acquired first, followed (with some variation) by alveolars, velars, and alveopalatals. Interdentals (such as [θ] and [ð]) are acquired last.
- New phonemic contrasts manifest themselves first in word-initial position. Thus, the /p/-/b/ contrast, for instance, is manifested in pairs such as *pat-bat* before *mop-mob*.

By age two, a typical English-speaking child has the inventory of consonant phonemes shown in table 10.2.

TABLE 10.2 Typical consonant inventory at age two

Stops			Fricatives	Other
p	b	m	f	w
t	d	n	s	
k	g			

By age four, this inventory is considerably larger and typically includes the sounds shown in table 10.3.

TABLE 10.3 Typical consonant inventory at age four

Stops			Fricatives		Affricates		Other	
p	b	m	f	v	tʃ	dʒ	w	j
t	d	n	s	z			l	r
k	g	ŋ	ʃ					

Still to be acquired at this age are the interdental fricatives [θ] and [ð] and the voiced alveopalatal fricative [ʒ].

In general, the relative order in which sounds are acquired reflects their distribution in the world's languages. The sounds that are acquired early tend to be found in more languages whereas the sounds that are acquired late tend to be less common across languages.

10.2.3 Early phonetic processes

Children's ability to perceive the phonemic contrasts of their language develops well in advance of their ability to produce them. So even children who are unable to produce the difference between words like *mouse* and *mouth*, *cart* and *card*, or *jug* and *duck* may nonetheless be able to point to pictures of the correct objects in a comprehension task. Moreover, as the following experimenter's report vividly illustrates, children even seem to know that their pronunciations are sometimes not yet 'right'.

> *One of us spoke to a child who called his inflated plastic fish a fis. In imitation of the child's pronunciation, the observer said: "This is your fis?" "No," said the child, "my fis." He continued to reject the adult's imitation until he was told, "That is your fish." "Yes," he said, "my fis."*

The child's reaction to the adult's initial pronunciation of *fish* shows that he could perceive the difference between /s/ and /ʃ/ and that he had correctly represented the word as /fɪʃ/ in his lexicon even though he could not yet produce it himself.

What precisely is responsible for the special character of the sound patterns in children's early speech? The key seems to lie in the operation of a limited number of universal phonetic processes.

Syllable deletion

Because syllables bearing primary or secondary stress are more noticeable than their unstressed counterparts, they tend to be more salient to children in the early stages of the language acquisition process. As a result, stressed syllables are more likely to be retained in children's pronunciation than are unstressed syllables (see table 10.4).

TABLE 10.4 Differences in the retention of stressed and unstressed syllables

Word	Child's pronunciation
hip po pó ta mus	[pɑs]
spa ghé tti	[gɛ]
hé li còp ter	[ɛlkɑt]
kan ga róo	[wu]
té le phòne	[fow]

However, unstressed syllables in final position tend to be retained, probably because the ends of words are easier to notice and remember (see table 10.5).

TABLE 10.5 Retention of unstressed syllables in final position

Word	Child's pronunciation
po tá to	[tejdo]
ba ná na	[nænə]
to má to	[mejdo]
él e phant	[ɛlfən]

Syllable simplification

Another frequent process in children's speech involves the systematic deletion of certain sounds in order to simplify syllable structure. In the data in table 10.6, typical of the speech of two- and three-year-old children, consonant clusters are reduced by deleting one or more segments.

TABLE 10.6 Reduction of consonant clusters

[s] + stop (strategy: delete [s])
stop → [tɑp]
small → [mɑ]
desk → [dɛk]

stop + liquid (strategy: delete liquid)
try → [taj]
crumb → [gʌm]
bring → [bɪŋ]

fricative + liquid (strategy: delete liquid)
from → [fʌm]
sleep → [sip]

nasal + voiceless stop (strategy: delete nasal)
bump → [bʌp]
tent → [dɛt]

Yet another common deletion process in early child language involves the elimination of final consonants, as in the following examples.

(1) dog [dɑ]
bus [bʌ]
boot [bu]

Both the reduction of consonant clusters and the deletion of final consonants have the effect of simplifying syllable structure, bringing it closer to the consonant-vowel (CV) template that is universally favoured by children and that is the most widely found pattern in human language in general.

Substitution

One of the most widespread phonetic processes in early language involves substitution—the systematic replacement of one sound by an alternative that the child finds easier to articulate (see table 10.7). Common substitution processes include **stopping**, the replacement of a fricative by a corresponding stop; **fronting**, the moving forward of a sound's place of articulation; **gliding**, the replacement of a liquid by a glide; and **denasalization**, the replacement of a nasal stop by a non-nasal counterpart.

TABLE 10.7 Substitution in early speech

Process	Example	Change
Stopping (continuant → stop)	sing → [tɪŋ]	s → t
	sea → [ti]	s → t
	zebra → [dibrə]	z → d
	thing → [tɪŋ]	θ → t
	this → [dɪt]	ð → d, s → t
	shoes → [tud]	ʃ → t, z → d
Fronting	ship → [sɪp]	ʃ → s
	jump → [dzʌmp]	dʒ → dz
	chalk → [tsɑːk]	tʃ → ts
	go → [dow]	g → d
Gliding	lion → [jajn̩]	l → j
	laughing → [jæfɪŋ]	l → j
	look → [wʊk]	l → w
	rock → [wɑk]	r → w
	story → [stowi]	r → w
Denasalization	spoon → [bud]	n → d
	jam → [dæb]	m → b
	room → [wub]	m → b

Assimilation

Still another widespread phonetic process in child language is assimilation—the modification of one or more features of a segment under the influence of neighbouring sounds. In the following examples, initial consonants have been voiced in anticipation of the following vowel.

(2) tell [dɛl]
pig [bɪg]
push [bʊs]
soup [zup]

Assimilation is also observed in children's tendency to maintain the same place of articulation for all of the consonants or vowels in a word. This can lead to the pronunciation of *doggy* as [gɑgi] (with identical consonants), and [bibi] for *baby* (with identical vowels in both syllables). Other examples include [fɛlf] for *self*, [kæklin] for *Cathleen*, and [næns] for *dance*.

10.3 Vocabulary development

By age eighteen months or so, the average child has a vocabulary of fifty words or more. Common items include the words listed in table 10.8.

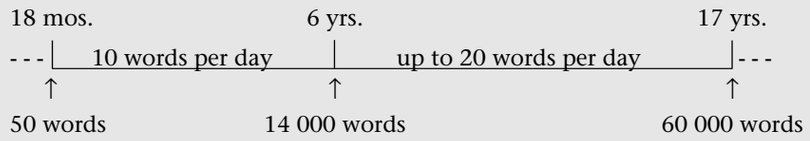
TABLE 10.8 Common items in the first fifty words
Entities
Words referring to people: *daddy, mommy, baby* food/drink: *juice, milk, cookie, water, toast, apple, cake* animals: *dog, cat, duck, horse* clothes: *shoes, hat* toys: *ball, blocks* vehicles: *car, boat, truck* other: *bottle, key, book*
Properties
hot, allgone, more, dirty, cold, here, there
Actions
up, sit, see, eat, go, down
Personal-social
hi, bye, no, yes, please, thank-you

As table 10.8 shows, nounlike words make up the single largest class in the child's early vocabulary, with verb- and adjective-like words being the next most frequent category types. Among the most frequent words are expressions for displeasure or rejection (such as *no*) and various types of social interaction (such as *please* and *bye*). Over the next months this vocabulary grows rapidly, sometimes by as much as ten or twelve words a day. By age six, most children have mastered about thirteen or fourteen thousand words.

Children seem to differ somewhat in the types of words that they focus on, especially in the early stages of language acquisition. One of these differences is reflected in the number of nouns in early vocabulary. Whereas some children have a relatively high proportion of such words (75 percent or more) by age two, other learners exhibit a much lower percentage of nouns (50 percent or less). Making up for the smaller number of nouns is a larger vocabulary of socially useful expressions such as *bye*, *go-away*, *stop-it*, *thank-you*, *I-want-it*, and so on. (Hyphens are used here to indicate that these expressions are not yet segmented into their component words.)

Language Matters **Moving Along**

Every child develops at his or her own pace, of course, but to the extent that we can depict a 'typical' profile for vocabulary development, it would look something like this. Note the relatively slow start (just 50 words in 18 months), followed by a rapid acceleration that is sustained over a multi-year period.



10.3.1 Strategies for acquiring word meaning

Children seem to draw on certain strategies when trying to determine the meaning of a new word. This is perhaps easiest to illustrate in the case of noun-type meanings, for which the following strategies appear to be employed.

(3) Three strategies for learning the meanings of new words.

The Whole Object Assumption
A new word refers to a whole object.

The Type Assumption
A new word refers to a type of thing, not just to a particular thing.

The Basic Level Assumption
A new word refers to objects that are alike in basic ways (appearance, behaviour, etc.).

To see how these strategies work, imagine that a mother and her eighteen-month-old daughter are driving through the countryside and they encounter a sheep munching on the grass. The mother points to the animal and says "sheep." What does the child think the word means? Does it mean 'white'? Or does it mean 'woolly'? Does it refer to the animal? Or to parts of the animal? Or does it refer to the fact that a particular animal is munching on grass?

The Whole Object Assumption allows the child to infer that the word *sheep* refers to the animal itself, not to its parts, not to its whiteness, and not to its wooliness. The Type Assumption allows her to infer that *sheep* refers to a type of animal, not to just one particular sheep. And the Basic Level Assumption leads her to guess that *sheep* is used to refer just to white, four-legged, woolly animals, and not animals in general.

Contextual clues

Another major factor in vocabulary development is the child's ability to make use of contextual clues to draw inferences about the category and meaning of new words. For instance, from early in the language acquisition process, children can use the presence or absence of determiners to distinguish between names and ordinary nouns. Two-year-old children who are told that a new doll is a *dax* will apply this label to similar-looking dolls as well. However, if they are told that the new doll is *Dax*, they assume that it refers just to the doll they have actually been shown. Like adults, these children treat *dax* as an ordinary noun when it is preceded by *a*, but as a name when there is no determiner.

In another experiment, three- and four-year-old children were asked to act out the meaning of sentences such as 'Make it so there is *tiv* to drink in this glass (of water)'. The only clues about the interpretation of *tiv* came from the meaning of the rest of the sentence and from the child's understanding of the types of changes that can be made to a glass of water. Not only did more than half the children respond by either adding or removing water, but some even remembered what *tiv* 'meant' two weeks later!

10.3.2 Meaning errors

The meanings that children associate with their early words sometimes correspond closely to the meanings employed by adults. In many cases, however, the match is less than perfect. The two most typical semantic errors involve overextension and underextension.

Overextensions

In cases of **overextension**, the meaning of the child's word is more general or inclusive than that of the corresponding adult form. The word *dog*, for example, is frequently overextended to include horses, cows, and other four-legged animals. Similarly, *ball* is sometimes used for

Language Matters **Fast Mapping**

How many times does a child have to hear a new word in order to learn it? In one study, eighteen-month-old children were able to learn pairs of new words after just three exposures. In a study of somewhat older children (two to five year olds), a single encounter with a new word led to impressive success: 81 percent of the children could identify the word's referent the next time they heard it. The rapid learning of new words is called *fast mapping*.

Sources: C. Dollaghan, "Child Meets Word," *Journal of Speech and Hearing Research* 28 (1985):449–54.
C. Houston-Price, K. Plunkett, and P. Harris, "Word-learning Wizardry at 1:6," *Journal of Child Language* 32 (2005):175–90.

any round object, including a balloon, an Easter egg, a small stone, and so on. As many as one-third of children's words may be overextended at the fifty-word stage of vocabulary development (see table 10.9).

TABLE 10.9 Additional examples of overextension

Word	First referent	Subsequent extensions
tick tock	watch	clocks, gas-meter, fire hose on a spool, scale with round dial
fly	fly	specks of dirt, dust, small insects, child's toes, crumbs of bread
quack	duck	all birds and insects, flies, coins (with an eagle on the face)
candy	candy	cherries, anything sweet
apple	apples	balls, tomatoes, cherries, onions, biscuits
turtle	turtles	fish, seals
cookie	cookies	crackers, any dessert
kitty	cats	rabbits, any small furry animal
box	boxes	elevators
belt	belts	watch strap

The evidence collected to date suggests that perceptual properties are the single most important factors in children's first hypotheses about word meanings. As a result, children often overextend a word to include a set of perceptually similar objects that they know to have diverse functions. For example, one child used the word *moon* for the moon, grapefruit halves, and a crescent-shaped car light. Another child used the word *money* for a set of objects ranging from pennies to buttons and beads. If you reconsider the examples of overextension given in table 10.9, you will see that they too can be explained in terms of perceptual similarities.

Many overextensions may be deliberate attempts to compensate for vocabulary limitations. One indication of this is that particular overextensions often disappear as soon as children learn the right word for the objects that they have been mislabelling. For example, two-year-old Allen was using the word *dog* for dogs, cats, sheep, and other four-legged mammals, but he stopped doing so as soon as he learned the words *cat* and *sheep*. If he thought that *dog* meant 'animal', he could still have sometimes referred to cats and sheep as *dogs* (just as adults sometimes refer to them as animals). The fact that he didn't suggests that he never thought *dog* meant 'animal'; he had just been 'borrowing' it until the right word came along.

A further indication that many overextensions are designed to compensate for vocabulary limitations comes from the fact that children seem to overextend more in their production than in their comprehension. This is not the result that one would expect if children thought that *dog* meant 'animal'.

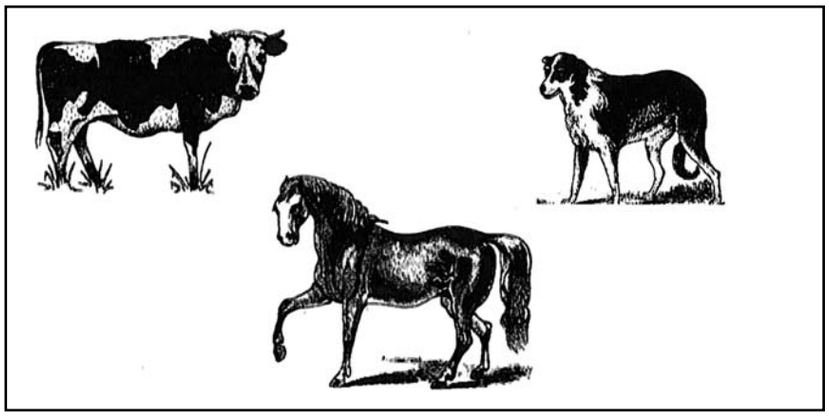


FIGURE 10.3
A sample overextension test

Even children who sometimes use *dog* to refer to cows or horses typically point to the right animal when asked to show the dog to the experimenter (see figure 10.3).

Underextensions

Another possible type of word-meaning error in early language involves **underextension**, the use of lexical items in an overly restrictive fashion. Thus, *kitty* might be used to refer to the family pet, but not to other cats. Or the word *dog* might be used for collies, spaniels, and beagles, but not for chihuahuas.

Underextension errors often reflect children's propensity to focus on prototypical or core members of a category. The potential referents of many words differ in terms of how well they exemplify the properties associated with a particular concept. For example, among the potential referents of the word *dog*, collies and spaniels have more of the properties associated with the concept 'dog' (long hair, relative size, type of bark, and so on) than do chihuahuas. While the preference for a prototype can be overruled by factors such as the presence of a non-typical category member in the child's everyday experience (e.g., a chihuahua as a family pet), the internal structure of concepts can have an important influence on semantic development.

Verb meanings

Meaning errors also occur with verbs. For example, some preschool children believe that *fill* means 'pour' rather than 'make full'. So, when asked to decide which of the two series of pictures in figure 10.4 is an example of filling, they choose the second series—even though the glass remains empty!

Not surprisingly, there is a tendency for children who make this sort of mistake to use *fill* in the wrong syntactic patterns as well.

(4) And fill the little sugars up in the bowl . . . (Mark, at age 4 yrs., 7 mos.)
I didn't fill water up to drink it. (E, at age 4 yrs., 1 mo.)
Can I fill some salt into the [salt shaker]? (E, at age 5 yrs.)

These errors disappear as children come to realize that *fill* means 'make full' rather than 'pour into'.

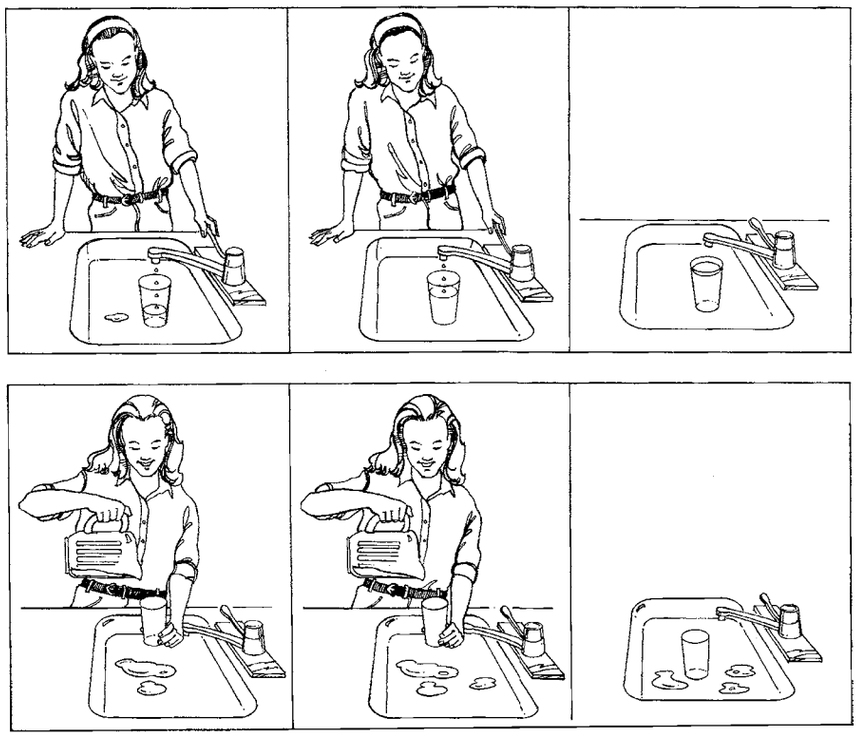


FIGURE 10.4 Sample pictures used to test children's understanding of *fill*. Some children believe that the action depicted in the bottom series of pictures involves filling, even though the glass remains empty.

Source: Jess Gropen, Steven Pinker, Michelle Hollander, and Richard Goldberg, "Syntax and Semantics in the Acquisition of Locative Verbs," *Journal of Child Language* 18 (1991):115–51. Reprinted with the permission of Cambridge University Press.

Dimensional terms

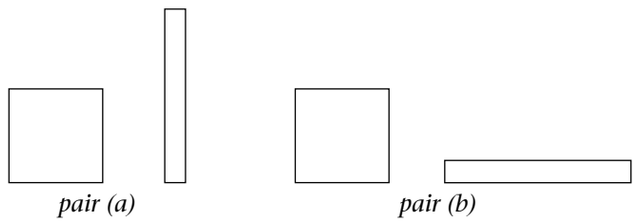
Terms describing size and dimensions are acquired in a relatively fixed order, depending on their generality (see table 10.10). The first adjectives of this type to be acquired, *big* and *small*, are the most general in that they can be used for talking about any aspect of size (height, area, volume, and so on). In contrast, the second group of adjectives to emerge—*tall*, *long*, *short*, *high*, and *low*—can only be used for a single dimension (height-length). The remaining modifiers (*thick-thin*, *wide-narrow*, and *deep-shallow*) are still more restricted in their use since they describe the secondary or less extended dimension of an object. For instance, the dimension of a stick that we describe in terms of width or thickness is almost always less extended than the dimension that we describe in terms of height or length, which tends also to be perceptually more salient.

TABLE 10.10 Order of acquisition for dimensional adjectives

Step	Words	What they describe
1	*big-small*	any aspect of size
2	*tall-short*, *long-short*, *high-low*	a single dimension
3	*thick-thin*, *wide-narrow*, *deep-shallow*	a secondary dimension

The difficulty of dimensional adjectives for children is also evident in experimental tasks. In one experiment children aged three to five were shown pairs of objects—sometimes a big one and a tall one (pair (a) below) and sometimes a big one and a long one (pair (b) below). Younger children did well when asked to choose 'the big one'. However, when asked to choose 'the tall one' or 'the long one', they often picked the big one instead. This suggests that they are initially more sensitive to overall size than to a single dimension like height or length.

FIGURE 10.5
'big'–'tall' versus 'big'–'long'



10.4 Morphological development

As is the case with the sound pattern of language and with vocabulary, the details of morphological structure emerge over a period of several years. Initially, the words produced by English-speaking children seem to lack any internal morphological structure: affixes are systematically absent and most words consist of a single root morpheme.

10.4.1 Overgeneralization

Because many common words have irregular inflection in English (*went* as the past tense form of *go*, *ran* as the past form of *run*, *men* as the plural form of *man*), children sometimes begin by simply memorizing inflected words on a case-by-case basis without regard for general patterns or rules. As a result, they may initially use irregular forms such as *men* and *ran* correctly. However, when they subsequently observe the generality of *-s* as a plural marker and *-ed* as a past tense marker (usually around age two and a half), they sometimes use these suffixes for the irregular forms—producing words such as *mans* and *runned*. (Errors that result from the overly broad application of a rule are called **overgeneralizations** or **overregularizations**.) Even occasional mixed forms such as *felled*, a blend of *fell* and *falled*, may occur during this period (see table 10.11).

TABLE 10.11 The development of affixes

Stage 1:	Case-by-case learning (plural *boys, men*, etc.; past tense *walked*, *ran*, etc.)
Stage 2:	Overuse of general rule (plural *mans*; past tense *runned*)
Stage 3:	Mastery of exceptions to the general rule (plural *men*; past tense *ran*)

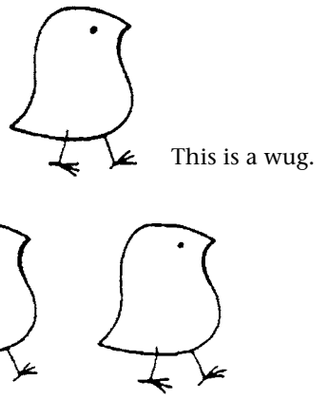
Language Matters **How Many Times Does It Take to Get It Right?**

How many times does a child have to hear the adult form of an irregular verb before all overregularizations are eliminated? Several hundred times, according to one estimate. That's why children are often relatively quick at figuring out the right past tense form for frequently heard irregular verbs like *go* and *see*, but take much longer to master less common verbs such as *sink* or *win*.

Source: Michael Maratsos, "More Overregularizations After All: New Data and Discussion on Marcus, Pinker, Ullman, Hollander, Rosen and Xu," *Journal of Child Language* 27 (2000):183–212.

One of the best indications that children have mastered an inflectional rule comes from their ability to apply it to forms they have not heard before. In a classic experiment, children were shown a picture of a strange creature and told, "This is a wug." A second picture was then presented and the children were told "Now there's another wug. There are two of them. Now there are two . . . ?" (see figure 10.6). Even four- and five-year-old children did well with the plural forms of '*wug* words', demonstrating that the general rules for inflection have been learned by that time, despite the occurrence of occasional errors.

FIGURE 10.6
The 'wug test'



Source: Jean Berko, "The Child's Learning of English Morphology," *Word* 14 (1958):150–77. Reprinted courtesy of Jean Berko Gleason.

Although inflectional overgeneralization is very noticeable in young children's speech and can last into the school years, it doesn't affect all irregular verbs all the time. In fact, preschool children seem to overregularize verbs less than 25 percent of the time at any point in development. This suggests that the overgeneralization errors observed in early speech reflect lapses in accessing the appropriate irregular form from the lexicon rather than the failure to learn irregular forms per se.

10.4.2 A developmental sequence

An important result of early work on child language was the discovery that the development of bound morphemes and functional categories (such as determiners and auxiliaries) takes place in an orderly fashion that is quite similar across children. In a pioneering study of three children between the ages of twenty and thirty-six months, the developmental sequence in table 10.12 was found to be typical.

TABLE 10.12 Typical developmental sequence for non-lexical morphemes

1. *-ing*	5. past tense *-ed*
2. plural *-s*	6. third person singular *-s*
3. possessive *-'s*	7. auxiliary *be*
4. *the, a*	

An interesting feature of this developmental sequence is that it seems to be at least partly independent of the frequency with which the various morphemes occur in adult speech (see table 10.13). For example, the determiners *the* and *a* are the most frequent morphemes in the children's environment even though they are acquired relatively late.

TABLE 10.13 Typical relative frequency of morphemes in parental speech

1. *the, a*	5. possessive *-'s*
2. *-ing*	6. third person singular *-s*
3. plural *-s*	7. past tense *-ed*
4. auxiliary *be*	

This shows that frequency by itself cannot explain developmental order, although it may have some role to play in conjunction with other factors. (It's also clear that pronunciation by itself is not decisive either, since the three *-s* morphemes are acquired at different times.) What, then, determines the order of acquisition of non-lexical categories and bound morphemes?

Some determining factors

Research on a variety of languages suggests that several factors are involved.

1. ***Frequent occurrence, especially in utterance-final position*** Children show a greater tendency to notice and remember elements that occur at the end of the utterance than those found in any other position.
2. ***Syllabicity*** Children seem to take greater notice of morphemes such as *-ing*, which can constitute syllables on their own, than the plural or possessive suffix *-'s*, whose principal allomorphs (/-s/ and /-z/) are single consonants.
3. ***Absence of homophony*** Whereas the word *the* functions only as a determiner in English, the suffix *-s* can be used to mark any one of three things: plural number in nouns,

third person singular in verbs, or possession. The resulting complication in the relationship between form and meaning may impede acquisition.

4. ***Few or no exceptions in the way it is used*** Whereas all singular nouns form the possessive with *-'s*, not all verbs use *-ed* to mark the past tense (*saw*, *read*, *drove*). Such exceptions hinder the language acquisition process.
5. ***Allomorphic invariance*** Whereas the affix *-ing* has the same form for all verbs, the past tense ending *-ed* has three major allomorphs—/-t/ for verbs such as *chase*, /-d/ for forms such as *crave* and /-əd/ for verbs such as *recite*. This type of allomorphic variation, which also occurs with the plural, possessive, and third person singular affixes in English, slows morphological development.
6. ***Clearly discernible semantic function*** Whereas morphemes such as plural *-s* express easily identifiable meanings, some morphemes (such as the third person singular *-s,* as in *She works hard*) make no obvious contribution to the meaning of the sentence. Acquisition of this latter type of morpheme is relatively slow.

10.4.3 Word formation processes

The major word formation processes in English—derivation and compounding—both emerge early in the acquisition of English. The first derivational suffixes to show up in children's speech are the ones that are most common in the adult language (see table 10.14).

TABLE 10.14 Suffixes in the speech of a child prior to age four

Ending	Meaning	Example
-er	'doer'*	walk<u>er</u>
-ie	'diminutive'	dogg<u>ie</u>
-ing	'activity'	Run<u>ning</u> is fun.
-ness	'state'	happi<u>ness</u>

Note: **-er* also has an 'instrument' meaning, as in *cutter* 'something used for cutting', but this is less frequent in children's early speech.

Children as young as three demonstrate an ability to use derivation to make up names for agents and instruments when presented with questions such as the following.

> *"I've got a picture here of someone who crushes things. What could we call someone who crushes things? Someone who crushes things is called a . . . "*
>
> *"I've got a picture here of something that cuts things. What could we call something that cuts things? Something that cuts things is called a . . . "*

Children exhibit a propensity for forming compounds, especially of the N-N type, both in experimental settings where they are asked to make up words (e.g., "What would you call a boy who rips paper?"—a paper ripper) and in their own spontaneous speech. Some of the compounds found in the speech of three and four year olds do not follow the usual pattern for English compounds (e.g., **open man* for 'someone who opens things' and **cutter grass* for

Language Matters **It Takes a While**

The full derivational system continues to develop well into the school years. Even ten year olds have some difficulty using suffixes to recognize the category of unfamiliar words, as when they are asked which of four words best fits in a sentence such as the following:

You can ___ the effect by turning off the lights.

intensify	intensification
intensity	intensive

They have even more trouble when the possible words are made up rather than real:

I wish Dr. Who would just ____ and get it over with.

transumpation	transumpative
transumpate	transumpatic

Source: A. Tyler and W. Nagy, "The Acquisition of English Derivational Morphology," *Journal of Memory and Language* 28 (1989):649–67.

'grass cutter'), but these disappear by age five. Other early compounds have the right structure, but are inappropriate because English already has words with the intended meaning (see table 10.15).

TABLE 10.15 Some innovative compounds

Child's word	Intended meaning
car-smoke	'exhaust'
cup-egg	'boiled egg'
firetruck-man	'fire fighter'
plant-man	'gardener'
store-man	'clerk'
leg-pit	'area behind the knee'

Children's creativity with compounds points to a preference for building words from other words, perhaps because this places less demand on memory than does learning an entirely new word for each concept.

Even the subtlest properties of word formation seem to be acquired in the preschool years. One such property involves the fact that an inflectional suffix such as the plural cannot occur inside compounds (compare **dogs catcher* with *dog catcher*). In one study, children as young as three years of age produced compounds that obeyed this constraint. Thus, when asked a question such as "What do you call someone who eats cookies?", they responded by saying *cookie eater* rather than **cookies eater*.

10.5 Syntactic development

Like phonological and morphological development, the emergence of syntactic structure takes place in an orderly manner and reveals much about the nature of the language acquisition process. We will briefly survey some of the milestones in this developmental process here.

10.5.1 The one-word stage

As noted earlier, children begin to produce one-word utterances between the ages of twelve and eighteen months. A basic property of these one-word utterances is that they can be used to express the type of meaning that is associated with an entire sentence in adult speech. Thus, a child might use the word *dada* to assert 'I see Daddy', *more* to mean 'Give me more candy', and *up* to mean 'I want up'. Such utterances are called **holophrases** (literally 'whole sentences').

In forming holophrastic utterances, children seem to choose the most informative word that applies to the situation at hand. A child who wants a candy, for example, would say *candy* rather than *want* since *candy* is more informative in this situation. Similarly, a child who notices a new doll would be more likely to say *doll* than *see*, thereby referring to the most novel feature of the situation he or she is trying to describe.

Table 10.16 presents examples of the types of holophrastic meaning that children commonly express during the one-word stage.

TABLE 10.16 Semantic relations in children's one-word utterances

Semantic relation	Utterance	Situation
Agent of an action	*dada*	as father enters the room
Action or state	*down*	as child sits down
Undergoer (or 'theme')	*door*	as father closes the door
Location	*here*	as child points
Recipient	*mama*	as child gives mother something
Recurrence	*again*	as child watches lighting of a match

Comprehension appears to be considerably in advance of production in the one-word stage, and children are able to understand many multiword utterances during this period. One indication of this comes from an experiment in which children in the one-word stage listened to sentences such as *Big Bird is hugging Cookie Monster* as an experimenter tracked their gaze towards competing pictures: the children preferred to look at a depiction of Big Bird hugging Cookie Monster, rather than the reverse situation.

10.5.2 The two-word stage

Within a few months of their first one-word utterances, children begin to produce two-word 'mini-sentences'. Table 10.17 provides a sampling of these utterances and the types of

TABLE 10.17 Some patterns in children's two-word speech

Utterance	Intended meaning	Semantic relation
Baby chair	'The baby is sitting on the chair.'	agent-location
Doggy bark	'The dog is barking.'	agent-action
Ken water	'Ken is drinking water.'	agent-theme
Hit doggy	'I hit the doggy.'	action-theme
Daddy hat	'Daddy's hat'	possessor-possessed

meaning they are commonly used to express. (Although these examples are from English, similar patterns are found in the early development of all languages.)

It is unclear whether children have acquired syntactic categories such as noun, verb, and adjective at this point in their development. This is because the markers that help distinguish among syntactic categories in adult English (e.g., inflection such as the past tense suffix and functional categories such as determiners and auxiliary verbs) are absent during this period. To complicate matters still further, the relative shortness of the utterances produced during the two-word stage means that the positional differences associated with category distinctions in adult speech are often not manifested. Thus, words such as *busy* (an adjective in adult speech) and *push* (a verb) may appear in identical patterns.

(5) Mommy busy.
Mommy push.

While this does not show that children lack syntactic categories, it makes it difficult to demonstrate that they possess them. For this reason, researchers are split over whether to describe children's utterances in terms of the syntactic categories of adult speech.

A notable feature of children's two-word utterances is that they almost always exhibit the appropriate word order. This suggests a very early sensitivity to this feature of sentence structure, but there is reason to believe that children do not initially have a general word order rule. Rather, they may have a separate rule for each verb (e.g., 'Put the subject in front of *push*'; 'Put the subject in front of *read*'; and so on). In one experiment, for instance, children aged two to four were taught made-up verbs (such as *tam*, *gop*, and *dack*) for novel actions involving puppet characters. Each verb was presented in one of the following orders:

(6) *subject-verb-object order*: Elmo tammed the apple.
subject-object-verb order: Elmo the apple gopped.
verb-subject-object order: Dacked Elmo the apple.

The two- and three-year-old children were willing to learn word order patterns not found in English and would often employ the subject-object-verb and verb-subject-object order for new verbs if that was what they had been exposed to, as if they thought that each verb could have its own word order pattern. In contrast, the four year olds used the subject-verb-object order regardless of what the experimenter had said, which suggests that they had acquired a general word order rule for English that they automatically extended to new verbs.

10.5.3 The telegraphic stage

After a period of several months during which their speech is largely limited to one- and two-word utterances, children begin to produce longer and more complex grammatical structures. As illustrated in example (7), a defining feature of these patterns is the frequent absence of bound morphemes and non-lexical categories.

(7) Chair broken.
Daddy like book.
What her name?
Man ride bus today.
Car make noise.
Me wanna show Mommy.
I good boy.

Such speech is often dubbed **telegraphic**, thanks to its resemblance to the clipped style of language found in the now-defunct telegram (a pre-email form of communication that required paying by the word).

Although it is certainly true that many important morphemes are missing from children's early speech, these items do not go entirely unnoticed. As noted in section 10.3.1, for instance, children as young as seventeen months can infer from the presence or absence of a determiner whether a novel word refers to a type of object (e.g., a doll) or to a particular object. Eighteen month olds pay more attention to a passage containing an *is* + *V-ing* pattern (e.g., *she is playing*) than to one containing ungrammatical *she can playing*. And infants as young as eleven months of age are surprised when *a* or *the* is replaced by a nonsense syllable, or when it is used in the wrong place, as in *book the*.

The telegraphic stage is characterized by the emergence of quite elaborate types of phrase structure. As the examples in (7) help show, children can form phrases consisting of a head and a complement (*like book, ride bus, show mommy*), phrases that include a modifier (such as *today* and *good*), and even full-fledged sentences.

TABLE 10.18 The development of phrase structure

Stage	Approx. age	Developments
Holophrastic	1–1.5 yrs.	single word utterances; no structure
Two-word	1.5–2 yrs.	early word combinations; presence of syntactic categories unclear
Telegraphic	2–2.5 yrs.	emergence of phrase structure

Language development from this point onward is rapid. As the examples in table 10.19 illustrate, in a matter of just a few months children move from relatively primitive two- and three-word utterances at the beginning of the telegraphic stage to a broad range of morphologically and syntactically intricate sentence types.

10.5.4 Later development

In the months following the telegraphic stage, children continue to acquire the complex grammar that underlies adult linguistic competence, including the operations that move various words and phrases to non-basic positions in the sentence.

Yes-no questions

In the very early stages of language acquisition, children signal *yes-no* questions by means of rising intonation alone. (Recall that auxiliary verbs are a relatively late development.)

(8) See hole?
I ride train?
Ball go?
Sit chair?

Even after individual auxiliary verbs make their appearance, there is often a delay of a few months before Inversion takes place in *yes-no* questions. In one study, for example, a young

TABLE 10.19 Sample utterances from a child's speech over an 11-month period

Age	Sample utterances
28 mos.	Play checkers. Big drum. I got horn. A bunny-rabbit walk.
30 mos.	Write a piece of paper. What that egg doing? I lost a shoe. No, I don't want to sit seat.
32 mos.	Let me get down with the boots on. Don't be afraid of horses. How tiger be so healthy and fly like kite? Joshua throw like penguin.
34 mos.	Look at that train Ursula brought. I simply don't want put in chair. Don't have paper. Do you want little bit, Cromer? I can't wear it tomorrow.
36 mos.	I going come in fourteen minutes. I going wear that to wedding. I see what happens. I have to save them now. Those are not strong mens. They are going sleep in wintertime. You dress me up like a baby elephant.
38 mos.	So it can't be cleaned? I broke my racing car. Do you know the lights went off? What happened to the bridge? Can I put my head in the mailbox so the mailman can know where I are and put me in the mailbox?

Source: Steven Pinker, *The Language Instinct* (New York: Morrow, 1994), pp. 269–70. Copyright © 1994 by Steven Pinker. Reprinted by permission of HarperCollins Publishers.

boy began using the auxiliary verb *can* at age two years, five months, but he did not use it in the pre-subject position until six months later.

An interesting—but infrequent—error in children's early use of Inversion in both *yes-no* and *wh* questions is exemplified in (9).

(9) *Can* he *can* look?
What *shall* we *shall* have?
Did you *did* came home?

In these sentences, the auxiliary verb occurs twice—once to the left of the subject and once to the right. It has been suggested that this pattern reflects an error in the use of Inversion that involves leaving a copy of the moved auxiliary behind in its original position.

Wh questions

Wh questions emerge gradually between the ages of two and four. The first *wh* words to be acquired are typically *what* and *where*, followed by *who*, *how*, and *why*; *when*, *which,* and *whose* are relatively late acquisitions.

(10) Where that?
What me think?
Why you smiling?
Why not me drink it?

With the acquisition of auxiliary verbs, Inversion becomes possible. Interestingly, some children appear to find Inversion easier in *yes-no* questions, where it is the only movement operation, than in *wh* questions, where the *wh* word must also be moved. (For some reason, this is especially true in the case of *why* questions.) The following examples from children's speech all show the effects of moving the *wh* word, but not the auxiliary verb.

(11) What I did yesterday?
Where I should sleep?
Why that boy is looking at us?
Why she doesn't like bananas?
Why unicorns are pretend?

10.5.5 The interpretation of sentence structure

The interpretation of sentences draws heavily on various features of syntactic structure. In this section we will briefly consider some aspects of the acquisition of two interpretive phenomena that rely on information about syntactic structure.

Passives

Children learning English are able to use word order clues to interpret sentences at a very early point in the acquisition process. By the time their average utterance length is two words, they are able to respond correctly about 75 percent of the time to comprehension tests involving simple sentences such as (12), in which *the truck* is the agent and *the car* is the theme.

(12) The truck bumped the car.

However, children find it much harder to interpret certain other types of sentences correctly. This is especially true for passive sentences such as the one in (13), in which more than just word order matters—the form of the verb and the presence of *by* jointly indicate that the first NP refers to the undergoer rather than the agent.

(13) The car was bumped by the truck.

Although children produce passive sentences in their own speech from around age three, they have continuing difficulty responding appropriately to passive constructions in comprehension tests (see table 10.20).

TABLE 10.20 Accurate interpretation of passive constructions

Group	Percentage correct
Nursery School	20
Kindergarten	35
Grade 1	48
Grade 2	63
Grade 3	88

Why should this be so? One possibility is that children expect the first NP in a sentence to refer to the agent. This is sometimes called the **Canonical Sentence Strategy** (see figure 10.7).

FIGURE 10.7 The Canonical Sentence Strategy

NP … V … NP is interpreted as
agent – action – undergoer

The Canonical Sentence Strategy works for active sentences such as *The truck bumped the car*, but not for passive sentences, where the first NP refers to the undergoer and the second NP to the agent.

(14) Active sentence: The truck bumped the car.
agent *undergoer*

Passive sentence: The car was bumped by the truck.
undergoer *agent*

Children employing this strategy associate the first NP with the agent and the second NP with the undergoer, so when they hear the passive sentence in (14), they think the car bumped the truck.

As the data in table 10.20 show, this strategy is applied much less consistently by grade one children, who have evidently begun to realize that word order is not the only thing that determines a sentence's interpretation—the verbal construction (*was bumped*) and the presence of a preposition such as *by* also matter. A year or so later, children's scores start to rise dramatically, indicating that they have come to recognize the special properties of the passive construction.

Pronominals and reflexives

A reflexive pronoun (*myself*, *himself*, *herself*, and so on) must have a 'higher' (i.e., c-commanding) antecedent in the minimal clause containing it.

(15) *a.* Reflexive pronoun with a higher antecedent in the same clause
I hurt *myself* with the stapler.

b. Reflexive pronoun without a higher antecedent in the same clause
*You hurt *myself* with the stapler.

In contrast, a pronominal (*me*, *him*, *her*) cannot have a higher antecedent in the same minimal clause.

(16) *a.* Pronominal with a higher antecedent in the same clause
*I hurt *me* with the stapler.

b. Pronominal without a higher antecedent in the same clause
You hurt *me* with the stapler.

Despite the abstractness of these principles, children appear not to have trouble distinguishing between pronominals and reflexive pronouns in their own speech. In one study of the use of *me* and *myself* in speech transcripts from three children aged two to five, researchers found a few errors of the following type.

(17) *Sample pronoun errors:*
Mistake involving *me*: I see *me*. (Adam, age 34 mos., looking through a telescope)
Mistake involving *myself*: Don't you drop me . . . you hurt *myself*. (Abe, age 34 mos.)

Overall though, the children misused *me* only about 5 percent of the time and made errors with *myself* less than 1 percent of the time. We will return to this point in section 10.6.4.

10.6 What makes language acquisition possible?

In the preceding sections, we have seen that the language acquisition process extends over a period of several years. It is relatively easy to describe what takes place during these years, but it is much more difficult to explain *how* it happens. The sections that follow focus on some of the factors that may contribute to an eventual understanding of how the language acquisition process works.

10.6.1 The role of adult speech

Popular opinion holds that children learn language simply by imitating the speech of those around them. This cannot be right, however. Not only do children tend not to repeat the speech of others, they are typically unable to imitate structures that they have not yet learned. For instance, a child who has not yet started to invert the auxiliary verb and the subject in questions will imitate sentence (18a) by producing (18b).

(18) *a. Model sentence*: Why can't kitty stand up?
b. Child's imitation: Why kitty can't stand up?

A child's own grammar, not the model provided by adult speech, determines what she or he will say at any given point of development.

Of course, language learners must be sensitive in some way to the language in their environment. After all, children who are exposed to English learn to speak English, those exposed to Cree learn Cree, and so forth. It seems, though, that the relationship between input (the language children hear) and acquisition is subtler and more complicated than one might think.

Caregiver speech

A good deal of work has been devoted to the search for a possible relationship between language acquisition and the type of speech that is typically addressed to young language learners.

Such speech is often called **motherese** or **caregiver speech**. Table 10.21 summarizes the principal features of the caregiver speech used by middle-class English-speaking caregivers with children.

TABLE 10.21 Some features of English caregiver speech
Phonetic
Slow, carefully articulated speech Higher pitch Exaggerated intonation and stress Longer pauses
Lexical and semantic
More restricted vocabulary Concrete reference to the here and now
Syntactic
Few incomplete sentences Short sentences More imperatives and questions
Conversational
More repetitions Few utterances per conversational turn

Caregiver speech could be helpful to children in various ways. For example, exposure to slow, carefully articulated speech may make it easier for children to pick out words and to learn their pronunciation. (Remember that sentences consist of a continuous stream of speech sounds; there are no pauses between words.) Moreover, the acquisition of meaning may be facilitated by the fact that caregiver speech tends to concentrate on the here and now, especially the child's surroundings, activities, and needs. The examples in table 10.22 help illustrate this.

TABLE 10.22 Some examples of caregiver speech

Caregiver's utterance	Context
That's right, pick up the blocks.	the child is picking up a box of building blocks
That's a puppy.	the child is looking at a young dog
The puppy's in the basket.	the child is examining a puppy in a basket

Exposure to language of this type may well make it easier to match morphemes, words, and phrases with meanings—a major part of the language acquisition process.

Although potentially *helpful*, caregiver speech may not actually be *necessary* to the language acquisition process. In Western Samoa, for instance, speech to children is not simplified

in the way it often is in North America, and caregivers do not try to reformulate children's unintelligible speech or make any special attempt to understand it. Yet Samoan children have no trouble learning Samoan. Evidently, the speech style typical of middle-class caregivers in North America is not essential for language acquisition.

Moreover, even in cultures where it is common, caregiver speech seems to have very selective effects on child language. For instance, the number of *yes-no* questions in caregiver speech seems to be correlated with the rate at which auxiliary verbs develop—apparently because auxiliaries occur in the salient sentence-initial position in *yes-no* questions (*Can Jennifer go?*). At the same time, though, many other features of caregiver speech seem *not* to affect child language. As we saw earlier (in section 10.4.2), for example, the relative frequency of bound morphemes and non-lexical categories in caregiver speech apparently does not determine their order of acquisition.

In and of itself, then, caregiver speech cannot explain how language acquisition occurs. However, research into this subject may contribute to this goal in less direct ways by helping determine the types of linguistic experience that are most valuable to children. This in turn could help us identify the types of mechanisms and strategies involved in language acquisition.

10.6.2 The role of feedback

It is sometimes suggested that parents help their children learn language by correcting their 'mistakes'. However, studies of actual interactions between parents and children point in a quite different direction. In general, parents tend to be more concerned with the truth of children's utterances than with their grammaticality—one transcript of a parent-child conversation includes *That's right* as a response to the grammatical monstrosity *Mama isn't boy, he's a girl!*

Moreover, even when adults do attempt to correct children's grammatical errors, their efforts often have little effect. The following exchange between a child and his father is typical in this regard.

(19) *Child*: Want other one spoon, daddy.
Father: You mean, you want the other spoon.
Child: Yes, I want other one spoon, please daddy.
Father: Can you say "the other spoon"?
Child: other . . . one . . . spoon.
Father: Say "other."
Child: other.
Father: "spoon."
Child: spoon.
Father: "other spoon."
Child: other . . . spoon. Now give me other one spoon?

Interestingly, however, some research suggests that subtler forms of feedback may have a role to play in the language acquisition process.

Recasts

Adults often respond to a child's utterance by repeating it, making adjustments to its form and/or content. (Responses of this sort are called **recasts**.)

(20) *Child*: Daddy here.
Mother: Yes, Daddy is here.
Child: Him go.
Mother: Yes, he is going.
Child: Boy chasing dog.
Mother: Yes, the boy is chasing the dog.
Child: The dog is barking.
Mother: Yes, he is barking at the kitty.

Recasts provide children with potentially useful information—adding a missing verb (*is* in the first example), changing the form of a pronoun (*him* to *he* in the second example), and so on. On the other hand, parents usually don't correct errors, and sometimes they actually reformulate their children's *grammatical* utterances (as in the final example), so recasts also have the potential to be misleading.

It is not yet clear what role recasts play in language learning, and studies to date have yielded conflicting results. For instance, a study of the acquisition of *the* and *a* by three children revealed no link between the frequency of recasts and the rate at which their use of determiners increased—no matter how many recasts children heard, it didn't seem to speed up their learning.

On the other hand, a quite different result emerged from an experiment in which four and five year olds were taught made-up verbs that have irregular past tense forms—for example, *pell* (with *pold* as its past tense). When the children first learned what the verbs meant (they were linked to various funny actions, such as hitting someone with a beanbag attached to a string), they heard only the '*-ing*' forms ('This is called *pelling*'). They therefore had no idea what the past tense forms should be. Just hearing an adult use *pold* to refer to a past pelling action had little or no effect, but being allowed to make 'mistakes' such as *pelled* and then hearing an adult recast the sentence using *pold* had a major impact. In fact, a single recast was often enough to permit learning of the irregular form, which suggests that certain types of feedback have a role to play in the language acquisition process after all.

10.6.3 The role of cognitive development

Because there are dramatic changes in both linguistic and non-linguistic abilities during the first years of life, it is tempting to think that the two are somehow linked. Yet there is considerable evidence to suggest that language acquisition is to a large extent independent of other types of cognitive development. One such piece of evidence comes from the study of individuals whose general cognitive development is deficient but whose language is highly developed. For example, Rick, a severely retarded fifteen year old, performed so poorly on a variety of non-linguistic tasks that his general cognitive level was estimated to be that of a preschool child. Yet, as the following examples illustrate, his speech manifests considerable syntactic and morphological sophistication—with appropriate use of affixes, non-lexical categories, and word order.

(21) She must've got me up and thrown me out of bed.
She keeps both of the ribbons on her hair.
If they get in trouble, they'd have a pillow fight.
She's the one that walks back and forth to school.
I wanna hear one more just for a change.

Language Matters **A Linguistic Savant**

A particularly celebrated case of a dissociation between language and cognitive development involves Christopher. Now an adult, Christopher can read, write, and communicate in about twenty languages (including English, Danish, Dutch, Finnish, French, German, Modern Greek, Hindi, Italian, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Turkish, and Welsh). He learned some of these languages as a child (based on minimal exposure) and taught himself others as an adolescent and adult, often with amazing speed, as the following account of his encounter with Dutch illustrates.

> In March . . . , shortly before he was due to appear on Dutch television, it was suggested that he might spend a couple of days improving his rather rudimentary Dutch with the aid of a grammar and dictionary. He did so to such good effect that he was able to converse in Dutch—with facility if not total fluency—both before and during the programme. (p. 18)

Christopher has a non-verbal IQ (depending on the test) of between 56 and 76, and a mental age of 9 years, 2 months. He has trouble with addition (he can handle simple cases such as 12 + 13, but not 'carrying over' as in 14 + 19); he is very bad at drawing; and he can't figure out how tic-tac-toe works. He is unable to care for himself and lives in a home for adults with special needs.

Source: Neil Smith and Ianthi-Maria Tsimpli, *The Mind of a Savant* (Oxford: Blackwell, 1995). Reproduced by permission of Blackwell Publishing.

On the other hand, there are also documented cases of people whose IQ is within the normal range but who nonetheless have great difficulty with inflection for the past tense and plural, as illustrated by the examples in (22). (There is reason to believe that this particular disorder is inherited.)

(22) The boys eat four cookie.
It's a flying finches, they are.
The neighbours phone the ambulance because the man fall off the tree.

Case studies such as these suggest that certain aspects of language (in particular, morphology and syntax) are independent of non-linguistic types of cognitive development. This in turn implies that the mental mechanisms responsible for the acquisition of those parts of the grammar are relatively autonomous and that their operation neither follows from nor guarantees general cognitive development.

10.6.4 The role of inborn knowledge

There can be no doubt that there is something special about the human mind that equips it to acquire language. The only real question has to do with precisely what that special thing is.

A very influential view among linguists is that children are born with prior knowledge of the type of categories, operations, and principles that are found in the grammar of any human language. They therefore know, for example, that the words in the language they are acquiring will belong to a small set of syntactic categories (N, V, and so on) and that they can be combined in particular ways to create larger phrases (NP, VP, IP, etc.). The set of inborn categories, operations, and principles common to all human languages makes up Universal Grammar (UG).

The view that certain grammatical knowledge is inborn is known as **nativism**. Although nativism has roots in philosophy that date back thousands of years, its popularity in linguistics is due largely to the influence of Noam Chomsky, a linguist at the Massachusetts Institute of Technology. Chomsky's basic claim is that the grammars for human language are too complex and abstract to be learned on the basis of the type of experience to which children have access. Therefore, he argues, significant components of the grammar must be inborn. To illustrate this, we must consider a relatively complex example involving the notion of c-command alluded to in section 10.5.5.

Principles A and B

The interpretation of pronouns such as *himself* and *him* is regulated by the following two principles.

(23) *Principle A*
A reflexive pronoun must have a c-commanding antecedent in the same minimal IP.

Principle B
A pronominal must not have a c-commanding antecedent in the same minimal IP.

These principles have played an important role in the study of language acquisition, and three arguments have been put forward in support of the claim that they are inborn.

First, the notion of c-command is quite abstract. It is not the type of concept that we would expect young children to discover simply by listening to sentences. Since we also know that no one teaches them about c-command, it makes sense to think that this notion is inborn and therefore does not have to be discovered or taught.

Second, the c-command relation seems to be universally relevant to pronoun interpretation. Thus, there appears to be no language in which the equivalent of English *himself* can refer to the boy rather than the boy's father in sentences such as the following.

(24) The boy's father overestimates himself.

The universality of this restriction would be explained if Principles A and B were innate and hence part of the inborn linguistic knowledge of all human beings.

Third, as we saw earlier in this chapter, Principles A and B seem to be available to children from a very early stage in their development—even three year olds appear to have mastered the distinction between reflexives and pronominals in their own speech (although they do sometimes make mistakes in comprehension). Given the complexity of these principles, this provides additional evidence for the claim that they are inborn.

Parameters

Of course, not every feature of a language's grammar can be inborn. Its vocabulary and morphology must be learned, and so must at least part of its syntax. In the case of phrase structure, for example, UG stipulates that an X' constituent can include a head and its complements, but it does not specify the relative order of these elements. This differs from language to language, so that a child acquiring English must learn that heads precede their complements, whereas a child acquiring Japanese must learn the reverse order. UG

includes a parameter for word order that offers a choice between head-initial and head-final order. (We ignore the positioning of specifiers for the purposes of the illustration in table 10.23.)

TABLE 10.23 The word order parameter

Stipulated by UG	Resulting options
X' consists of X and a complement	X–Complement order [head-initial] Complement–X order [head-final]

There are also phonological parameters: for example, languages can differ from each other in terms of whether they allow two or more consonants in the onset of a syllable—English does (e.g., *gleam*, *sprint*), whereas Japanese does not.

All of this suggests that part of the language acquisition process involves **parameter setting**—that is, determining which of the options permitted by a particular parameter is appropriate for the language being learned.

10.6.5 Is there a critical period?

One of the most intriguing issues in the study of language acquisition has to do with the possibility that normal linguistic development is possible only if children are exposed to language during a particular time frame or **critical period**. Evidence for the existence of such a period comes from the study of individuals who do not experience language during the early part of their lives.

One such individual is the much-discussed Genie, who was kept in a small room with virtually no opportunity to hear human speech from around age two to age thirteen. After many years of therapy and care, Genie's non-linguistic cognitive functioning was described as 'relatively normal' and her lexical and semantic abilities as 'good'. In terms of syntax and morphology, however, many problems remained, as evidenced in the sample utterances in table 10.24.

TABLE 10.24 Some of Genie's utterances

Utterance	Meaning
Applesauce buy store	'Buy applesauce at the store.'
Man motorcycle have	'The man has a motorcycle.'
Want go ride Miss F. car	'I want to go for a ride in Miss F.'s car.'
Genie have full stomach	'I have a full stomach.'
Mama have baby grow up	'Mama has a baby who grew up.'

As these examples show, Genie makes word order errors (the first two examples) and her speech does not contain non-lexical categories or affixes.

Another revealing case study involved Chelsea, a deaf child who was misdiagnosed as retarded and emotionally disturbed. Chelsea grew up without language and was not exposed to speech until the age of thirty-one, when she was finally fitted with hearing aids. After intensive therapy, she is able to hold a job and to live independently. However, her vocabulary consists of only 2000 words and her sentences are badly formed, as the following examples help show.

(25) The woman is bus the going.
Combing hair the boy.
Orange Tim car in.
The girl is gone the ice cream shopping buying the man.

Based on case studies such as these, it is now widely believed that the ability to acquire a first language in an effortless and ultimately successful way begins to decline from age six and is severely compromised by the onset of puberty.

Summing up

This chapter has been concerned with the problem of how children acquire the **grammar** of their first language. Research in this area deals with two major issues: the nature of the developmental sequence leading to the emergence of mature linguistic competence in the areas of phonology, vocabulary, morphology, and syntax, and the factors that make it possible for children to acquire a complex grammar. A number of factors may contribute to the child's acquisition of language, including the properties of **caregiver speech**, **recasts**, and inborn linguistic knowledge (**Universal Grammar**). We look to future research for deeper insights into the precise role of these and other factors.

Recommended reading

Bloom, Paul. 2002. *How Children Learn the Meanings of Words*. Cambridge, MA: MIT Press.
Clark, Eve. 1993. *The Lexicon in Acquisition*. New York: Cambridge University Press.
Clark, Eve. 2002. *First Language Acquisition*. New York: Cambridge University Press.
Gallaway, Clare, and Brian Richards. 1994. *Input and Interaction in Language Acquisition*. New York: Cambridge University Press.
Lust, Barbara. 2006. *Child Language: Acquisition and Growth*. Cambridge, UK: Cambridge University Press.
O'Grady, William. 2005. *How Children Learn Language*. Cambridge, UK: Cambridge University Press.
Piattelli-Palmarini, Massimo, ed. 1980. *Language and Learning: The Debate between Jean Piaget and Noam Chomsky*. Cambridge, MA: Harvard University Press.
Vihman, Marilyn. 1996. *Phonological Development: The Origins of Language in the Child*. Cambridge, MA: Blackwell.

Exercises

1. One piece of evidence that children acquire a grammar is their production of over-regularized past tense forms such as *doed*, *leaved*, and *goed*. Based on this model, what type of evidence should we look for in order to show that children have acquired the rule that creates 'comparative' forms such as *bigger*, *richer*, and *taller*? (Hint: Think about adjectives that have irregular comparative forms in the adult language.)

2. In one naturalistic study, a search for passive structures in a sample of 18 000 utterances from sixty children yielded only nineteen examples produced by twelve of the children.
   a) Does this mean that the other forty-eight children had not yet learned the passive structure?
   b) How are the disadvantages of the naturalistic method exemplified here?

3. The following transcriptions represent the pronunciation of a two-year-old child. Indicate which phonetic processes have applied in each case.

a)	skin	[kɪd]	'kid'	h)	tent	[dɛt]	'det'
b)	spoon	[bun]	'boon'	i)	teddy	[dɛdi]	'deddy'
c)	zoo	[du]	'doo'	j)	brush	[bʌt]	'but'
d)	John	[dɑn]	'don'	k)	bump	[bʌp]	'bup'
e)	bath	[bæt]	'bat'	l)	play	[pwej]	'pway'
f)	other	[ʌdə]	'udder'	m)	breakfast	[brɛkpəst]	'breakpast'
g)	Smith	[mɪt]	'mit'				

4. Drawing on the phonetic processes posited for the preceding exercise, predict one or more plausible immature pronunciations for each of the following words.

a) show	e) juice
b) please	f) thumb
c) spit	g) zero
d) under	h) ring

5. Consider the following examples of overextensions, all of which have actually been observed in children's speech. What is the apparent basis for each of these overextensions?

	Word	*First referent*	*Overextensions*
a)	sch	sound of a train	music, noise of wheels, sound of rain
b)	bow-wow	dog	sheep, rabbit fur, puppet
c)	baby	baby	people in pictures
d)	sizo	scissors	nail file, knife, screwdriver, spoon
e)	policeman	policeman	mailman, sailor, doctor
f)	strawberry	strawberry	grapes, raspberry
g)	fireworks	fireworks	matches, light, cigarette
h)	Batman	Batman logo on a T-shirt	any logo on a T-shirt

6. Since children have a tendency to focus on the prototypical members of categories in the acquisition of words, how might you expect children to underextend the following words? What members of the category might you expect children not to include?
   a) bird
   b) pet
   c) toy

7. The allomorphic variation associated with the 3rd person singular verbal ending *-s* is identical to that found with plural *-s*.
a) Make up a test parallel to the '*wug* test' discussed in section 10.4.1.
b) If possible, give your test to children between the ages of three and seven. Are your results similar to the ones discussed in the chapter?

8. Based on the discussion in section 10.4.2 about the developmental sequence of morpheme acquisition, consider the acquisition in other languages of the morphemes corresponding to those listed in table 10.12. Would you predict that these morphemes would be acquired in exactly the same order as their English equivalents? Why or why not?

9. Considering children's tendency to overgeneralize morphological rules, what might we expect a young child to use in the place of the following adult words? Justify your choice in each case.
a) fish (plural)
b) went
c) mice
d) ate
e) has
f) geese
g) brought
h) hit (past tense)
i) himself
j) women

10. Each of the following utterances is from the speech of a child in the two-word stage. Identify the semantic relation expressed by each of these utterances.

	Intended meaning	*Child's utterance*
a)	Jimmy is swimming.	Jimmy swim.
b)	Ken's book	Ken book.
c)	Daddy is at his office.	Daddy office.
d)	You push the baby.	Push baby.
e)	Mommy is reading.	Mommy read.

11. Consider the following data from Jordie, a two-and-a-half-year-old child, in light of the list of morphemes in table 10.12.

	Intended meaning	*Jordie's utterance*
a)	Where's my blanket?	Where my blanket?
b)	Does it go right here, Mommy?	Go right here, Mommy?
c)	It's running over.	Running over.
d)	Here, it goes here.	Here, go here.
e)	No, that's mine.	No, that mine.
f)	Dinosaurs say gronk.	Dinosaur say gronk.
g)	There's more.	There more.

i) Which of the morphemes in table 10.12 are missing in Jordie's sentences but present in the equivalent adult utterance?
ii) List the morphemes that are present in both the adult interpretations and in Jordie's speech.

12. Now consider the following utterances from a child named Krista.

Intended meaning	*Krista's utterance*
a) My name is Krista.	Mine name Krista.
b) My sister's name is Peggy.	Sister name Peggy.
c) The tape is right there.	Tape right there.
d) Daddy's book	Daddy book.
e) I've got a book.	I'm got a book.
f) Read me a story.	Read me story.
g) I'll do it.	I'm do it.
h) He went outside.	He went outside.
i) Open the gate, please.	Open a gate, please.
j) Gramma's house.	Gramma's house.
k) Smell the flowers.	Smell flowers.
l) Shoes on.	Shoes on.
m) The wee boy fell down.	Wee boy fell down.
n) That's my ball.	That's mines ball.

i) Which morphemes are missing in Krista's speech, but present in the adult interpretations?
ii) Krista uses the past tense twice in the above utterances. Do you think this is evidence that she has acquired the past tense morpheme? Why or why not?
iii) Comment on Krista's difficulty with possessive pronouns.
iv) Do you think she has acquired possessive -*'s*? Why or why not?

13. The following utterances were produced spontaneously by Holly, age three years.
a) I learned about loving moms.
b) Put him in the bathtub.
c) We eated gummy snakes.
d) Thank you for giving these books us.
e) I don't know.
f) He bited my finger. (When corrected, she said: He bitted my finger.)
g) I runned in the water.
h) I rided on a elephant.

i) Has Holly acquired the past tense morpheme? How do you know?
ii) What is the evidence in Holly's speech that she has learned phrases that consist of a head, a complement, and/or a specifier?
iii) What is the evidence that she has acquired the category noun? the category verb?

14. It has been reported that hearing children growing up in homes with non-speaking deaf parents cannot learn spoken language from radio or even television (see p. 278 of *The Language Instinct* by S. Pinker [New York: Morrow, 1994]).
i) Can you think of any reasons for this?
ii) What are the implications of these findings for our understanding of the type of experience that is required for language acquisition?

To find suggestions for further reading and research on this topic, go to the Companion Website at **www.pearsoncanada.ca/ogrady**, Chapter 10.