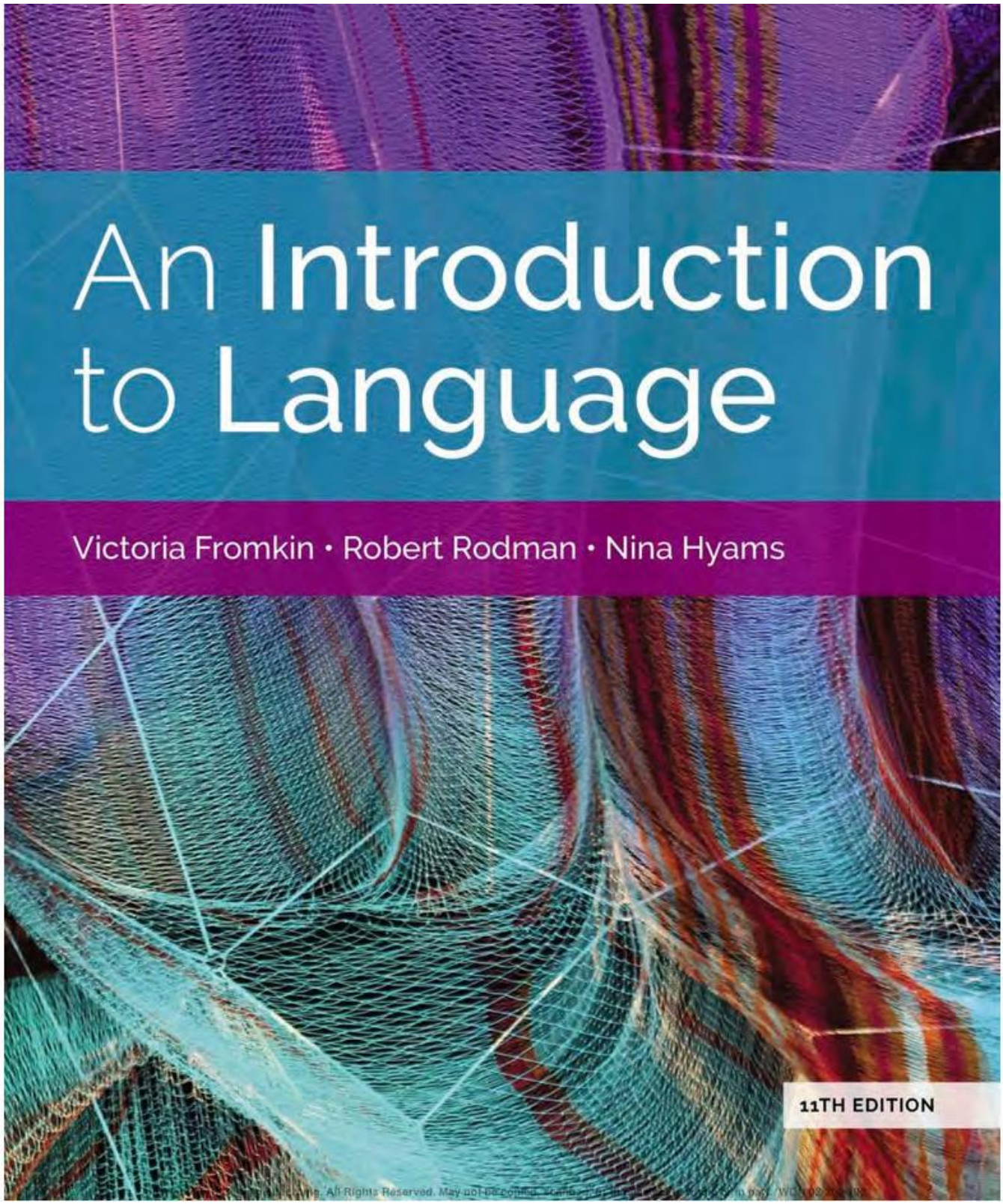

An Introduction to Language 11e

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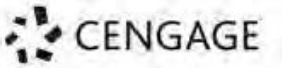

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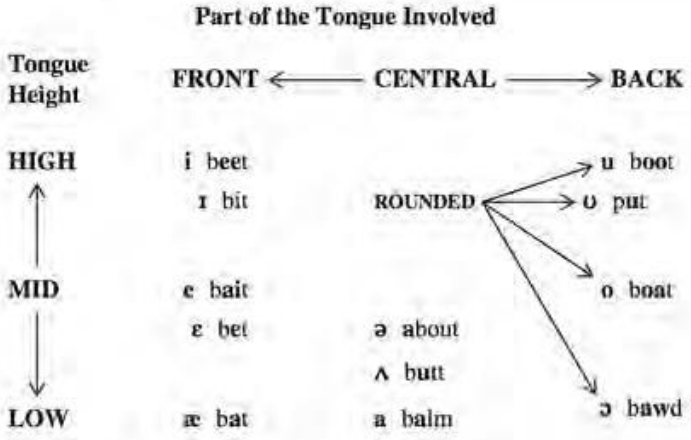
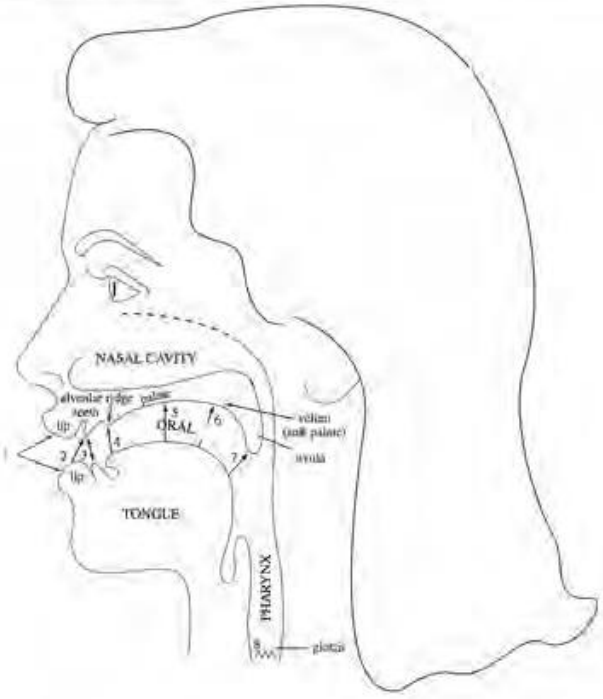
Classification of American English Vowels



A Phonetic Alphabet for English Pronunciation

Consonants						Vowels			
p	pill	t	till	k	kill	i	beet	ɪ	bit
b	bill	d	dill	g	gill	e	bait	ɛ	bet
m	mill	n	nil	ŋ	ring	u	boot	ʊ	foot
f	feel	s	seal	h	heal	o	boat	ɔ	bore
v	veal	z	zeal	l	leaf	æ	bat	a	pot/bar
θ	thigh	ʃ	chill	r	reef	ʌ	butt	ə	sofa
ð	thy	ʤ	gin	j	you	aɪ	bite	aʊ	bout
ʃ	shill	ʍ	which	w	witch	ɔɪ	boy		
ʒ	measure								

The Vocal Tract. Places of articulation: 1. bilabial; 2. labiodental; 3. interdental; 4. alveolar; 5. (alveo)palatal; 6. velar; 7. uvular; 8. glottal.



Some Phonetic Symbols for American English Consonants

	Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar	Glottal
Stop (oral)							
voiceless	p			t		k	ʔ
voiced	b			d		g	
Nasal (voiced)	m			n		ŋ	
Fricative							
voiceless		f	θ	s	ʃ		h
voiced		v	ð	z	ʒ		
Affricate							
voiceless					ʧ		
voiced					ʤ		
Glide							
voiceless	ʍ					ʍ	
voiced	w				j	w	
Liquid (voiced)							
(central)				r			
(lateral)				l			

Contents

1

What Is Language?

> When we study human language, we are approaching what some might call the "human essence," the distinctive qualities of mind that are, so far as we know, unique to man.
>
> NOAM CHOMSKY, *Language and Mind*, 1968

Whatever else people do when they come together—whether they play, fight, make love, or make automobiles—they talk. We live in a world of language. We talk to friends, associates, wives and husbands, lovers, teachers, parents, rivals, and even enemies. We talk face-to-face and over all manner of electronic media, and everyone responds with more talk. Hardly a moment of our waking lives is free from words, and even our dreams are filled with talk. We also talk when there is no one to answer. Some of us talk aloud in our sleep. We talk to our pets and sometimes to ourselves.

The capacity for language, perhaps more than any other attribute, distinguishes humans from other animals. According to the philosophy expressed in many myths and religions, language is the source of human life and power. To some people of Africa, a newborn child is a *kintu*, a "thing," not yet a *muntu*, a "person." It is only by the act of learning language that the child becomes a human being. To understand our humanity, we must understand the nature of language that makes us human. That is the goal of this book. We begin with a simple question: What does it mean to "know" a language?

Linguistic Knowledge

> Do we know only what we see, or do we see what we somehow already know?
>
> CYNTHIA OZICK, "What Helen Keller Saw," *New Yorker*, June 16 & 23, 2003

When you know a language, you can speak and be understood by others who also know that language. This means you are able to produce strings of sounds that signify certain meanings and to understand or interpret the sounds produced by others. But language is much more than speech. Deaf people produce and understand sign languages just as hearing persons produce and understand spoken languages. The languages of the deaf communities throughout the world are equivalent to spoken languages, differing only in their modality of expression.

Most everyone knows at least one language. Five-year-old children are nearly as proficient at speaking and understanding as their parents. Yet, the ability to carry out the simplest conversation requires profound knowledge that most speakers are unaware of. This is true for speakers of all languages, from Albanian to Zulu. A speaker of English can produce a sentence having two relative clauses without knowing what a relative clause is. For example:

> My goddaughter who was born in Sweden and who now lives in Iowa is named Disa, after a Viking queen.

In a parallel fashion, a child can walk without understanding or being able to explain the principles of balance and support or the neurophysiological control mechanisms that permit one to do so. The fact that we may know something unconsciously is not unique to language.

Knowledge of the Sound System

> When I speak it is in order to be heard.
>
> ROMAN JAKOBSON

Part of knowing a language means knowing what sounds (or signs[1]) are in that language and what sounds are not. One way this unconscious knowledge is revealed is by the way speakers of one language pronounce words from another language. If you speak only English, for example, you may substitute an English sound for a non-English sound when pronouncing "foreign" words such as French *ménage à trois*. If you pronounce it as the French do, you are using sounds outside the English sound system.

French people speaking English often pronounce words such as *this* and *that* as if they were spelled *zis* and *zat*. The English sound represented by the initial letters *th* in these words is not part of the French sound system, and the mispronunciation reveals the French speaker's unconscious knowledge of this fact.

[1]The sign languages of the deaf will be discussed throughout the book. A reference to "language," then, unless speech sounds or spoken languages are specifically mentioned, includes both spoken and signed languages.

Knowing the sound system of a language includes more than knowing the inventory of sounds. It means also knowing which sounds may start a word, end a word, and follow each other. The name of a former president of Ghana was *Nkrumah*, pronounced with an initial sound like the sound ending the English word *sink*. While this is an English sound, no word in English begins with the *nk* sound. Speakers of English who have occasion to pronounce this name often mispronounce it (by Ghanaian standards) by inserting a short vowel sound, like *Nekrumah* or *Enkrumah*, making the word correspond to the English system. Children develop the sound patterns of their language very rapidly. A one-year-old learning English already knows that *nk* cannot begin a word, just as a Ghanaian child of the same age knows that it can in his language. We will learn more about sounds and sound systems in Chapters 5 and 6.

Knowledge of Words

Sounds and sound patterns of our language constitute only one part of our linguistic knowledge. Beyond that we know that certain sequences of sounds signify certain concepts or **meanings**. Speakers of English understand what *boy* means, and that it means something different from *toy* or *girl* or *pterodactyl*. We also know that *toy* and *boy* are words, but *moy* is not. When you know a language, you know words in that language; that is, you know which sequences of sounds have specific meanings and which do not.

Arbitrary Relation of Form and Meaning

> What's in a name? That which we call a rose
>
> By any other name would smell as sweet;
>
> WILLIAM SHAKESPEARE, *Romeo and Juliet*, Act II, Scene II

If you do not know a language, the words (and sentences) of that language will be mainly incomprehensible, because the relationship between speech sounds and the meanings they represent is, for the most part, an **arbitrary** one. When you are acquiring a language, you have to learn that the sounds represented by the letters *house* signify the concept  ; if you know French, this same meaning is represented by *maison*; if you know Russian, by *dom*; if you know Spanish, by *casa*. Similarly,  is represented by *hand* in English, *main* in French, *nsa* in Twi, and *ruka* in Russian. The same sequence of sounds can represent different meanings in different languages. The word *bolna* means "speak" in Hindi–Urdu and "aching" in Russian; *bis* means "devil" in Ukrainian and "twice" in Latin; a *pet* is a domestic animal in English and a fart in Catalan; and the sequence of sounds *taka* means "hawk" in Japanese, "fist" in Quechua, "a small bird" in Zulu, and "money" in Bengali.

These examples show that the words of a particular language have the meanings they do only by convention. Despite a penchant that biologists have for Greek roots, a pterodactyl could have been called *ron*, *blick*, or *kerplunkity*.

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This **conventional** and arbitrary relationship between the **form** (sounds) and **meaning** (concept) of a word is also true in sign languages. If you see someone using a sign language you do not know, it is doubtful that you will understand the message from the signs alone. A person who knows Chinese Sign Language (CSL) would find it difficult to understand American Sign Language (ASL), and vice versa.

Many signs were originally like miming, where the relationship between form and meaning is not arbitrary. Bringing the hand to the mouth to mean "eating," as in miming, would be nonarbitrary as a sign. Over time these signs may change, just as the pronunciation of words changes, and the miming effect is lost. These signs become conventional, so that the shape or movement of the hands alone does not reveal the meaning of the signs.

There is some **sound symbolism** in language—that is, words whose pronunciation suggests their meanings. Most languages contain **onomatopoeic** words like *buzz* or *murmur* that imitate the sounds associated with the objects or actions they refer to. But even here, the sounds differ from language to language and reflect the particular sound system of the language. In English *cock-a-doodle-doo* is an onomatopoeic word whose meaning is the crow of a rooster, whereas in Finnish the rooster's crow is *kukkokiekuu*. Forget *gobble gobble* when you're in Istanbul; a turkey in Turkey goes *glu-glu*.

Sometimes particular sound combinations seem to relate to a particular concept. Many English words beginning with *gl* relate to sight, such as *glare, glint, gleam, glitter, glossy, glaze, glance, glimmer, glimpse,* and *glisten*. However, *gl* words

and their like are a very small part of any language, and *gl* may have nothing to do with "sight" in another language, or even in other words in English, such as *gladiator, glucose, glory, glutton,* and *globe.*

To know a language, we must know words of that language. But no speaker knows all the entries in an unabridged dictionary—and even if someone did, he would still not know that language. Imagine trying to learn a foreign language from an online dictionary. However, many words you learned, you would not be able to form nor understand very many phrases. And even if you could manage to get your message across using a few words from a traveler's dictionary, such as "car—gas—where?" the best you could hope for is to be pointed in the direction of a gas station. If you were answered with a sentence, it is doubtful that you would understand what was said or be able to look it up, because you would not know where one word ended and another began. Chapter 3 will discuss how words are put together to form phrases and sentences, and Chapter 4 will explore word and sentence meanings.

The Creativity of Linguistic Knowledge

> All humans are artists, all of us . . . Our greatest masterpiece of art is the use of a language to create an entire virtual reality within our mind.
>
> DON MIGUEL RUIZ, 2012

> ALBERT: So are you saying that you were the best friend of the woman who was married to the man who represented your husband in divorce?
>
> ANDRÉ: In the history of speech, that sentence has never been uttered before.
>
> NEIL SIMON, *The Dinner Party,* 2000

Knowledge of a language enables you to combine sounds to form words, words to form phrases, and phrases to form sentences. No matter how smart your smartphone is, it cannot contain all the sentences of a language because the number is infinite. Knowing a language means being able to produce and understand new sentences never spoken before. This is the **creative aspect** of language. Not every speaker can create great literature, but everybody who knows a language can create and understand novel sentences.

That language is creative and sentences potentially infinite in length and number is shown by the fact that any sentence can be made indefinitely longer. In English, you can say:

This is the house.

or

This is the house that Jack built.

or

This is the malt that lay in the house that Jack built.

or

> This is the dog that worried the cat that killed the rat that ate the malt that lay in the house that Jack built.

The longer these sentences become the less likely we are to hear or say them. A sentence such as "The old, old, old, old, old, old man fell" with half-dozen occurrences of *old* would be highly unusual in either speech or writing, even to describe Methuselah. But such a sentence is theoretically possible. If you know English, you have the knowledge to add any number of adjectives to a noun, and any number of clauses to a sentence, as in "the house that Jack built."

All human languages permit their speakers to increase the length and complexity of sentences in these ways; creativity is a universal property of human language.

Our creative ability is reflected not only in what we say, but also in our understanding of new or novel sentences. Consider the following sentence: "Daniel Boone decided to become a pioneer because he dreamed of pigeon-toed giraffes and cross-eyed elephants dancing in pink skirts and green berets on the wind-swept plains of the Midwest." You may not believe the sentence; you may question its logic; but you can understand it, although you probably never heard or read it before now.

In pointing out the creative aspect of language, Noam Chomsky, who many regard as the father of modern linguistics, argued persuasively against the view that language is a set of learned responses to stimuli. It's true that if someone steps on your toes, you may automatically respond with a scream or a grunt, but these sounds are not part of language. They are involuntary reactions to stimuli. After we reflexively cry out, we can then go on to say: "Thank you very much for stepping on my toe, because I was afraid I had elephantiasis and now that I can feel the pain I know I don't," or any one of an infinite number of sentences, because the particular sentences we produce are not controlled by any stimulus.

Even some involuntary cries such as "ouch" change according to the language we speak. Step on an Italian's toes and he will cry "ahi." French speakers often fill their pauses with the vowel sound that starts their word for "egg"—*oeu(f)*—a sound that does not occur in English. Even conversational fillers such as *er, uh,* and *you know* in English are constrained by the language in which they occur.

The fact of human linguistic creativity was well expressed more than 400 years ago by Huarte de San Juan (1530–1592): "Normal human minds are such that . . . without the help of anybody, they will produce 1,000 (sentences) they never heard spoke of . . . inventing and saying such things as they never heard from their masters, nor any mouth."

Knowledge of Sentences and Nonsentences

> A person who knows a language has mastered a system of rules that assigns sound and meaning in a definite way for an infinite class of possible sentences.
>
> NOAM CHOMSKY, *Language and Mind*, 1968

Our knowledge of language not only allows us to produce and understand an infinite number of well-formed (even if silly and illogical) sentences. It also permits us to distinguish well-formed (grammatical) from ill-formed (ungrammatical) sentences. This is further evidence of our linguistic creativity because ungrammatical sentences are typically novel, not sentences we have previously heard or produced, precisely because they are ungrammatical!

Consider the following sentences:

a. John kissed the little old lady who owned the shaggy dog.
b. Who owned the shaggy dog John kissed the little old lady.
c. John is difficult to love.
d. It is difficult to love John.
e. John is anxious to go.
f. It is anxious to go John.
g. John, who was a student, flunked his exams.
h. Exams his flunked student a was who John.

If you were asked to put an asterisk or star before the examples that seemed ill formed or ungrammatical or "not good" to you, which ones would you mark? Our intuitive knowledge about what is or is not an allowable sentence in English convinces us to star *b, f,* and h. Which ones did you star?

Would you agree with the following judgments?

a. What he did was climb a tree.
b. *What he thought was want a sports car.[2]
c. Drink your beer and go home!
d. *What are drinking and go home?
e. I expect them to arrive a week from next Thursday.
f. *I expect a week from next Thursday to arrive them.
g. Linus lost his security blanket.
h. *Lost Linus security blanket his.

If you find the starred sentences unacceptable, as we do, you see your linguistic creativity at work.

These sentences also illustrate that not every string of words constitutes a well-formed sentence in a language. Sentences are not formed simply by placing one word after another in any order, but by organizing the words according to the rules of sentence formation of the language. These rules are finite in length and finite in number so that they can be stored in our finite brains. Yet, they permit us to form and understand an infinite set of new sentences. They also enable us to judge whether a sequence of words is a well-formed sentence of our language or not. These rules are not determined by a judge or a legislature, or even taught in a grammar class. They are unconscious rules that we acquire as young children as we develop language and they are responsible for our linguistic creativity. Linguists refer to this set of rules as the **grammar** of the language.

[2]The asterisk is used before examples that speakers find ungrammatical. This notation will be used throughout the book.

Returning to the question we posed at the beginning of this chapter—what does it mean to know a language? It means knowing the sounds and meanings of many, if not all, of the words of the language, and the rules for their combination—the grammar, which accounts for infinitely many possible sentences. We will have more to say about these rules of grammar in later chapters.

Linguistic Knowledge and Performance

> "What's one and one and one and one and one and one and one and one and one and one?" "I don't know," said Alice. "I lost count." "She can't do Addition," the Red Queen interrupted.
>
> LEWIS CARROLL, *Through the Looking-Glass*, 1871

Speakers of all languages have the knowledge to understand or produce sentences of any length. Here is an example from the ruling of a federal judge:

> We invalidate the challenged lifetime ban because we hold as a matter of federal constitutional law that a state initiative measure cannot impose a severe limitation on the people's fundamental rights when the issue of whether to impose such a limitation on these rights is put to the voters in a measure that is ambiguous on its face and that fails to mention in its text, the proponent's ballot argument, or the state's official description, the severe limitation to be imposed.

Theoretically, there is no limit to the length of a sentence, but in practice very long sentences are unlikely, the verbose federal judge's ruling notwithstanding. Evidently, there is a difference between having the knowledge required to produce or understand sentences of a language and applying this knowledge. It is a difference between our knowledge of words and grammar, which is our **linguistic competence**, and how we use this knowledge in actual speech production and comprehension, which is our **linguistic performance**.

Our linguistic knowledge permits us to form longer and longer sentences by joining sentences and phrases together or adding modifiers to a noun. However, there are physiological and psychological reasons that limit the number of adjectives, adverbs, clauses, and so on that we actually produce and understand. Speakers may run out of breath, lose track of what they have said, or die of old age before they are finished. Listeners may become tired, bored, disgusted, or confused, like poor Alice when being interrogated by the Red Queen.

When we speak we usually wish to convey some message. At some stage in the act of producing speech, we must organize our thoughts into strings of words. Sometimes the message is garbled. We may stammer, or pause, or produce **slips of the tongue** such as saying *preach seduction* when *speech production* is meant (discussed in Chapter 10).

What Is Grammar?

We use the term "grammar" with a systematic ambiguity. On the one hand, the term refers to the explicit theory constructed by the linguist and proposed as a description of the speaker's competence. On the other hand, it refers to this competence itself.

NOAM CHOMSKY AND MORRIS HALLE, *The Sound Pattern of English*, 1968

Descriptive Grammars

There are no primitive languages. The great and abstract ideas of Christianity can be discussed even by the wretched Greenlanders.

JOHANN PETER SUESSMILCH, in a paper delivered before the Prussian Academy, 1756

The way we are using the word *grammar* differs from most common usages. In our sense, the grammar is the knowledge speakers have about the units and rules of their language—rules for combining sounds into words (called *phonology*), rules of word formation (called *morphology*), rules for combining words into phrases and phrases into sentences (called *syntax*), as well as rules for assigning meaning (called *semantics*). The grammar, together with a mental dictionary (called a *lexicon*) that lists the words of the language, represents our linguistic competence. To understand the nature of language, we must understand the nature of grammar.

Every human being who speaks a language knows its grammar. When linguists wish to describe a language, they make explicit the rules of the grammar that exist in the minds of the speakers of the language. There will be some differences among speakers, but there must be shared knowledge too. The shared knowledge—the common parts of the grammar—makes it possible to communicate through language. To the extent that the linguist's description is a true model of a speaker's linguistic capacity, it is a successful description of the grammar and of the language itself. Such a model is called a **descriptive grammar**. It does not tell you how you *should* speak; it tells you how you *do* speak. It explains how it is possible for you to speak and understand and make judgments about well-formedness, and it describes what you know about the sounds, words, phrases, and sentences of your language.

When we say that a sentence is **grammatical**, we mean that it conforms to the rules of the mental grammar (as described by the linguist); when we say that it is **ungrammatical**, we mean it deviates from the rules in some way. If, however, we posit a rule for English that does not agree with your intuitions as a speaker, then the grammar we are describing differs in some way from the mental grammar that represents your linguistic competence; that is, your language is not the one described. That's okay. No language or variety of a language (called a *dialect*) is superior or inferior to any other in a linguistic sense. Every grammar is equally complex, logical, and capable of producing an infinite set of sentences to express any thought. (We will have more to say about dialects in Chapter 7.)

Prescriptive Grammars

> It is certainly the business of a grammarian to find out, and not to make, the laws of a language.
>
> JOHN FELL, *Essay towards an English Grammar*, 1784

> Just read the sentence aloud, Amanda, and listen to how it sounds. If the sentence sounds OK, go with it. If not, rearrange the pieces. Then throw out the rule books and go to bed.
>
> JAMES KILPATRICK, "Writer's Art" (syndicated newspaper column), 1998

> Any fool can make a rule
>
> And every fool will mind it
>
> HENRY DAVID THOREAU, journal entry, 1860

Not all grammarians, past or present, share the view that all grammars are equal. Language "purists" of all ages believe that some versions of a language are better than others, that there are certain "correct" forms that all educated people should use in speaking and writing, and that language change is corruption. The Greek Alexandrians in the first century, the Arabic scholars at Basra in the eighth century, and numerous English grammarians of the eighteenth and nineteenth centuries held this view. They wished to *prescribe* rather than *describe* the rules of grammar, which gave rise to the writing of **prescriptive grammars**.

In the Renaissance, a new middle class emerged who wanted their children to speak the dialect of the "upper" classes. This desire led to the publication of many prescriptive grammars. In 1762, Bishop Robert Lowth wrote *A Short Introduction to English Grammar with Critical Notes*. Lowth prescribed a number of new rules for English, many of them influenced by his personal taste. Before the publication of his grammar, practically everyone—upper-class, middle-class, and lower-class—said *I don't have none* and *You was wrong about that*. Lowth, however, decided that "two negatives make a positive" and therefore one should say *I don't have any*; and that even when *you* is singular it should be followed by the plural *were*. Many of these prescriptive rules were based on Latin grammar and made little sense for English. Because Lowth was influential and because the rising new class wanted to speak "properly," many of these new rules were legislated into English grammar, at least for the **prestige dialect**—that variety of the language spoken by people in positions of power.

The view that using double negatives in a sentence is a sign of inferiority cannot be justified unless you want to lose an argument with your French or Italian teacher. In both of those languages double negatives are "good grammar":

French:	Je	ne	veux	parler	avec	personne.
	I	not	want	speak	with	no-one.

Italian:	Non	voglio	parlare	con	nessuno.
	not	I-want	speak	with	no-one.

English translation: "I don't want to speak with anyone."

Prescriptive grammars such as Lowth's are different from the descriptive grammars that linguists develop. Their goal is not to describe the rules people know, but to tell them what rules they should follow. The great British Prime Minister Winston Churchill is credited with this response to the "rule" against ending a sentence with a preposition: "This is the sort of nonsense up with which I will not put."

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Even today language purists write books and blogs attempting to "save the English language." For example, they criticize the use of *enormity* to mean "enormous" instead of "monstrously evil", its original meaning. But languages change in the course of time and words change meaning. Language change is a natural process, as we discuss in Chapter 8. Over time *enormity* has been used increasingly used to mean "enormous," and now that former U.S. President Barack Obama has used it that way (in his victory speech of November 4, 2008), and that British author J. K. Rowling uses it similarly in the immensely popular *Harry Potter and the Deathly Hallows*, that usage will gain acceptance.

Still, the "saviors" of the English language will never disappear. They will continue to blame TV, the Internet, and especially texting for corrupting the English language, and are likely to continue to dis (oops, we mean disparage) anyone who suggests that African American English (AAE)[3] and other dialects are viable, complete languages.

All human languages and dialects are fully expressive, complete, and logical, as much as they were two hundred or two thousand years ago. Hopefully (another frowned-upon usage), this book will convince you that all languages and dialects are rule-governed, whether spoken by rich or poor, powerful or weak, learned or illiterate. Grammars and usages of particular groups in society may be dominant for social and political reasons, but from a linguistic (scientific) perspective they are neither superior nor inferior to the grammars and usages of less prestigious members of society.

[3]AAE is also called African American Vernacular English (AAVE), Ebonics, and Black English (BE). It is spoken by some (but by no means all) African Americans. It is discussed in Chapter 7.

Having said all this, it is undeniable that the **standard** dialect (defined in Chapter 7) may indeed be a better dialect for someone wishing to obtain a particular job or achieve a position of social prestige. In a society where "linguistic profiling" is used to discriminate against speakers of a minority dialect, it may behoove those speakers to learn the prestige dialect rather than wait for social change. But linguistically, prestige and standard dialects do not have superior grammars.

Finally, all of the preceding remarks apply to *spoken* language. Writing is another story. Writing follows certain prescriptive rules of grammar, usage, and style that the spoken language does not. Moreover, and importantly, writing must be taught and is not acquired naturally through simple exposure to the spoken language (see Chapter 9).

Teaching Grammars

> I don't want to talk grammar. I want to talk like a lady.
>
> G. B. SHAW, *Pygmalion*, 1912

The descriptive grammar of a language attempts to describe the rules internalized by a speaker of that language. It is different from a **teaching grammar**, which is used to learn another language or dialect. Teaching grammars can be helpful to people who do not speak the standard or prestige dialect, but find it would be advantageous socially and economically to do so. They are used in schools in foreign language classes. This kind of grammar gives the words and their pronunciations, and explicitly states the rules of the language, especially where they differ from the language of instruction.

It is often difficult for adults to learn a second language without formal instruction even when they have lived for an extended period in a country where the language is spoken. (Second language acquisition is discussed in more detail in Chapter 9.) Teaching grammars assume that the student already knows one language and compares the grammar of the target language with the grammar of the native language. The meaning of a word is provided by a **gloss**—the parallel word in the student's native language, such as *maison*, "house" in French. It is assumed that the student knows the meaning of the gloss "house" and so also the meaning of the word *maison*.

Sounds of the target language that do not occur in the native language are often described by reference to known sounds. Thus, the student might be aided in producing the French sound *u* in the word *tu* by instructions such as "Round your lips while producing the vowel sound in *tea*."

The rules about how to put words together to form grammatical sentences may also make reference to the learner's knowledge of his native language. For example, the teaching grammar *Learn Zulu* by Sibusiso Nyembezi states that "The difference between singular and plural is not at the end of the word but at the beginning of it," and warns that "Zulu does not have the indefinite and definite articles 'a' and 'the.'" Such statements assume students know the rules of their own grammar, in this case English. Although such grammars might be

considered prescriptive in the sense that they attempt to teach the student what is or is not a grammatical construction in the new language, their aim is different from grammars that attempt to change the rules or usage of a language that is already known by the speaker.

This book is not primarily concerned with either prescriptive or teaching grammars. However, these kinds of grammars are considered in Chapter 7 in the discussion of standard and nonstandard dialects.

Universal Grammar

> In a grammar there are parts that pertain to all languages; these components form what is called the general grammar. In addition to these general (universal) parts, there are those that belong only to one particular language; and these constitute the particular grammars of each language.
>
> CÉSAR CHESNEAU DU MARSAIS, c. 1750

There are rules of particular languages such as English or Arabic or Zulu that form part of the individual grammars of these languages, and then there are rules that hold in all languages. The universal rules are of particular interest because they give us a window into the human "faculty of language," which enables us to learn and use any particular language.

Interest in language universals has a long history. Early scholars encouraged research into the nature of language in general and promoted the idea of *general grammar* as distinct from *special grammar*. General grammar was to reveal those features common to all languages.

Students trying to learn Latin, Greek, French, or Swahili as a second language are generally so focused on learning aspects of the new language that differ from their native language that they may overlook the universal laws of language. Yet, there is much that all language learners know unconsciously even before they begin to learn a new language. They know that a language has its own set of sounds, perhaps thought of as its alphabet, that combine according to certain patterns to form words, and that the words themselves recombine to form phrases and sentences. Learners will expect to find verbs and nouns—as these are universal grammatical categories; they will know that the language—like all languages—has a way of negating, forming questions, issuing commands, referring to past or future time, and more generally, has a system of rules that will allow them to produce and understand an infinite number of sentences.

The more linguists explore the intricacies of human language, the more evidence we find to support Chomsky's view that there is a **Universal Grammar (UG)** that is part of the biologically endowed human language faculty. We can think of UG as the blueprint that all languages follow that forms part of the child's innate capacity for language learning. It specifies the different components of the grammar and their relations, how the different rules of these components are constructed, how they interact, and so on. A major aim of **linguistic theory** is to discover the nature of UG.

The linguist's goal is to reveal the "laws of human language," as the physicist's goal is to reveal the "laws of the physical universe." The complexity of language undoubtedly means this goal will never be fully achieved. All scientific theories are incomplete, and new hypotheses must be proposed to account for new data. Theories are continually changing as new discoveries are made. Just as physics was enlarged by Einstein's theories of relativity, so grows the linguistic theory of UG as new discoveries shed new light on the nature of human language. The comparative study of many different languages is of central importance to this enterprise.

The Development of Grammar in the Child

> How comes it that human beings, whose contacts with the world are brief and personal and limited, are nevertheless able to know as much as they do know?
>
> BERTRAND RUSSELL, *Human Knowledge: Its Scope and Limits*, 1948

Linguistic theory is concerned not only with describing the knowledge that adult speakers have of their language, but also with explaining how this knowledge is acquired.

All typically developing children acquire (at least one) language in a relatively short period with apparent ease. They do this despite the fact that parents and other caregivers do not provide them with any specific language instruction. Indeed, it is often remarked that children seem to "pick up" language just from hearing it spoken around them. Children are language-learning virtuosos—whether a child is male or female, from a rich family or a disadvantaged one, grows up on a farm or in the city, attends day care or has home care, none of these factors fundamentally affects the way language develops. Children can acquire any language they are exposed to with comparable ease—English, Dutch, French, Swahili, Japanese—and even though each of these languages has its own peculiar characteristics, children learn them all in very much the same way. For example, all children go through a babbling stage; their babbles gradually give way to words, which then combine to form simple sentences, and then sentences of ever-increasing complexity. The same four-year-old child who may be unable to tie her shoes or even count to five has managed to master the complex grammatical structures of her language and acquire a substantial lexicon.

How children accomplish this remarkable cognitive feat is a topic of intense interest to linguists. The child's inexorable path to adult linguistic competence and the uniformity of the acquisition process point to a substantial innate component to language development, what we referred to earlier as Universal Grammar. Children acquire language as quickly and effortlessly as they do because they do not have to figure out all the grammatical rules, only those that are specific to their particular language. The universal properties—the laws of language—are part of their biological endowment. In Chapter 9, we will discuss language acquisition in more detail.

Sign Languages: Evidence for Language Universals

> It is not the want of organs that [prevents animals from making] . . . known their thoughts . . . for it is evident that magpies and parrots are able to utter words just like ourselves, and yet they cannot speak as we do, that is, so as to give evidence that they think of what they say. On the other hand, men who, being born deaf and mute . . . are destitute of the organs which serve the others for talking, are in the habit of themselves inventing certain signs by which they make themselves understood.
>
> RENÉ DESCARTES, *Discourse on Method*, 1637

The sign languages of deaf communities provide some of the best evidence to support the view that all languages are governed by the same universal principles. Current research on sign languages has been crucial to understanding the biological underpinnings of human language acquisition and use.

The major language of the deaf community in the United States is **American Sign Language (ASL)**. ASL is an outgrowth of the sign language used in France and brought to the United States in 1817 by the great educator Thomas Hopkins Gallaudet.

ASL and other sign languages do not use sounds to express meanings. Instead, they are visual-gestural systems that use hand, body, and facial gestures as the forms used to represent words and grammatical rules. Sign languages are fully developed languages, and signers create and comprehend unlimited numbers of new sentences, just as speakers of spoken languages do. Signed languages have their own grammatical rules and a mental lexicon of signs, all encoded through a system of gestures, and are otherwise equivalent to spoken languages. Signers are affected by performance factors just as speakers are; slips of the hand occur similar to slips of the tongue. Finger fumblers amuse signers just as tongue twisters amuse speakers. These and other language games play on properties of the "sound" systems of the spoken and signed languages.

Deaf children who are exposed to signed languages acquire them just as hearing children acquire spoken languages, going through the same linguistic stages, including the babbling stage. Deaf children babble with their hands, just as hearing children babble with their vocal tracts. Neurological studies show that signed languages are organized in the brain in the same way as spoken languages, despite their visual modality. We discuss the brain basis of language in Chapter 10.

In short, signed languages resemble spoken languages in all major aspects. This universality is expected because, regardless of the modality in which it is expressed, language is based in human biology. Our knowledge, use and acquisition of language are not dependent on the ability to produce and hear sounds, but on a far more abstract cognitive capacity.

What Is Not (Human) Language

> It is a very remarkable fact that there are none so depraved and stupid, without even excepting idiots, that they cannot arrange different words together, forming of them a statement by which they make known their thoughts; while, on the other hand, there is no other animal, however perfect and fortunately circumstanced it may be, which can do the same.
>
> RENÉ DESCARTES, *Discourse on Method and Meditation on First Philosophy*

Patrick McDonnell/King Features Syndicate

All languages share certain fundamental properties, and children naturally acquire these languages because human beings are designed for human language. But what of the "languages" of other species: Are they like human languages? Can other species be taught a human language?

The Birds and the Bees

Most animal species possess some kind of communication system. Humans also communicate through systems other than language such as head nodding or facial expressions. The question is whether the communication systems used by other species are at all like human language with its very specific properties, most notably its creative aspect.

Many species have a non vocal system of communication. Among certain species of spiders there is a complex system for courtship. Before approaching his ladylove, the male spider goes through an elaborate series of gestures to tell her that he is indeed a spider and a suitable mate, and not a crumb or a fly to be eaten. These gestures are invariant. One never finds a creative spider changing or adding to the courtship ritual of his species.

A similar kind of gestural language is found among the fiddler crabs. There are forty species, and each uses its own claw-waving movement to signal to another member of its "clan." The timing, movement, and posture of the body never change from one time to another or from one crab to another within the particular variety. Whatever the signal means, it is fixed. Only one meaning can be conveyed.

An essential property of human language not shared by the communication systems of spiders, crabs, and other animals is its **discreteness**. Human languages are not simply made up of a fixed set of invariant signs. They are composed of discrete units—sounds, words, phrases—that are combined according to the rules of the grammar of the language. The word *top* in English has a particular meaning, but it also has individual parts that can be rearranged to produce other meaningful sequences—*pot* or *opt*. Similarly, the phrase *the cat on the mat* means something different from *the mat on the cat*. We can arrange and rearrange the units of our language to form an infinite number of expressions. The creativity of human language depends on discreteness.

In contrast to crabs and spiders, birds communicate vocally and bird-songs have always captured the human imagination. Musicians and composers have been moved by these melodies, sometimes imitating them in their compositions, other times incorporating birdsongs directly into the music. Birdsongs have also inspired poets as in Percy Bysshe Shelley's *To a Skylark*:

Teach me half the gladness
That thy brain must know;
Such harmonious madness
From my lips would flow,
The world should listen then, as I am listening now.

Birds do not sing for our pleasure, however. Their songs and calls communicate important information to other members of the species and sometimes to other animals. **Birdcalls** (consisting of one or more short notes) convey danger, feeding, nesting, flocking, and so on. **Bird songs** (more complex patterns of notes) are used to stake out territory and to attract mates. Like the messages of crabs and spiders, however, there is no evidence of any internal structure to these songs; they cannot be segmented into discrete meaningful parts and rearranged to encode different messages as can the words, phrases, and sentences of human language.

In his territorial song, the European robin alternates between high-pitched and low-pitched notes to indicate how strongly he feels about defending his territory. The different alternations indicate intensity and nothing more. The robin is creative in his ability to sing the same song in different ways, but not creative in his ability to use the same units of the system to express different messages with different meanings. Recently, scientists have observed that finches will react when the units of a familiar song are rearranged. It is unclear, however, whether the birds recognize a violation of the rules of the song or are just responding to a pattern change.

Though crucial to the birds' survival, the messages conveyed by these songs and calls are limited, relating only to a bird's immediate environment and needs. Human language is different of course. Our words and sentences are not simply responses to internal and external stimuli. If you're tired you may yawn, but you may also say "I'm tired," or "I'm going to bed," or "I'm going to Starbucks for a double espresso." Notably, you also have the right to remain silent, or talk about things completely unrelated to your physical state—the weather, Facebook, your plans for the weekend, or most interesting of all, your linguistics class.

Linguists call this property of human language **displacement**: the capacity to talk (or sign) messages that are unrelated to here and now. Displacement and discreteness are two fundamental properties that distinguish human language from the communication systems of birds and other animals.

One respect in which birdsongs do resemble human languages is in their development. In many bird species, the full adult version of the birdsong is acquired in several stages, as it is for children acquiring language. The young bird sings a simplified version of the song shortly after hatching and then learns the more detailed, complex version by hearing adults sing. However, he must hear the adult song during a specific fixed period after birth—the period differs from species to species; otherwise song acquisition does not occur. For example, the chaffinch is unable to learn the more detailed song elements after ten months of age. A baby nightingale in captivity may be trained to sing melodiously by another nightingale, a "teaching bird," but only before its tail feathers are grown. These birds show a **critical period** for acquiring their "language" similar to the critical period for human language acquisition, which we will discuss in Chapters 9 and 10. As with human language acquisition, the development of the birdsongs of these species involves an interaction of both learned and innate structure.

An interesting consequence of the fact that some birdsongs are partially learned means that variation can develop. There can be "regional dialects" within the same species, and as with humans, these dialects are transmitted from parents to offspring. Researchers have noted, in fact, that dialect differences may be better preserved in songbirds than in humans because there is no homogenization of regional accents due to radio or TV. We will discuss human language dialects in Chapter 7.

Honeybees have a particularly interesting signaling system. When a forager bee returns to the hive she communicates to other bees where a source of food is located by performing a dance on a wall of the hive that reveals the location and quality of the food source. For one species of Italian honeybee, the dancing may assume one of three possible patterns: *round* (which indicates locations near the hive, within 20 feet or so); *sickle* (which indicates locations at 20 to 60 feet from the hive); and *tail-wagging* (for distances that exceed 60 feet). The number of repetitions per minute of the basic pattern in the tail-wagging dance indicates the precise distance: the slower the repetition rate, the longer the distance. The number of repetitions and the intensity with which the bee dances the round dance indicates the richness of the food source: the more repetitions and the livelier the bee dance the more food to be gotten.

Bee dances are discrete in some sense, consisting of separate parts, and in principle they can communicate infinitely many different messages, like human language; but unlike human language the topic is always the same, namely food. They lack the displacement property. As experiments have shown, when a bee is forced to walk to a food source rather than fly, she will communicate a distance many times farther away than the food source actually is. The bee has no way of communicating the special circumstances of its trip. This absence of creativity makes the bee's dance qualitatively different from human language.

As we will discuss in Chapter 10, the human language ability is rooted in the human brain. Just like human language, the communication system of each species is determined by its biology. This raises the interesting question of whether it is possible for one species to acquire the language of another; more specifically, can animals learn human language?

Can Animals Learn Human Language?

> It is a great baboon, but so much like man in most things . . . I do believe it already understands much English; and I am of the mind it might be taught to speak or make signs.
>
> ENTRY IN SAMUEL PEPYS'S DIARY, 1661

The idea of talking animals is as old and as widespread among human societies as language itself. All cultures have legends in which some animal speaks. All over West Africa, children listen to folktales in which a "spider-man" is the hero. "Coyote" is a favorite figure in many Native American tales, and many an animal takes the stage in Aesop's famous fables. Bugs Bunny, Mickey Mouse, and Donald Duck are icons of American culture. The fictional Doctor Doolittle communicated with all manner of animals, from giant snails to tiny sparrows, as did Saint Francis of Assisi.

In reality, various species show abilities that seem to mimic aspects of human language. Talking birds such as parrots and mynahs can be taught to faithfully reproduce words and phrases, but this does not mean they have acquired a human language. As the poet William Cowper put it: "Words learned by rote a parrot may rehearse; but talking is not always to converse."

Talking birds do not decompose their imitations into discrete units. *Polly* and *Molly* do not rhyme for a parrot. They are as different as *hello* and *goodbye*. If Polly learns "Polly wants a cracker" and "Polly wants a doughnut" and also learns to say *whiskey* and *bagel*, she will not then spontaneously produce "Polly wants whiskey" or "Polly wants a bagel" or "Polly wants whiskey and a bagel." If she learns *cat* and *cats*, and *dog* and *dogs*, and then learns the word *parrot*, she will not be able to form the plural *parrots*, as children do. Unlike every developing child, a parrot cannot generalize from particular instances and so cannot produce utterances that have not been directly taught. A parrot—even a very chatty one—cannot produce an unlimited set of sentences from a finite set of units. The imitative utterances of talking birds mean nothing to the birds; these utterances have no communicative function. Simply knowing how to produce a sequence of speech sounds is not the same as knowing a language. But what about animals that appear to learn the meanings of words? Do they have human language?

Dogs can easily be taught to respond to commands such as *heel*, *sit*, and *fetch* and even seem to understand object words such as *ball* and *toy*. Indeed, in 2004 German psychologists reported on a Border Collie named Rico who had acquired a 200-word vocabulary (containing both German and English words). When asked to fetch a particular toy from a pile of many toys Rico was correct over 90 percent of the time. When told to fetch a toy whose name he had not

been previously taught, Rico could match the novel name to a new toy among a pile of familiar toys about 70 percent of the time—a rate comparable to that of young children performing a similar novel name task.

More recently, a Border Collie named Chaser who lives in South Carolina is reported to understand the names of 1022 toys! Chaser was taught these names over a three-year period. And like Rico he is able to connect a novel name to a new toy placed in a huge pile of toys whose names he already knows.

Rico and Chaser are clearly very intelligent dogs and their name recognition skills are amazing. It is unlikely, however, that Rico or Chaser (or Spot or Rover) understand the *meanings* of words or have acquired a symbolic system in the way that children do. Rather, they learn to associate a particular sequence of sounds with an object or action. For Chaser and Rico the name "Sponge Bob," for example, might mean something like "fetch Sponge Bob"—what the dog has been taught to do. The young child who has learned the name "Sponge Bob" knows that it refers to a particular toy or TV character independent of any a particular game or context. The philosopher Bertrand Russell summed up the dog rather insightfully, noting that ". . . however eloquently he may bark, he cannot tell you that his parents were honest though poor."

In their natural habitat, chimpanzees, gorillas, and other nonhuman primates communicate with each other through visual, auditory, olfactory, and tactile signals. Many of these signals seem to have meanings associated with the animals' immediate environment or emotional state. They can signal danger and can communicate aggressiveness and subordination. However, the natural sounds and gestures produced by all nonhuman primates are highly stereotyped and limited in the number and kind of messages they convey. Their signals cannot be broken down into discrete units and rearranged to create new meanings. They also lack the property of displacement: Intelligent though they are, these animals have no way of expressing the anger they felt yesterday or the anticipation of tomorrow.

Even though primate communication systems are quite limited, many people have been interested in the question of whether they have the latent capacity to acquire complex linguistic systems similar to human language. Throughout the second half of the twentieth century, there were a number of studies designed to determine whether nonhuman primates could learn human language, including both words (or signs) and the grammatical rules for their combination.

In early experiments, researchers raised chimpanzees in their own homes alongside their children in order to recreate the natural environment in which human children acquire language. The chimps were unable to vocalize words despite the efforts of their caretakers, though they did achieve the ability to understand a number of individual words. Primate vocal tracts do not permit them to pronounce many different sounds, but because of their manual dexterity, sign language was an attractive alternative to test their cognitive linguistic ability.

Starting with a chimpanzee named Washoe, and continuing over the years with a gorilla named Koko and another chimp ironically named Nim Chimpsky (after Noam Chomsky), intense efforts were made to teach them American Sign Language. Though the primates achieved small successes such as the ability to string two signs together, and occasionally showed flashes of creativity, none remotely reached the qualitative linguistic ability of a human child.

Similar results were obtained in attempts to teach primates artificial languages designed to resemble human languages in some respects. Chimpanzees Sarah, Lana, Sherman, Austin, and a male bonobo (or pygmy chimpanzee) named Kanzi, were taught languages whose "words" were plastic chips, or keys on a keyboard, that could be arranged into "sentences." The researchers were particularly interested in the ability of primates to communicate using such abstract symbols.

But these experiments, like previous ones, were subject to scientific scrutiny. Questions arose over what kind of knowledge Sarah and Lana and Kanzi were showing with their symbol manipulations and to what extent their responses were being inadvertently cued by experimenters. Many scientists, including some who were directly involved with these projects, have concluded that the creative ability that is so much a part of human language is not evidenced by the chimps' use of the artificial languages. As often happens in science, the search for the answers to one kind of question leads to answers to other questions. The linguistic experiments with primates have led to many advances in our understanding of primate cognitive ability. Researchers have gone on to investigate other capacities of the chimp mind, such as causality. These studies also underscore how remarkable it is that all human children are able to create new and complex sentences never spoken or heard before within just a few short years, without the benefit of explicit guidance.

Can Computers Learn Human Language?

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> Man is still the most extraordinary computer of all.
>
> JOHN F. KENNEDY (1917–1963)

Computers are prolific. If you are reading this book, there is a high likelihood that you use a computer, be it as large as a desktop or as small as an Apple Watch. You may also be able to speak to your computer and it may speak back. Your computer may take dictation, translate between languages, read an electronic newspaper out loud and give you the definition of *eleemosynary*. These are the trappings of human language, but does your computer, or any computer, have human language competence?

We saw earlier that two key properties of human language are discreteness and displacement. Computer speech has both these properties. Spoken words are assembled from discrete, prestored units of sound; and sentences from a prestored lexicon of words. Moreover, computer speech may refer to the past, present, or future and to its current location or another place.

Unlike talking birds, computers have no trouble generalizing sentences such as "Polly wants a cracker" to "Polly wants some whiskey" or even to "Hedwig likes mice." Forming plurals or past tenses are also easily programmable. A computer could associate one million spoken names of objects to pictures of those objects, putting poor Chaser (and all of us) to shame. As to the lack of creativity among nonhuman primates, computers suffer from no such drawback. Computers have been programed to write poetry, learn new words, and even provide psychological counseling.

Even the best of language-using computers have distinctly nonhuman-language traits. While humans never pronounce the same word twice identically, computers always do. Humans suffer from slips of the tongue, fumbled pronunciations, and convoluted phrasing. Humans often speak in fits and starts, hemming and hawing, inserting filler sounds such as "um" and "you know." Humans repeat words in a sentence such as "I . . . I . . . I don't want to paint uh I mean stain . . . stain my floor, no, I mean the decking." Humans bollix their syntax and realize it after they may have said "The horses away ran from the barn jumped the fence over." Computers never do any of this unless they are purposefully programmed to do so, and even when they are, the "mistakes" sound disingenuous.

Nonetheless, it may be argued that these are issues of linguistic performance. The toughest test of linguistic competence is a version of one first suggested by Alan M. Turing (1912–1954), the British mathematician who is considered the founder of modern computer science. Behind two screens are placed a computer and a human. An interrogator engages both voices behind the screens in conversation. If based on language usage, the interrogator is unable to determine which is the human and which is the computer, then one might argue that the computer has attained human linguistic competence.

No computer has come close to passing this "Turing test," fictional computers and robots to the contrary notwithstanding. Indeed, the test has never been seriously administered. Moreover, if in an unforeseeable future a computer was programmed to pass this test, it would be the ingenuity and linguistic competence of the programmers on display, not the computer nor its software. Despite the intelligence of animals and machines, none has achieved the linguistic competence of any healthy human being.

Language and Thought

> It was intended that when Newspeak had been adopted once and for all and Oldspeak forgotten, a heretical thought—that is, a thought diverging from the principles of IngSoc—should be literally unthinkable, at least so far as thought is dependent on words.
>
> GEORGE ORWELL, appendix to *1984*, 1949

> The limits of my language mean the limits of my world.
>
> LUDWIG WITTGENSTEIN, *Tractatus Logico-Philosophicus*, 1922

Many people are fascinated by the question of how language relates to thought. It is natural to imagine that something as powerful and fundamental to human nature as language would influence how we think about or perceive the world around us. This is clearly reflected in the appendix of George Orwell's masterpiece *1984*, quoted above. Over the years, there have been many claims made regarding the relationship between language and thought. The claim that the structure of a language influences how its speakers perceive the world around them is most closely associated with the linguist Edward Sapir and his student Benjamin Whorf, and is therefore referred to as the **Sapir–Whorf hypothesis**. In 1929 Sapir wrote:

> Human beings do not live in the objective world alone, nor in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society . . . we see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation.[4]

Whorf made even stronger claims:

> The background linguistic system (in other words, the grammar) of each language is not merely the reproducing instrument for voicing ideas but rather is itself the shaper of ideas, the program and guide for the individual's mental activity, for his analysis of impressions, for his synthesis of his mental stock in trade . . . We dissect nature along lines laid down by our native languages.[5]

The strongest form of the Sapir–Whorf hypothesis is called **linguistic determinism** because it holds that the language we speak *determines* how we perceive and think about the world. According to this view, language acts like a filter on reality. One of Whorf's best-known claims in support of linguistic determinism was that the Hopi Indians do not perceive time in the same way as speakers of European languages because the Hopi language does not make the grammatical distinctions of tense that, for example, English does with words and word endings such as *did, will, shall, -s, -ed,* and *-ing*.

A weaker form of the hypothesis is **linguistic relativism**, which says that languages differ in the categories they encode and therefore speakers of different languages think about the world in different ways. For example, languages break up the color spectrum at different points. In Navaho, blue and green are one word. Russian has different words for dark blue *(siniy)* and light blue

[4]Sapir, E. 1929. *Language*. New York: Harcourt, Brace & World, p. 207.

[5]Whorf, B. L., and J. B. Carroll. 1956. *Language, thought, and reality: Selected writings*. Cambridge, MA: MIT Press.

(goluboy), while in English we need to use the additional words *dark* and *light* to express the difference. The American Indian language Zuni does not distinguish between the colors yellow and orange.

Languages also differ in how they express locations. For example, in Italian, you ride "in" a bicycle and you go "in" a country while in English you ride "on" a bicycle and you go "to" a country. In English, we say that a ring is placed "on" a finger and a finger is placed "in" the ring. Korean, on the other hand, has one word for both situations, *kitta*, which expresses the idea of a tight-fitting relation between the two objects. Spanish has two different words for the inside of a corner *(rincón)* and the outside of a corner *(esquina)*.

That languages show linguistic distinctions in their lexicons and grammar is certain, and we will see many examples of this in later chapters. The question is to what extent—if at all—such distinctions determine or influence the thoughts and perceptions of speakers. The Sapir–Whorf hypothesis is controversial, but it is clear that the strong form of this hypothesis is false. Peoples' thoughts and perceptions are not determined by the words and structures of their language. We are not prisoners of our linguistic systems. If speakers were unable to think about something for which their language had no specific word, translations would be impossible, as would learning a second language. English may not have separate words for the inside of a corner and the outside of a corner, but we are perfectly able to express these concepts using more than one word. In fact, we just did. If humans could not think about something for which we don't have a word, how would infants ever learn their first words, much less languages?

Many of the specific claims of linguistic determinism have been shown to be wrong. For example, the Hopi language may not have words and word endings for specific tenses, but the language has other expressions for time, including words for the days of the week, parts of the day, yesterday and tomorrow, lunar phases, seasons, and so on. The Hopi people use various kinds of calendars and various devices for time-keeping based on the sundial. Clearly, they have a sophisticated concept of time despite the lack of a tense system in the language.

The Munduruku, an indigenous people of the Brazilian Amazon, have no words in their language for triangle, square, rectangle, or other geometric concepts, except circle. The only terms to indicate direction are words for upstream, downstream, sunrise, and sunset. Yet, Munduruku children understand many principles of geometry as well as American children, whose language is rich in geometric and spatial words.

Though languages differ in their color words, speakers can readily perceive colors that are not named in their language. Grand Valley Dani is a language spoken in New Guinea with only two color words, black and white (dark and light). In experimental studies, however, speakers of the language showed recognition of the color red, and they did better with fire-engine red than off-red. This would not be possible if their color perceptions were fixed by their language. Our perception of color is determined by the structure of the human eye, not by the structure of language. However, some experiments have shown that speakers are better at discriminating two colors when their language has different words for each, supporting a weaker version of the Whorfian hypothesis.

SHERMAN'S LAGOON © 2011 JIM TOOMEY

One Whorfian claim that has taken on the cast of an urban legend is that the Inuit language, spoken in the Canadian Arctic, has many more words for snow than English, and that this affects the worldview of the Inuit people. However, anthropologists have shown that Inuit has no more words for snow than English does: around a dozen, including *sleet, blizzard, slush,* and *flurry*. But even if it did, this would not show that language conditions the Inuits' experience of the world. Rather, it suggests that experience with a particular world creates the need for certain words. In this respect, the Inuit speaker is no different from the computer programmer, who has a technical vocabulary for Internet protocols, or the linguist, who has many specialized words regarding language. In this book, we will introduce you to many new words and linguistic concepts, and surely you will learn them! This would be impossible if your thoughts about language were determined by the linguistic vocabulary you now have.

Politicians and marketers certainly believe that language can influence our thoughts and values. One political party may refer to "assisted suicide" while another "compassion and choices." In the abortion debate, some refer to the "right to choose" and others to the "right to life." The terminology reflects different ideologies, but the choice of expression is primarily intended to sway public opinion. Politically correct (PC) language also reflects the idea that language can influence thought. Many people believe that by changing the way we talk, we can change the way we think; that if we eliminate racist and sexist terms from our language, we will become a less racist and sexist society. As we will discuss in Chapter 7, language itself is not sexist or racist, but people can be, and because of this, particular words take on negative meanings.

In his book *The Language Instinct*, the psychologist Steven Pinker uses the expression *euphemism treadmill* to describe how the euphemistic terms that are created to replace negative words often take on the negative associations of the words they were coined to replace. For example, *handicapped* was once a euphemism for the offensive term *crippled*, and when *handicapped* became politically incorrect it was replaced by the euphemism *disabled*, which was then replaced by yet another euphemism, *challenged*, and most recently, *person with a disability*. Nonetheless, in all such cases, changing language has not resulted in a new worldview for the speakers. Rather, it is changing sensibilities that drive the changes in language.

Some language changes inspired by political correctness can be quite extreme. For example, a local council in Britain banned the term *brainstorming* and replaced it with *thought showers* because local lawmakers worried that the original term might offend people with epilepsy. Or the instruction to newly recruited holiday Santa Clauses in Sidney, Australia, to not say *Ho Ho Ho* deemed too close to the American slang for prostitute and therefore degrading to women.

Prescient as Orwell was with respect to how language could be used for social control, he was more circumspect with regard to the relation between language and thought. He was careful to qualify his notions with the phrase "at least so far as thought is dependent on words." Current research shows that language does not determine how we think about and perceive the world. Future research should show the extent to which language influences other aspects of cognition such as memory and categorization.

Summary

We are all intimately familiar with at least one language, our own. Yet, few of us ever stop to consider what we know when we know a language. No book contains, or could possibly contain, the English or Russian or Zulu language. The words of a language can be listed in a dictionary, but not all the sentences can be. Speakers use a finite set of rules to produce and understand an infinite set of possible sentences.

These rules are part of the **grammar** of a language, which develops when you acquire the language and includes the sound system (the **phonology**), the structure and properties of words (the **morphology** and **lexicon**), how words may be combined into phrases and sentences (the **syntax**), and the ways in which sounds and meanings are related (the **semantics**). The sounds and meanings of individual words are related in an **arbitrary** fashion. If you had never heard the word *syntax*, you would not know what it meant by its sounds. The gestures used by signers are also arbitrarily related to their meanings. Language, then, is a system that relates sounds (or hand and body gestures) with meanings. When you know a language, you know this system.

This knowledge **(linguistic competence)** is different from behavior **(linguistic performance)**. You have the competence to produce a million-word sentence but performance limitations such as memory and endurance keep this from occurring.

There are different kinds of "grammars." The **descriptive grammar** of a language represents the (often unconscious) linguistic knowledge of its speakers. Such a grammar is a model of the **mental grammar** every speaker of the language possesses. It does not teach the rules of the language; it describes the rules that are already there.

A grammar that attempts to legislate what your grammar should be is called a **prescriptive grammar**. It specifies a standard of usage. It does not describe, except incidentally. **Teaching grammars**, while prescriptive in nature, are written to help people learn a foreign language or a dialect of their own language.

The more linguists investigate the nearly 7,000 languages of the world and describe the ways in which they differ from one another, the more they discover that these differences are limited. There are linguistic universals that pertain

to the components of the grammar, the ways in which these components are related, and the forms of rules that govern them. These principles compose **Universal Grammar (UG)**, which provides a blueprint for the grammars of all possible human languages. Universal Grammar constitutes the innate component of the human language faculty that makes language development in children possible.

Strong evidence for Universal Grammar is found in the way children acquire language. Children learn language by exposure. They need not be deliberately taught, though parents may enjoy "teaching" their children to speak or sign. Children will learn any human language to which they are exposed, and they learn it in definable stages, beginning at a very early age.

The fact that deaf children learn **sign language** shows that the ability to hear or produce sounds is not a prerequisite for language learning. All the sign languages in the world, which differ among themselves as much as spoken languages do, are visual-gestural systems that are as fully developed and as structurally complex as spoken languages. The major sign language used in the United States is **American Sign Language (ASL)**. The ability of human beings to acquire, know, and use language is a biologically based ability rooted in the structure of the human brain, and expressed in different modalities (spoken or signed).

If language is defined merely as a system of communication, or the ability to produce speech sounds, then language is not unique to humans. There are, however, certain characteristics of human language not found in the communication systems of any other species. A basic property of human language is its **creativity**—a speaker's ability to combine the basic linguistic units to form an infinite set of "well-formed" grammatical sentences, most of which are novel, never before produced or heard.

Human languages consist of discrete units that combine according to the rules of the grammar of the language. Human languages also allow us to talk about things that are removed in time and space from our immediate environment or mental or physical state. These are the properties of **discreteness** and **displacement** and they distinguish human language from the "languages" of other species.

For many years, researchers were interested in the question of whether language is a uniquely human ability. There have been many attempts to teach nonhuman primates to communicate using sign language or symbolic systems that resemble human language in certain respects. Overall, results have been disappointing. Some chimpanzees have been trained to use an impressive number of symbols or signs. But a careful examination of their multi-sign utterances reveals that unlike children, the chimps show little creativity or spontaneity. Their "utterances" are highly imitative (echoic), often unwittingly cued by trainers, and have little syntactic structure. Some highly intelligent dogs have also learned a significant number of words, but their learning is restricted to a specific context and it is likely that their "meanings" for these words are very different from the symbolic or referential meanings that would be learned by a human child.

Computer scientists have labored for decades to program computers with the linguistic competence of a human. While the results are impressive, and computers appear to be able to talk, listen, and understand, there is little evidence that human linguistic competence has been achieved.

The **Sapir–Whorf hypothesis** holds that the particular language we speak determines or influences our thoughts and perceptions of the world. Much of the early evidence in support of this hypothesis has not stood the test of time. More recent experimental studies suggest that the words and grammar of a language may affect certain aspects of cognition such as memory.

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Exercises

1. An English speaker's knowledge includes the sound sequences of the language. When new products are put on the market, the manufacturers have to think up new names for them that conform to the allowable sound patterns. Suppose, you were hired by a manufacturer of soap products to name five new products. What names might you come up with? List them.

   We are interested in how the names are pronounced. Therefore, describe in any way you can how to say the words you list. Suppose, for example, you named one detergent *Blick*. You could describe the sounds in any of the following ways:

   bl as in *blood*, *i* as in *pit*, *ck* as in *stick*
   bli as in *bliss*, *ck* as in *tick*
   b as in *boy*, *lick* as in *lick*

2. Consider the following sentences. Put a star (*) after those that do not seem to conform to the rules of your grammar, that are ungrammatical for you. State, if you can, why you think the sentence is ungrammatical.
   a. Robin forced the sheriff go.
   b. Napoleon forced Josephine to go.
   c. The devil made Faust go.
   d. He passed by a large pile of money.

2

Morphology: The Words of Language

> By words the mind is winged.
>
> ARISTOPHANES (450–388 BCE)

> A powerful agent is the right word. Whenever we come upon one of those intensely right words . . . the resulting effect is physical as well as spiritual, and electrically prompt.
>
> MARK TWAIN

Every speaker of every language knows tens of thousands of words. Unabridged dictionaries of English contain nearly 500,000 entries, but most speakers don't know all of these words. It has been estimated that a child of six knows as many as 13,000 words and the average high school graduate about 60,000. A college graduate presumably knows many more than that, but whatever our level of education, we learn new words throughout our lives, such as the many words in this book that you will learn for the first time.

Words are an important part of linguistic knowledge and constitute a component of our mental grammars, but one can learn thousands of words in a language and still not know the language. Anyone who has tried to communicate in a foreign country by merely using a dictionary knows this is true. On the other hand, without words we would be unable to convey our thoughts through language or understand the thoughts of others.

Someone who doesn't know English would not know where one word begins or ends in an utterance like *Thecatsatonthemat*. We separate written words by

spaces, but in the spoken language there are no pauses between most words. Without knowledge of the language, one can't tell how many words are in an utterance. Knowing a word means knowing that a particular sequence of sounds is associated with a particular meaning. A speaker of English has no difficulty in segmenting the stream of sounds into six individual words—*the*, *cat*, *sat*, *on*, *the*, and *mat*—because each of these words is listed in his or her mental dictionary, or lexicon (the Greek word for *dictionary*), that is part of a speaker's linguistic knowledge. Similarly, a speaker knows that *uncharacteristically*, which has more letters than *Thecatsatonthemat*, is nevertheless a single word.

The lack of pauses between words in speech has provided humorists with much material. The comical hosts of the show *Car Talk*, aired on National Public Radio (as reruns nowadays), close the show by reading a list of credits that includes the following cast of characters:

Copyeditor:	Adeline Moore (add a line more)
Accounts payable:	Ineeda Czech (I need a check)
Pollution control:	Maury Missions (more emissions)
Purchasing:	Lois Bidder (lowest bidder)
Statistician:	Marge Innovera (margin of error)
Russian chauffeur:	Picov Andropov (pick up and drop off)
Legal firm:	Dewey, Cheetham, and Howe (Do we cheat 'em? And how!)[1]

In all these instances, you would have to have knowledge of English words to make sense of and find humor in such plays on words.

The fact that the same sound sequences (Lois Bidder—lowest bidder) can be interpreted differently shows that the relation between sound and meaning is an arbitrary pairing, as discussed in Chapter 1. For example, *Un petit d'un petit* in French means "a little one of a little one," but to an English speaker the sounds resemble the name *Humpty Dumpty*.

When you know a word, you know its sound (pronunciation) and its meaning. Because the sound-meaning relation is arbitrary, it is possible to have words with the same sound and different meanings (*bear* and *bare*) and words with the same meaning and different sounds (*sofa* and *couch*).

Because each word is a sound-meaning unit, its pronunciation is stored in our mental lexicon alongside the corresponding meaning. For literate speakers, the spelling of most of the words is also included.

Each word in your mental lexicon includes other information as well, such as whether it is a noun, a pronoun, a verb, an adjective, an adverb, a preposition, or a conjunction. That is, the mental lexicon also specifies the **grammatical category** or **syntactic class** of the word. You may not consciously know that a form such as *love* is listed as both a verb and a noun, but as a speaker you have such knowledge, as shown by the phrases *I love you* and *You are the love of my life*. If such information were not in the mental lexicon, we would not know how to form grammatical sentences, nor would we be able to distinguish grammatical from ungrammatical sentences.

[1] Car Talk" credits from National Public Radio.™ Dewey, Cheetham & Howe, 2006, all rights reserved.

Content Words and Function Words

"... and even ... the patriotic archbishop of Canterbury found it advisable—"

"Found what?" said the Duck.

"Found it," the Mouse replied rather crossly; "of course you know what 'it' means."

"I know what 'it' means well enough, when I find a thing," said the Duck; "it's generally a frog or a worm. The question is, what did the archbishop find?"

LEWIS CARROLL, *Alice's Adventures in Wonderland*, 1865

Languages make an important distinction between two kinds of words—content words and function words. Nouns, verbs, adjectives, and adverbs are the **content words**. These words denote concepts such as objects, actions, attributes, and ideas that we can think about like *children*, *build*, *beautiful*, and *seldom*. Content words are sometimes called the **open class** words because we can and regularly do add new words to these classes, such as *Facebook* (noun), *blog* (noun, verb), *frack* (verb), and *online* (adjective, adverb).

Other classes of words do not have clear lexical meanings or obvious concepts associated with them, including conjunctions such as *and*, *or*, and *but*; prepositions such as *in* and *of*; the articles *the* and *a/an*, and pronouns such as *it*. These kinds of words are called **function words** because they specify grammatical relations and have little or no semantic content. For example, the articles indicate whether a noun is definite or indefinite—*the* boy or *a* boy. The preposition *of* indicates possession, as in "the book of yours," but this word indicates many other kinds of relations too. The *it* in *it's raining* and *the archbishop of Canterbury found it advisable* are further examples of words whose function is purely grammatical—they are required by the rules of syntax and are indispensable to the grammar.

Function words are sometimes called **closed class** words. This is because it is difficult to think of any articles, conjunctions, prepositions, or pronouns that have recently entered the language. The small set of personal pronouns such as *I*, *me*, *mine*, *he*, and *she*, are part of this class. So are the complementizers *if*, *that*, and *whether* which we will discuss the next chapter.

The difference between content and function words is illustrated by the following test that has circulated over the Internet:

> Count the number of Fs in the following text without reading further, then check the footnote:[2]
>
> FINISHED FILES ARE THE
> RESULT OF YEARS OF SCIENTIFIC
> STUDY COMBINED WITH THE
> EXPERIENCE OF YEARS.

[2]Most people come up with three. If you came up with fewer than six, count again, and this time, pay attention to the function word *of*.

This little test illustrates that the brain treats content and function words (such as *of*) differently. A great deal of psychological and neurological evidence supports this claim. As will be discussed in Chapter 10, in reading tasks people tend to skip over the function words. And some brain-damaged patients with language impairments are unable to read function words such as *in* or *which*, but can read the lexical content words *inn* and *witch*.

The two classes of words also seem to function differently in **slips of the tongue** produced by normal individuals. For example, a speaker may inadvertently switch words producing "the journal of the editor" instead of "the editor of the journal," but the switching or exchanging of function words has not been observed. There is also evidence for this distinction from language acquisition (discussed in Chapter 9). In the early stages of development, children often omit function words from their speech as in "doggie barking."

The linguistic evidence suggests that content words and function words play different roles in language. Content words bear the brunt of the meaning, whereas function words connect the content words to the larger grammatical context.

Morphemes: The Minimal Units of Meaning

> "They gave it me," Humpty Dumpty continued, "for an un-birthday present."
>
> "I beg your pardon?" Alice said with a puzzled air.
>
> "I'm not offended," said Humpty Dumpty.
>
> "I mean, what is an un-birthday present?"
>
> "A present given when it isn't your birthday, of course."
>
> LEWIS CARROLL, *Through the Looking-Glass*, 1871

Humpty Dumpty is well aware that the form *un-* means "not," as further shown in the following pairs of words:

A	B
desirable	undesirable
likely	unlikely
inspired	uninspired
happy	unhappy
developed	undeveloped
sophisticated	unsophisticated

Thousands of English adjectives begin with *un-*. If we assume that the most basic unit of meaning is the word, what do we say about parts of words, such as *un-*, which has a fixed meaning? In all the words in the B column, *un-* means the same thing—"not." *Undesirable* means "not desirable," *unlikely* means "not likely," and so on. All the words in column B consist of at least two meaningful units: *un* + *desirable*, *un* + *likely*, *un* + *inspired*, and so on.

Just as *un-* occurs with the same meaning in the previous list of words, so does *phon-* in the following words. (You may not know the meaning of some of them, but you will when you finish this book.)

phone	phonology	phoneme
phonetic	phonologist	phonemic
phonetics	phonological	allophone
phonetician	telephone	euphonious
phonic	telephonic	symphony

Phon- is a minimal form in that it can't be decomposed. *Ph* doesn't mean anything; *pho*, though it may be pronounced like *foe*, has no relation in meaning to it; and *on* is not the preposition spelled *o-n*. In all the words on the list, *phon* has the identical meaning "pertaining to sound."

These examples illustrate that many words are composed by rules and have internal structure. *Uneaten, undisputed,* and *ungrammatical* are words in English, but **eatenun*, **disputedun*, and **grammaticalun* (to mean "not eaten," "not disputed," "not grammatical") are not words because we form a negative meaning of a word by adding *un-* to the beginning of a word not the end.

When Samuel Goldwyn, the pioneer moviemaker, announced, "In two words: impossible," he was reflecting the common view that words are the basic meaningful elements of a language. We have seen that this cannot be so, because some words contain several distinct units of meaning. The linguistic term for the most elemental unit of grammatical form is **morpheme**. The word is derived from the Greek word *morphe*, meaning "form." If Goldwyn had taken a linguistics course, he would have said, more correctly, "In two morphemes: im-possible."

The study of the internal structure of words, and of the rules by which words are formed, is **morphology**. This word itself consists of two morphemes, *morph + ology*. The morpheme *-ology* means "branch of knowledge," so the meaning of *morphology* is "the branch of knowledge concerning (word) forms." Morphology also refers to our internal grammatical knowledge concerning the words of our language, and like most linguistic knowledge we are not consciously aware of it.

A single word may be composed of one or more morphemes:

One morpheme	boy
	desire
	meditate
two morphemes	boy + ish
	desire + able
	meditate + tion
three morphemes	boy + ish + ness
	desire + able + ity
four morphemes	gentle + man + li + ness
	un + desire + able + ity
more than four	un + gentle + man + li + ness
	anti + dis + establish + ment + ari + an + ism

A morpheme may be represented by a single letter such as the morpheme *a-* meaning "without" as in *amoral* and *asexual*, or by a single syllable, such as *child* and *ish* in *child* + *ish*. A morpheme may also consist of more than one syllable: of two syllables, as in *camel, lady,* and *water*; of three syllables, as in *Hackensack* and *crocodile*; or of four or more syllables, as in *hallucinate, apothecary, helicopter,* and *accelerate.*

A morpheme—the minimal linguistic unit—is thus an arbitrary union of a sound and a meaning (or grammatical function) that cannot be further analyzed. So, solidly welded is this union in the mind that it is impossible for you to hear or read a word you know and not be aware of its meaning, even if you try! These two sides of the same coin are often called a **linguistic sign**, not to be confused with the *sign* of sign languages. Every word in every language is composed of one or more morphemes.

The Discreteness of Morphemes

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Internet bloggers love to point out "inconsistencies" in the English language. They observe that while singers sing and flingers fling, it is not the case that fingers "fing." However, English speakers know that *finger* is a single morpheme, or a **monomorphemic word**. The final *-er* syllable in *finger* is not a separate morpheme because a finger is not "something that fings." Similarly, *butter* when not referring to goat-like behavior is monomorphemic food stuff, and *buttress*, to be sure, is neither a feminine form of *butt* nor has anything to do with locks of hair.

The meaning of a morpheme must be constant. The agentive morpheme *-er* means "one who does" in words such as *singer, painter, lover,* and *worker*, but the same sounds represent the comparative morpheme, meaning "more," in *nicer, prettier,* and *taller*. Thus, two different morphemes may be pronounced identically. The identical form represents two morphemes because of the different meanings. The same sounds may occur in another word and not represent a separate morpheme at all, as in *finger*.

Conversely, the two morphemes *-er* and *-ster* have the same meaning, but different forms. Both *singer* and *songster* mean "one who sings." And like *-er*, *-ster* is not a morpheme in *monster* because a monster is not something that "mons"

or someone that "is mon" the way *youngster* is someone who is young. All of this follows from the concept of the morpheme as a *sound* plus a *meaning* unit.

The decomposition of words into morphemes illustrates one of the fundamental properties of human language—discreteness—a property that sets it apart from the animal communication systems, as discussed in Chapter 1. In all languages, sound units combine to form morphemes, morphemes combine to form words, and words combine to form larger units—phrases and sentences.

Discreteness is an important part of linguistic creativity. We can combine morphemes in novel ways to create new words whose meaning will be apparent to other speakers of the language. If you know that "to tweet" means to post an update to the social media site Twitter, you automatically understand that a *tweetable* message is one that is suitable for posting on Twitter; that a *tweeter* is someone who tweets, and that when a *tweet* is *retweeted* thousands of times, it has gone viral! You know the meanings of all these words by virtue of your knowledge of the discrete morphemes *tweet, re-, -able,* and *-er,* and the rules for their combination.

Bound and Free Morphemes

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Our morphological knowledge has two components: knowledge of the individual morphemes and knowledge of the rules that combine them. We will see a similar situation in the next chapter where our syntactic knowledge consists of knowledge of words and the rules for combining them, and we will see yet another example of the discreteness of human language in succeeding chapters where speakers have knowledge of the individual sounds of their language and the rules for combining them into morphemes and words.

One of the things we know about particular morphemes is whether they can stand alone or whether they must be attached to a base morpheme. Some morphemes such as *boy, desire, gentle,* and *man* may constitute words by themselves. These are **free morphemes**. Other morphemes such as *-ish, -ness, -ly, pre-, trans-,* and *un-* are never words by themselves but are always parts of words. These **affixes** are **bound morphemes** and they may attach at the beginning, the end, in the middle, or both at the beginning and end of a word. The humor in the cartoon is Brad's stumbling over the bound morpheme *un-* in a questionable attempt to free it.

Prefixes and Suffixes

We know whether an affix precedes or follows other morphemes, for example, *un-, pre- (premeditate, prejudge),* and *bi- (bipolar, bisexual)* are **prefixes.** They occur before other morphemes. Some morphemes occur only as **suffixes,** following other morphemes. English examples of suffix morphemes are *-ing (sleeping, eating, running, climbing), -er (singer, performer, reader), -ist (typist, pianist, novelist, linguist),* and *-ly (manly, sickly, friendly),* to mention only a few.

Many languages have prefixes and suffixes, but languages may differ in how they deploy these morphemes. A morpheme that is a prefix in one language may be a suffix in another and vice versa. In English, the plural morphemes *-s* and *-es* are suffixes (*boys, lasses*). In Isthmus Zapotec, spoken in Mexico, the plural morpheme *ka-* is a prefix:

zigi	"chin"	kazigi	"chins"
zike	"shoulder"	kazike	"shoulders"
diaga	"ear"	kadiaga	"ears"

Languages may also differ in what meanings they express through affixation. In English, we do not add an affix to derive a noun from a verb. We have the verb *dance* as in "I like to dance," and we have the noun *dance* as in "There's a dance or two in the old dame yet." The form is the same in both cases. In Turkish, you derive a noun from a verb with the suffix *-ak,* as in the following examples:

dur	"to stop"	durak	"stopping place"
bat	"to sink"	batak	"sinking place" or "marsh/swamp"

To express reciprocal action in English we use the phrase *each other,* as in *understand each other, love each other.* In Turkish, a morpheme is added to the verb:

anla	"understand"	anla*sh*	"understand each other"
sev	"love"	sev*ish*	"love each other"

The reciprocal suffix in these examples is pronounced *sh* after a vowel and *ish* after a consonant. This is similar to the process in English in which we use *a* as the indefinite article morpheme before a noun beginning with a consonant, as in *a dog,* and *an* before a noun beginning with a vowel, as in *an apple.* The same morpheme may have more than one slightly different form (see Exercise 6, for example). We will discuss the various pronunciations of morphemes in more detail in Chapter 6.

In Piro, an Arawakan language spoken in Peru, a single morpheme, *-kaka,* can be added to a verb to express the meaning "cause to":

cokoruha	"to harpoon"	cokoruhakaka	"cause to harpoon"
salwa	"to visit"	salwakaka	"cause to visit"

In Karuk, a Native American language spoken in the Pacific Northwest, adding *-ak* to a noun forms the locative adverbial meaning "in."

ikrivaam	"house"	ikrivaamak	"in a house"

It is accidental that both Turkish and Karuk have a suffix *-ak.* Despite the similarity in *form,* the two meanings are different. Similarly, the reciprocal suffix *-ish* in Turkish is similar in form to the English suffix *-ish* as in *boyish.*

Similarity in meaning may give rise to different forms. In Karuk, the suffix *-ara* has the same meaning as the English *-y*, that is, "characterized by" (*hairy* means "characterized by hair").

aptiik	"branch"	aptikara	"branchy"

These examples illustrate again the arbitrary nature of the linguistic sign, that is, of the sound-meaning relationship, as well as the distinction between bound and free morphemes.

Infixes

Some languages also have **infixes**, morphemes that are inserted into other morphemes. Bontoc, spoken in the Philippines, is such a language, as illustrated by the following:

Nouns/Adjectives		Verbs	
fikas	"strong"	fumikas	"to be strong"
kilad	"red"	kumilad	"to be red"
fusul	"enemy"	fumusul	"to be an enemy"

In this language, the infix *-um-* is inserted after the first consonant of the noun or adjective. Thus, a speaker of Bontoc who knows that *pusi* means "poor" would understand the meaning of *pumusi*, "to be poor," on hearing the word for the first time, just as an English speaker who learns the verb *sneet* would know that *sneeter* is "one who sneets." A Bontoc speaker who knows that *ngumitad* means "to be dark" would know that the adjective "dark" must be *ngitad*.

Oddly enough, the only infixes in English are full-word obscenities, usually inserted into adjectives or adverbs. The most common infix in America is the word *fuckin'* and all the euphemisms for it, such as *friggin, freakin, flippin,* and *fuggin*, as in *ri-fuckin-diculous* or *Kalama-flippin-zoo*, based on the city in Michigan. In Britain, a common infix is *bloody*, an obscene term in British English, and its euphemisms, such as *bloomin'*. In the movie and stage musical *My Fair Lady*, the word *abso-bloomin-lutely* occurs in one of the songs sung by Eliza Doolittle.

Circumfixes

Some languages have **circumfixes**, morphemes that are attached to a base morpheme both initially and finally. These are sometimes called **discontinuous morphemes**. In Chickasaw, a Muskogean language spoken in Oklahoma, the negative is formed by surrounding the affirmative form with both a preceding *ik-* and a following *-o* working together as a single negative morpheme. The final vowel of the affirmative is dropped before the negative part *-o* is added. Examples of this circumfixing are:

Affirmative		Negative	
chokma	"he is good"	ik + chokm + o	"he isn"t good"
lakna	"it is yellow"	ik + lakn + o	"it isn't yellow"
palli	"it is hot"	ik + pall + o	"it isn't hot"
tiwwi	"he opens (it)"	ik + tiww + o	"he doesn't open (it)"

An example of a more familiar circumfixing language is German. The past participle of regular verbs is formed by tacking on *ge-* to the beginning and *-t* to the end of the verb root. This circumfix added to the verb root *lieb* "love" produces *geliebt*, "loved" (or "beloved," when used as an adjective).

Roots and Stems

Morphologically complex words consist of a morpheme **root** and one or more affixes. Some examples of English roots are *paint* in *painter*, *read* in *reread*, *ceive* in *conceive*, and *ling* in *linguist*. A root may or may not stand alone as a word (*paint* and *read* do; *ceive* and *ling* don't). In languages that have circumfixes, the root is the form around which the circumfix attaches, for example, the Chickasaw root *chokm* in *ikchokmo* ("he isn't good"). In infixing languages, the root is the form into which the infix is inserted; for example, *fikas* in the Bontoc word *fumikas* ("to be strong").

Semitic languages such as Hebrew and Arabic have a unique morphological system. Nouns and verbs are built on a foundation of three consonants, and one derives related words by varying the pattern of vowels and syllables. For example, the root for "write" in Egyptian Arabic is *ktb*, from which the following words (among others) are formed by infixing vowels:

katab	"he wrote"
kaatib	"writer"
kitàab	"book"
kútub	"books"

When a root morpheme is combined with an affix, it forms a **stem**. Other affixes can be added to a stem to form a more complex stem, as shown in the following:

root	Chomsky	(proper) noun
stem	Chomsky + ite	noun + suffix
word	Chomsky + ite + *s*	noun + suffix + suffix
root	believe	verb
stem	believe + able	verb + suffix
word	un + believe + able	prefix + verb + suffix
root	system	noun
stem	system + atic	noun + suffix
stem	un + system + atic	prefix + noun + suffix
stem	un + system + atic + al	prefix + noun + suffix + suffix
word	un + system + atic + al + ly	prefix + noun + suffix + suffix + suffix

With the addition of each new affix, a new stem and a new word are formed. Linguists sometimes use the word **base** to mean any root or stem to which an affix is attached. In the preceding example, *system*, *systematic*, *unsystematic*, and *unsystematical* are bases.

Bound Roots

> It had been a rough day, so when I walked into the party I was very chalant, despite my efforts to appear gruntled and consolate. I was furling my wieldy umbrella . . . when I saw her. . . . She was a descript person . . . Her hair was kempt, her clothing shevelled, and she moved in a gainly way.
>
> JACK WINTER, "How I Met My Wife" by Jack Winter from *The New Yorker*, July 25, 1994. Reprinted by permission of the Estate of Jack Winter.

Bound roots do not occur in isolation and they acquire meaning only in combination with other morphemes. For example, words of Latin origin such as *receive, conceive, perceive,* and *deceive* share a common root, *-ceive*; and the words *remit, permit, commit, submit, transmit,* and *admit* share the root *-mit*. For the original Latin speakers, the morphemes corresponding to *ceive* and *mit* had clear meanings, but for modern English speakers, Latinate morphemes such as *ceive* and *mit* have no independent meaning. Their meaning depends on the entire word in which they occur.

A similar class of words is composed of a prefix affixed to a bound root morpheme. Examples are *ungainly*, but no **gainly*; *discern*, but no **cern*; *nonplussed*, but no **plussed; downhearted* but no **hearted*, and others to be seen in this section's epigraph.

The morpheme *huckle*, when joined with *berry*, has the meaning of a berry that is small, round, and purplish blue; *luke* when combined with *warm* has the meaning "somewhat." Both these morphemes and others like them (*cran, boysen*) are bound morphemes that convey meaning only in combination.

Rules of Word Formation

> "I never heard of 'Uglification,'" Alice ventured to say. "What is it?" The Gryphon lifted up both its paws in surprise. "Never heard of uglifying!" it exclaimed. "You know what to beautify is, I suppose?" "Yes," said Alice doubtfully: "it means—to make—prettier." "Well, then," the Gryphon went on, "if you don't know what to uglify is, you are a simpleton."
>
> LEWIS CARROLL, *Alice's Adventures in Wonderland*, 1865

When the Mock Turtle listed the branches of Arithmetic for Alice as "Ambition, Distraction, Uglification, and Derision," Alice was very confused. She wasn't really a simpleton, since *uglification* was not a common word in English until Lewis Carroll used it. Still, most English speakers would immediately know the meaning of *uglification* even if they had never heard or used the word before because they would know the meaning of its individual parts—the root *ugly* and the affixes *-ify* and *-cation*.

We said earlier that knowledge of morphology includes knowledge of individual morphemes, their pronunciation, their meaning, and knowledge of the rules for combining them into complex words. The Mock Turtle added *-ify* to the adjective *ugly* and formed a verb. Many verbs in English have been formed from adjectives in this way: *purify, amplify, simplify, falsify*; and from nouns, too: *objectify, glorify, personify*. Notice that the Mock Turtle went even further: he added the suffix *-cation* to *uglify* and formed a noun, *uglification*, as in *glorification, simplification, falsification,* and *purification*. By using the **morphological rules** of English, he created a new word. The rules that he used are as follows:

Adjective + ify	→	Verb	"to make Adjective"
Verb + cation	→	Noun	"the process of making Adjective"

Derivational Morphology

Macnelly/King Features Syndicate

Bound morphemes such as *-ify*, *- cation*, and *- arian* are called **derivational morphemes**. When they are added to a base, a new word with a new meaning is derived. The addition of *-ify* to *pure—purify*—means "to make pure," and the addition of *-cation—purification*—means "the process of making pure." If we invent an adjective, *pouzy*, to describe the effect of static electricity on hair, you will immediately understand the sentences "Walking on that carpet really pouzified my hair" and "The best method of pouzification is to rub a balloon on your head." This means that we must have a list of the derivational morphemes in our mental dictionaries as well as the rules that determine how they are added to a root or stem. The form that results from the addition of a derivational morpheme is called a **derived word**.

Derivational morphemes have clear semantic content. In this sense, they are like content words, except that they are not words. As we have seen, when a derivational morpheme is added to a base, it adds meaning. The derived word may also be of a different grammatical class than the original word, as shown by suffixes such as *-able* and *-en*. When a verb is suffixed with *-able*, the result is an adjective, as in *desire + able*. When the suffix *-en* is added to an adjective, a verb is derived, as in *dark + en*. One may form a noun from an adjective, as in *sweet + ie*. Other examples are:

Noun to Adjective

boy + -ish
virtu + -ous
Elizabeth + -an
pictur + -esque
affection + -ate
health + -ful
alcohol + -ic

Verb to Noun

acquitt + -al
clear + -ance
accus + -ation
sing + -er
conform + -ist
predict + -ion

Adjective to Adverb

exact + -ly

Noun to Adverb

home + -ward
side + -ways
length + -wise

Noun to Verb

moral + -ize
vaccin + -ate
hast + -en
im- + prison
be- + friend
en- + joy
in- + habit

Adjective to Noun

tall + -ness
specific + -ity
feudal + -ism
free + -dom

Verb to Adjective

read + -able
creat + -ive
migrat + -ory
run(n) + -y

Adjective to Verb

en- + large
en- + dear
en- + rich

Some derivational affixes do not cause a change in grammatical class.

Noun to Noun

friend + -ship
human + -ity
king + -dom
New Jersey + -ite
vicar + -age
Paul + -ine
America + -n
libr(ary) + -arian
mono- + theism
dis- + advantage
ex- + wife
auto- + biography
un- + employment

Verb to Verb

un- + do
re- + cover
dis- + believe
auto- + destruct

Adjective to Adjective

pink + -ish
red + -like
a- + moral
il- + legal
in- + accurate
un- + happy
semi- + annual
dis- + agreeable
sub- + minimal

When a new word enters the lexicon by the application of morphological rules, other complex derivations may be **blocked**. For example, when *Commun + ist* entered the language, words such as *Commun + ite* (as in *Trotsky + ite*) or *Commun + ian* (as in *grammar + ian*) were not needed; their formation was blocked. Sometimes, however, alternative forms do coexist: for example, *Chomskyan* and *Chomskyist* and perhaps even *Chomskyite* (all meaning "follower of Chomsky's views of linguistics"). *Semanticist* and *semantician* are both used for linguists who study meaning in language, but the possible word *semantite* is not.

Finally, derivational affixes appear to come in two classes. In one class, the addition of a suffix triggers subtle changes in pronunciation. For example, when

we affix *-ity* to *specific* (pronounced "specifik" with a *k* sound), we get specificity (pronounced "specifisity" with an *s* sound). When deriving *Elizabeth* + *-an* from *Elizabeth*, the fourth vowel sound changes from the vowel in *Beth* to the vowel in *Pete*. Other suffixes such as *-y, -ive,* and *-ize* may induce similar changes: *sane/sanity, deduce/deductive, critic/criticize.*

On the other hand, suffixes such as *-er, -ful, -ish, -less, -ly,* and *-ness* may be tacked onto a base word without affecting the pronunciation, as in *baker, wishful, boyish, needless, sanely,* and *fullness*. Moreover, affixes from the first class cannot be attached to a base containing an affix from the second class: **need* + *less* + *ity*, **moral* + *ize* + ive; but affixes from the second class may attach to bases with either kind of affix: *moral* + *iz(e)* + *er, need* + *less* + *ness*.

Inflectional Morphology

Zits Partnership/King Features Syndicate

Function words such as *to, it,* and *be* are free morphemes. Many languages, including English, also have bound morphemes that have a strictly grammatical function. They mark properties such as tense, number, person, and so forth. Such bound morphemes are called **inflectional morphemes**. Unlike derivational morphemes, they never change the grammatical category of the stems to which they are attached. Consider the forms of the verb in the following sentences:

1. I sail the ocean blue.
2. He sails the ocean blue.
3. John sailed the ocean blue.
4. John has sailed the ocean blue.
5. John is sailing the ocean blue.

In sentence (2) the *-s* at the end of the verb is an agreement marker; it signifies that the subject of the verb is third-person and is singular, and that the verb is in the present tense. It doesn't add lexical meaning. The suffix *-ed* indicates past tense, and is also required by the syntactic rules of the language when verbs are used with auxiliary *have*, just as *-ing* is required when verbs are used with auxiliary *be*. (This will be discussed in Chapter 3.)

Inflectional morphemes represent relationships between different parts of a sentence. For example, *-s* expresses the relationship between the verb and the

third-person singular subject; *-ed* expresses the relationship between the time the utterance is spoken (e.g., now) and the time of the event (past). If you say "John danced," the *-ed* affix places the activity before the utterance time. Inflectional morphology is closely connected to the syntax and semantics of the sentence.

English also has other inflectional endings, such as the plural suffix, which is attached to certain singular nouns, as in *boy/boys* and *cat/cats*. In contrast to Old and Middle English, which were more richly inflected languages, as we discuss in Chapter 8, Modern English has only eight bound inflectional affixes:

English	Inflectional Morphemes	Examples
-s	third-person singular present	She wait-s at home.
-ed	past tense	She wait-ed at home.
-ing	progressive	She is eat-ing the donut.
-en	past participle	Mary has eat-en the donuts.
-s	plural	She ate the donut-s.
-'s	possessive	Disa's hair is short.
-er	comparative	Disa has short-er hair than Karin.
-est	superlative	Disa has the short-est hair.

Inflectional morphemes in English follow the derivational morphemes in a word. Thus, to the derivationally complex word *commit + ment* one can add a plural ending to form *commit + ment + s*, but the order of affixes may not be reversed to derive the impossible *commit + s + ment = *commitsment.*

Yet another distinction between inflectional and derivational morphemes is that all inflectional morphemes are **productive**: They apply freely to nearly every appropriate base (except "irregular" forms such as *feet*, not **foots*). Most nouns take an *-s* inflectional suffix to form a plural and most verbs take *-ed* to form a past tense, and any new verb added to the language will immediately take these inflections, witness *tweets, tweeting, tweeted.* Derivational morphemes vary a lot in their productivity; only some nouns take the derivational suffix *-ize* to form a verb: *idolize*, but not **picturize*, while *-er* can attach to almost any verb (even very new ones) to make an agent, *sing/singer, dance/dancer, blog/blogger, tweet/tweeter.*

Compared to many languages of the world, English has relatively little inflectional morphology. Some languages are highly inflected. In Swahili, which is widely spoken in eastern Africa, verbs can be inflected with multiple morphemes, as in *kimeanguka* (ki + me + anguka), meaning "it has fallen." Here the verb root *anguka* meaning "fall" has two inflectional prefixes: *ki-* meaning "it" and *me* meaning "completed action." (See Exercise 9.)

Even the more familiar European languages have many more inflectional endings than English. In the Romance languages (languages descended from Latin), the verb has different inflectional endings depending on the subject of the sentence. The verb is inflected to agree in person and number with the subject, as illustrated by the Italian verb *parlare* meaning "to speak":

Io parl**o**	"I speak"	Noi parli**amo**	"We speak"
Tu parl**i**	"You (singular) speak"	Voi parl**ate**	"You (plural) speak"
Lui/Lei parl**a**	"He/she speaks"	Loro parl**ano**	"They speak"

Russian has a system of inflectional suffixes for nouns that indicates the nouns grammatical relation—whether a subject (nominative), direct object (accusative), indirect object (dative), possessor (genitive), and so on—something English usually does with word order or prepositions:

Russian	Case	Translation
Drug čitaet	nominative	"a friend is reading"
Ja vstretil druga	accusative	"I met a friend"
Ja dala èto drugu	dative	"I gave it to a friend"
Bereg reki	genitive	"the bank of the river"
Ja pišu karandašom	instrumental	"I write with a pencil"
Cvety stojat na stole	prepositional	"the flowers are on the table"

The grammatical relation of a noun in a sentence is called the **case** of the noun. When case is marked by inflectional morphemes (the boldfaced underline suffixes), the process is referred to as **case morphology**. Russian has a rich case morphology, whereas English case morphology is limited to the one possessive *-'s* and to its system of pronouns: *I-me-my-mine, you-you-your-yours, he-him-his-his, she-her-her-hers, they-them-their-theirs, we-us-our-ours.* Many of the grammatical relations that Russian expresses with its case morphology are expressed in English with prepositions, as the translations to English indicate.

Among the world's languages is a richness and variety of inflectional processes. Earlier we saw how German uses circumfixes to inflect a verb stem to produce a past particle: *lieb* to ***geliebt,*** similar to the *-ed* ending of English. Arabic infixes vowels for inflectional purposes: *kitàab* "book" but *kútub* "books." Samoan (see Exercise 10) uses a process of **reduplication**—inflecting a word through the repetition of part or all of the word: *savali* "he travels," but *savavali* "they travel." Malay does the same with whole words: *orang* "person," but *orang orang* "people." Languages such as Finnish have an extraordinarily complex case morphology, whereas Mandarin Chinese lacks case morphology entirely.

Inflection achieves a variety of purposes. In English, verbs are inflected with *-s* to show third-person singular agreement. Languages such as Finnish and Japanese have a dazzling array of inflectional processes for conveying everything from "temporary state of being" (Finnish nouns) to "strong negative intention" (Japanese verbs). English spoken 1,000 years ago had considerably more inflectional morphology than Modern English, as we shall discuss in Chapter 8.

The differences between inflectional and derivational morphemes in Modern English are summarized in the table below and in Figure 2.1 that follows it:

Inflectional	Derivational
Grammatical function	Lexical function
No word class change	May cause word class change
Small or no meaning change	Some meaning change
Often required by rules of grammar	Never required by rules of grammar
Follow derivational morphemes in a word	Precede inflectional morphemes in a word
Productive	Some productive, many nonproductive

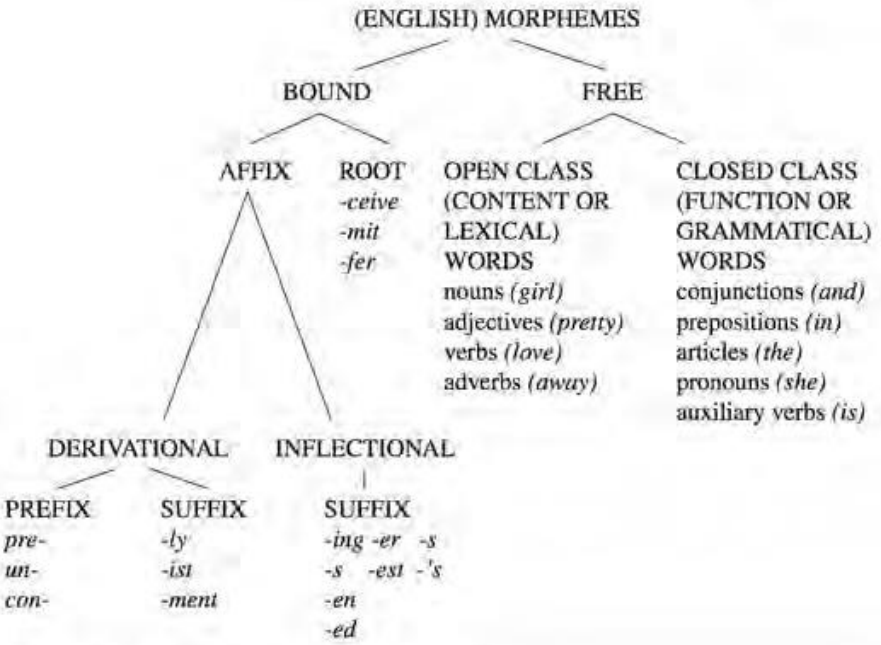
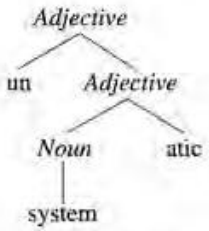


FIGURE 2.1 | Classification of English morphemes.

The Hierarchical Structure of Words

We saw earlier that morphemes are added in a fixed order. This order reflects the *hierarchical structure* of the word, entirely analogous to the hierarchical structure of sentences that we observed in the previous chapter. A word is not a simple sequence of morphemes just as a sentence is not a simple sequence of words. It has an internal structure. For example, the word *unsystematic* is composed of three morphemes: *un-*, *system*, and *-atic*. The root is *system*, a noun, to which we add the suffix *-atic*, resulting in an adjective, *systematic*. To this adjective, we add the prefix *un-*, forming a new adjective, *unsystematic*.

The hierarchical organization of words can be represented using tree diagrams, as illustrated for *unsystematic*:



This tree represents the application of two morphological rules:

1. Noun + atic → Adjective
2. un + Adjective → Adjective

Rule 1 attaches the derivational suffix *-atic* to the root noun, forming an adjective. Rule 2 takes the adjective formed by rule 1 and attaches the derivational prefix *un-*. The diagram shows that the entire word—*unsystematic*—is an adjective that is composed of an adjective—*systematic*—plus *un*. The adjective is itself composed of a noun—*system*—plus the suffix *-atic*.

Hierarchical structure is an essential property of human language. Words (and sentences) have component parts which relate to each other in specific, rule-governed ways. Despite appearances, it is not the case that the morphemes *un-* and *-atic* each relate to the root *system* in the same way. The root *system* is "closer" to *-atic* than it is to *un-*, which is actually connected to the adjective *systematic*, and not directly to the noun *system*. Indeed, **unsystem* is not a word, as may be inferred from the *un-* rule in (2).

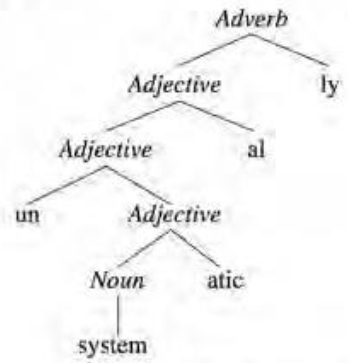
Further morphological rules can be applied to the given structure. For example, English has a derivational suffix *-al*, as in *egotistical, fantastical,* and *astronomical*. In these cases, *-al* is added to an adjective—*egotistic, fantastic, astronomic*—to form a new adjective. The rule for *-al* is as follows:

3. Adjective + al → Adjective

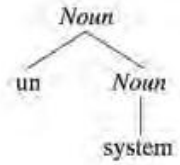
Another affix is -ly, which is added to adjectives—*happy, lazy, hopeful*—to form adverbs *happily, lazily, hopefully*. Following is the rule for -ly:

4. Adjective + ly → Adverb

Applying these two rules to the derived form *unsystematic*, we get the following tree for *unsystematically:*



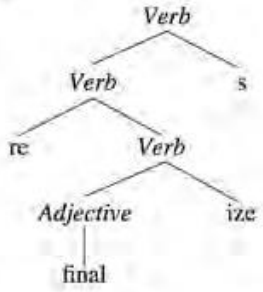
This is a rather complex word. Despite its complexity, it is well-formed because it follows the morphological rules of the language. On the other hand, a very simple word can be ungrammatical. Suppose in the above example we first added *un-* to the root *system*. That would have resulted in the nonword **unsystem*.



**Unsystem* is not a possible word because the rule of English that allows *un-* to be added to nouns is restricted to very few cases, and those are always nouns that already have a suffix such as *un + employment, un +cceptance* or *un + feasability*. The large soft-drink company whose ad campaign promoted the *Uncola* successfully flouted this linguistic rule to capture people's attention. Part of our linguistic competence includes the ability to recognize possible versus impossible words, such as **unsystem* and **Uncola*. Possible words are those that conform to the rules; impossible words are those that do not.

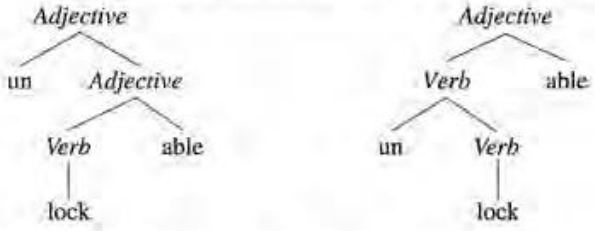
Tree diagrams make explicit the way speakers represent the internal structure of sentences as well as morphologically complex words. In speaking and writing, we appear to string morphemes together sequentially as in *un + system + atic*. However, our mental representation of words is hierarchical as well as linear, and this is shown by tree diagrams.

Inflectional morphemes are equally well represented. The following tree shows that the inflectional agreement morpheme *-s* follows the derivational morphemes *-ize* and *re-* in *refinalizes:*



The tree also shows that *re-* applies to *finalize*, which is correct as **refinal* is not a word, and that the inflectional morpheme follows the derivational morpheme.

The hierarchical organization of words is even more clearly shown by structurally ambiguous words, words that have more than one meaning by virtue of having more than one structure. Consider the word *unlockable*. Imagine you are inside a room and you want some privacy. You would be unhappy to find the door is *unlockable*—"not able to be locked." Now imagine you are inside a locked room trying to get out. You would be very relieved to find that the door is *unlockable*—"able to be unlocked." These two meanings correspond to two different structures, as follows:



In the first structure, the verb *lock* combines with the suffix *-able* to form an adjective *lockable* ("able to be locked"). Then, the prefix *un-*, meaning "not," combines with the derived adjective to form a new adjective *unlockable*

("not able to be locked"). In the second case, the prefix *un-* combines with the verb *lock* to form a derived verb *unlock*. Then, the derived verb combines with the suffix *-able* to form *unlockable*, "able to be unlocked."

An entire class of words in English follows this pattern: *unbuttonable, unzippable,* and *unlatchable,* among others. The ambiguity arises because the prefix *un-* can combine with an adjective, as illustrated in rule 2, or it can combine with a verb, as in *undo, unstaple, unearth,* and *unloosen*.

If words were only strings of morphemes without any internal organization, we could not explain the ambiguity of words such as *unlockable*. These words also illustrate another key point, which is that structure is important to determining meaning. The same three morphemes occur in both versions of *unlockable,* yet there are two distinct meanings. The different meanings arise because of the different structures.

Rule Productivity

> "Curiouser and curiouser!" cried Alice (she was so much surprised, that for the moment she quite forgot how to speak good English).
>
> LEWIS CARROLL, *Alice's Adventures in Wonderland*, 1865

We have noted that some morphological processes, inflection in particular, are productive, meaning that they can be used freely to form new words from the list of free and bound morphemes. Among derivational morphemes, the suffix *-able* can be conjoined with any verb to derive an adjective with the meaning of the verb and the meaning of *-able,* which is something like "able to be" as in *accept + able, laugh + able, pass + able, change + able, breathe + able, adapt + able,* and so on. The productivity of this rule is illustrated by the fact that we find *-able* affixed to new verbs such as *tweetable,* meaning a message suitable for posting on Twitter (140 characters or fewer).

The prefix *un-* derives same-class words with an opposite meaning: *unafraid, unfit, un-American,* and so on. Additionally, *un-* can be added to derived adjectives that have been formed by morphological rules, resulting in perfectly acceptable words such as *un + believe + able* or *un + pick + up + able*.

Yet, *un-* is not fully productive. We find *happy* and *unhappy, cowardly* and *uncowardly,* but not *sad* and **unsad, brave* and **unbrave,* or *obvious* and **unobvious*. It appears that the "un-Rule" is most productive for adjectives that are derived from verbs, such as *unenlightened, unsimplified, uncharacterized, unauthorized,* and *undistinguished*. It also appears that most acceptable *un-*words have polysyllabic bases, and while we have *unfit, uncool, unread,* and *unclean,* many of the unacceptable *un-* forms have monosyllabic stems such as **unbig, *ungreat, *unred, *unsad, *unsmall,* and **untall*.

The rule that adds *-er* to verbs in English to produce a noun meaning "one who does" is a nearly productive morphological rule, giving us *examiner, examtaker, sleepwalker, stir-fryer* for your favorite chef and even *force-feeder* for *thwarters* of *hunger-strikers,* but fails full productivity owing to "unwords" such as **chairer,* which is not "one who chairs."

The "other" *-er* suffix, the one that means "more" as in *greedier,* also fails to be entirely productive as Alice's **curiouser* points out. The more syllables a word

has, the less likely *-er* will work and we will need the word *more*, as in *more beautiful* (but not **beautifuler*) compared with the well-formed *prettier* and *lovelier*.

Other derivational morphemes fall farther short of productivity. Consider:

sincerity	from	*sincere*
warmth	from	*warm*
moisten	from	*moist*

The suffix *-ity* is found in many other words in English, such as *chastity, scarcity,* and *curiosity;* and *-th* occurs in *health, wealth, depth, width,* and *growth*. We find *-en* in *sadden, ripen, redden, weaken,* and *deepen*. Still, the phrase "*The tragicity of Hamlet" sounds somewhat strange, as does "*I'm going to *heaten* the sauce." Someone may say *coolth,* but when "words" such as *tragicity, heaten,* and *coolth are* used, it is usually either a slip of the tongue or an attempt at humor. Most adjectives will not accept any of these derivational suffixes.

Even less productive to the point of rareness are such derivational morphemes as the diminutive suffixes in the words *pig* + *let* and *sap* + *ling*.

In the morphologically complex words that we have seen so far, we can generally predict the meaning based on the meanings of the morphemes that make up the word. *Unhappy* means "not happy" and *acceptable* means "fit to be accepted." However, one cannot always know the meaning of the words derived from free and derivational morphemes by knowing the morphemes themselves. The following *un-* forms have unpredictable meanings:

unloosen	"loosen, let loose"
unrip	"rip, undo by ripping"
undo	"reverse doing"
untread	"go back through in the same steps"
unearth	"dig up"
unfrock	"deprive (a cleric) of ecclesiastic rank"
unnerve	"fluster"

Morphologically complex words whose meanings are not predictable must be listed individually in our mental lexicons. However, the morphological rules must also be in the grammar, revealing the relation between words and providing the means for forming new words.

Exceptions and Suppletions

The exception gives Authority to the Rule

GIOVANNI TORRIANO, *A Common Place of Italian Proverbs*, 1666

The morphological rule that forms plural nouns from singular nouns does not apply to words like *child, man, foot,* and *mouse*. These words are exceptions to the rule. Similarly, verbs such as *go, sing, bring, run,* and *know* are exceptions to the inflectional rule for producing past-tense verbs in English. These exceptional forms must be stored in the lexicon. There are therefore two mechanisms for forming complex words; regular forms such as *danced* and *books* are formed by applying morphological rules to the base morpheme, which is stored in the lexicon. Irregular, also called **suppletive**, forms must be retrieved directly from the lexicon.

When children are learning English (or any other language), they first learn the regular rules, which they apply to all forms. Thus, we often hear them say *mans* and *goed*. Later in the acquisition process, they specifically learn irregular plurals such as *men* and *mice*, and irregular past tense forms such as *came* and *went*. These children's errors are actually evidence that the regular rules exist. It also suggests that the "rule route" for forming complex words is more accessible to the child than accessing irregular forms in the lexicon. Children's morphological learning is discussed more fully in Chapter 9.

When a new word enters the language, the regular inflectional rules generally apply. The plural of *geek*, when it was a new word in English, was *geeks*, not **geeken*, although we are advised that some geeks wanted the plural of *fax* to be **faxen*, like *oxen*, when *fax* entered the language as a shortened form of *facsimile*. Never fear: its plural is *faxes*. The exception to this may be a word "borrowed" from a foreign language. For example, the plural of Latin *datum* has always been *data*, never *datums*, though nowadays *data*, the one-time plural, is treated by many as a singular word like *information*.

The past tense of the verb *hit*, as in the sentence *Yesterday you hit the ball*, and the plural of the noun *sheep* as in *The sheep are in the meadow*, show that some morphemes have no phonological shape at all. We know that *hit* in the above sentence is *hit* + *past* because of the time adverb *yesterday*, and we know that *sheep* is the phonetic form of *sheep* + *plural* because of the plural verb form *are*.

When a verb is derived from a noun, even if it is pronounced the same as an irregular verb, the regular rules apply to it. Thus, *ring*, when used in the sense of encircle, is derived from the noun *ring*, and as a verb it is regular. We say *the police ringed the bank with armed men*, not **rang the bank with armed men*. In the jargon of baseball one says that *the hitter flied out* (hit a lofty ball that was caught), rather than **flew out*, because the verb came from the compound noun *fly ball*.

Lexical Gaps

The vast majority of letter (sound) sequences that could be words of English—*crint, spleek, feg*—are not. Similar comments apply to morphological derivations like *disobvious* or *inobvious*. "Words" that conform to the rules of word formation but are not truly part of the vocabulary are called **accidental gaps** or **lexical gaps**. Accidental gaps are well-formed but non-existing words.

The actual words in a language constitute a mere subset of the possible words. There are always gaps in the lexicon—words not present but that could be added. Some of the gaps are due to the fact that a permissible sound sequence has no meaning attached to it (such as *blick*, or *slarm*, or *krobe*). The sequence of sounds must be in keeping with the constraints of the language, however; **bnick* is not a "gap" because no word in English can begin with *bn*. We will discuss such constraints in chapter 6.

Other gaps result when possible combinations of morphemes never come into use. Speakers can distinguish between impossible words such as **unsystem* and **needlessity* and possible but nonexisting words such as *magnificenter* or *disobvious* (cf. *distrustful*). The latter are blocked, as noted earlier, owing to the presence of *more magnificent* and *nonobvious*. Psycholinguistic experiments show that listeners respond more slowly to "possible" nonwords such as *floop* and *plim* than to "impossible" nonwords such as *tlat* and *mrock* (see Chapter 10). The ability to make this distinction is further evidence that the morphological component of our mental grammar consists of not just a lexicon—a list of existing words—but also of rules that enable us to create and understand new words, and to recognize possible and impossible words.

Other Morphological Processes

The various kinds of affixation that we have discussed are by far the most common morphological processes among the world's languages. But, as we continue to emphasize in this book, the human language capacity is enormously creative, and that creativity extends to ways other than affixation in which words may be altered and created.

Back-Formations

> [A girl] was delighted by her discovery that *eats* and *cats* were really *eat* + *-s* and *cat* + *-s*. She used her new suffix snipper to derive *mik* (mix), *upstair, downstair, clo* (clothes), *len* (lens), *brefek* (from *brefeks*, her word for breakfast), *trappy* (trapeze), even *Santa Claw*.
>
> STEVEN PINKER, *Words and Rules: The Ingredients of Language*, 1999

Misconception can sometimes be creative, and nothing in this world both misconceives and creates like a child, as we shall see in Chapter 9. A new word may enter the language because of an incorrect morphological analysis. *Peddle* was derived from *peddler* on the mistaken assumption that the *-er* was the agentive suffix. Such words are called **back-formations**. The verbs *hawk, stoke, swindle, burgle*, and *edit* all came into the language as back-formations—of *hawker, stoker, swindler, burglar*, and *editor*. *Pea* was derived from a singular word, *pease*, by speakers who thought *pease* was a plural.

Some word creation comes from deliberately miscast back-formations. The word *bikini* comes from the Bikini atoll of the Marshall Islands. Because the first

syllable *bi-* is a morpheme meaning "two" in words like *bicycle,* some clever person called a topless bathing suit a *monokini* and a tank top with a bikini bottom a *tankini*. Historically, a number of new words have entered the English lexicon in a similar way, some of the most recent being the *appletini, chocotini, mintini,* and *God-knows-what-else-tini* to be found as flavor additives to the traditional martini libation. Based on analogy with such pairs as *act/action, exempt/exemption,* and *revise/revision,* new words *resurrect, preempt,* and *televise* were formed from the existing words *resurrection, preemption,* and *television.*

Language purists sometimes rail against back-formations and cite *enthuse* and *liaise* (from *enthusiasm* and *liaison*) as examples of language corruption. However, language is not corrupt; it is adaptable and changeable. Don't be surprised to discover in your lifetime that *shevelled* and *chalant* have infiltrated the English language (from *disheveled* and *nonchalant*) to mean "tidy" and "concerned," and if it happens do not cry "havoc" and let slip the dogs of prescriptivism; all will be well.

Compounds

> [T]he Houynhnms have no Word in their Language to express any thing that is evil, except what they borrow from the Deformities or ill Qualities of the Yahoos. Thus they denote the Folly of a Servant, an Omission of a Child, a Stone that cuts their feet, a Continuance of foul or unseasonable Weather, and the like, by adding to each the Epithet of Yahoo. For instance, Hnhm Yahoo, Whnaholm Yahoo, Ynlhmnawihlma Yahoo, and an ill contrived House, Ynholmhnmrohlnw Yahoo.
>
> JONATHAN SWIFT, *Gulliver's Travels*, 1726

Two or more words may be joined to form new, compound words. English is very flexible in the kinds of combinations permitted, as the following table of compounds shows.

	Adjective	**Noun**	**Verb**
Adjective	bittersweet	smartwatch	whitewash
Noun	headstrong	homework	spoonfeed
Verb	feel-good	pickpocket	sleepwalk
Preposition	overeager	outpatient	undergo

Some compounds that have been recently introduced into English are *Facebook, LinkedIn, android apps, e-commerce, crowdfunding, cyber café, flash mob,* and *robocall.*

In English, the rightmost word in a compound is the **head** of the compound. The head is the part of a word or phrase that determines its broad meaning and grammatical category. The head of the compound *smartwatch* is *watch,* which determines the core meaning (*smartwatch* is a kind of watch), and syntactic category (*watch* is a noun so *smartwatch* is also a noun). The head of *sleepwalk* (a kind of walking) is *walk,* a verb, so *sleepwalk* is also a verb. If you go through the examples given above, you will see that they mostly conform to this "right-hand head rule." But there are exceptions. Compounds whose rightmost member is a preposition are not themselves prepositions. A *meet-up* is a kind of meeting, not a direction, *meltdown* and *knockout* are nouns, not prepositions. This is further evidence that prepositions form a closed-class category that does not readily admit new members, in contrast to nouns, verbs, and adjectives.

Some compounds are said to be "unheaded" because the rightmost member does not determine their core meaning. An example is *flatfoot*, which is not a kind of *foot*, but a slang term meaning policeman. *Policeman* is also a compound, but unlike *flatfoot*, it is headed by *man*. A policeman is a kind of man. The head of a compound transmits not only its meaning and syntactic category to the compound, but also whatever irregular morphological form it takes. The plural of *man* is the irregular form *men* and the plural of *policeman* is *policemen* (same for *policewomen*). But in the case of unheaded compounds such as *flatfoot*, irregular morphology is not inherited by the compound—just as the meaning is not inherited. A *flatfoot* is not a kind of foot, and its plural is not *flatfeet*, but rather *flatfoots*. It undergoes the regular rule. Absent a head the compound transmits neither its meaning nor its irregular morphology. Similar examples are given below:

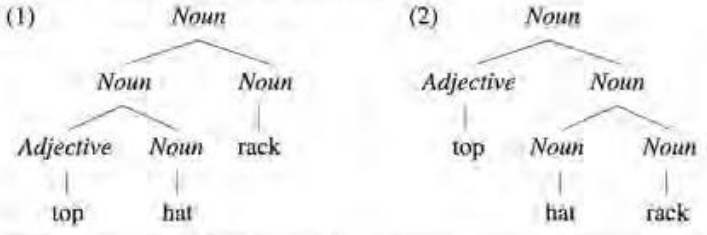
walkman	*walkmen	walkmans	(device for playing music)
sabertooth	*saberteeth	sabertooths	(extinct species of tiger)
lowlife	*lowlives	lowlifes	(a disreputable person)

There are a few English compounds that appear to be left-headed. An *attorney-general* is not a general but an attorney, a *mother-in-law* is a kind of mother. A *passer-by* is a person who passes. In these and similar cases the, plural inflection occurs "inside" the compound, on the head, *attorneys-general, passers-by, sons-in-law, courts-martial, sergeants-major*. Many of these left-headed compounds are legal or military terms. They were borrowed into English from French—a language in which adjectives follow nouns—during the Norman occupation of England when French was used for legal, military, and other affairs of state (see Chapter 8). It is fair to say, however, that for many people outside the military and legal professions these compounds behave like regular plurals, *attorney generals*, *court-martials*, and so on.

Although two-word compounds are the most common in English, it would be difficult to state an upper limit: Consider *three-time loser, four-dimensional space-time, sergeant-at-arms, mother-of-pearl, master of ceremonies, daughter-in-law,* and the military slang *fire-in-the-hole* meaning "watch out!"

Spelling does not tell us what sequence of words constitutes a compound; whether a compound is spelled with a space between the two words, with a hyphen, or with no separation at all depends on the idiosyncrasies of the particular compound, as shown in *blackbird, six-pack,* and *smoke screen.*

Like derived words, compounds have internal structure. This is clear from the ambiguity of a compound such as *top + hat + rack*, which can mean "a rack for top hats" corresponding to the structure in tree diagram (1), or "the highest hat rack," corresponding to the structure in (2).



Meaning of Compounds

The head of compound carries its core or basic meaning. *Homework* is a kind of work done at home. But the meaning of a compound is not always simply the sum of the meanings of its parts; a *blackboard* may be green or white, an online newspaper is still a *newspaper* though no paper is involved, an albino *goldfish* would still be a goldfish, and a rattlesnake, though more stealthy, remains a *rattlesnake* even without its rattle.

Other compounds reveal other meaning relations between the parts, which are not entirely consistent because many compounds are idiomatic (idioms are discussed in Chapter 4). A *boathouse* is a house for boats, but a *cathouse* is not a house for cats. (It is slang for a house of prostitution or whorehouse.) A *jumping bean* is a bean that jumps, a *falling star* is a star that (appears to) fall, and a *magnifying glass* is a glass that magnifies; but a *looking glass* is not a glass that looks, nor is an *eating apple* an apple that eats, and *laughing gas* does not laugh. *Peanut oil* and *olive oil* are oils made from something, but what about *baby oil*? And is this a contradiction: "horse meat is dog meat"? Not at all, since the first is meat *from* horses and the other is meat *for* dogs.

In the examples so far, the meaning of each compound includes at least to some extent the meanings of the individual parts. However, many compounds nowadays do not seem to relate to the meanings of the individual parts at all. A *jack-in-a-box* is a tropical tree, and a *turncoat* is a traitor. A *highbrow* does not necessarily have a high brow, nor does a *bigwig* have a big wig, nor does an *egghead* have an egg-shaped head.

Like certain words with the prefix *un-*, the meaning of many compounds must be learned as if they were individual whole words. Some of the meanings may be figured out, but not all. If you had never heard the word *hunchback*, it might be possible to infer the meaning; but if you had never heard the word *flatfoot*, it is doubtful you would know it means "detective" or "policeman," even though the origin of the word, once you know the meaning, can be figured out.

The pronunciation of English compounds differs from the way we pronounce the sequence of two words that are not compounded. In an actual compound, the first word is usually stressed (pronounced somewhat louder and higher in pitch), and in a noncompound phrase the second word is stressed. Thus, we stress *hot* in *hotdog* the food, but *dog* in *hot dog* the canine. (Stress, pitch, and other similar features are discussed in Chapters 5 and 6.)

Universality of Compounding

Other languages have rules for conjoining words to form compounds, as seen by French *cure-dent*, "toothpick"; German *Panzerkraftwagen*, "armored car"; Russian *cetyrexetaznyi*, "four-storied"; and Spanish *tocadiscos*, "record player." In the Native American language Tohono O'odham, the word meaning "thing" is *haʔichu*, and it combines with *doakam*, "living creatures," to form the compound *haʔichu doakam*, "animal life."

In Thai, the word "cat" is *mɛɛw*, the word for "watch" (in the sense of "to watch over") is *fâw*, and the word for "house" is *bâan*. The word for "watch cat" (like a watchdog) is the compound *mɛɛwfâwbâan*—literally, "catwatchhouse."

Compounding is a common and frequent process for enlarging the vocabulary of all languages.

"Malapropisms"

A malapropism is the confusion of a word through misinterpretation of its morphemes, usually with a humorous effect. Such "mistakes" reveal much of the lexical knowledge of the speaker. Here are a few examples. Many more circulate on the Internet.

Word	Humorous Definition
abdicate	to give up all hope of ever having a flat stomach
adamant	pertaining to original sin
circumvent	opening in the front of boxer shorts worn by Jewish men
coffee	the person upon whom one coughs
deciduous	able to make up one's mind
flabbergasted	appalled over how much weight you have gained
frisbeetarianism	the belief that after death your soul flies up and gets stuck in a tree
gubernatorial	having to do with peanuts
gullible	to do with seabirds
longevity	being very tall
metronome	a city dwelling diminutive troll
oxymoron	a really stupid cow
polyglot	more than one glot

The poor English-class student who used the word *indefatigable* in the sentence

She tried many reducing diets, but remained indefatigable.

clearly shows morphological knowledge: *in* meaning "not" as in *ineffective; de* meaning "off" as in *decapitate;* "fat" as in fat; *able* as in *able;* and combined meaning, "not able to take the fat off."

Sign Language Morphology

Sign languages are rich in morphology. They have root and affix morphemes, free and bound morphemes, lexical and grammatical morphemes, derivational and inflectional morphemes, and morphological rules for their combination to form morphologically complex signs. The affixation is accomplished by preceding or following a particular gesture with another "affixing" gesture.

The suffix meaning "negation," roughly analogous to *un-* or *non-* or *dis-*, is accomplished as a rapid turning over of the hand(s) following the end of the root sign that is being negated. For example, "want" is signed with open palms facing upward; "don't want" follows that gesture with a turning of the palms to face downward. This "reversal of orientation" suffix may be applied, with necessary adjustments, to many root signs.

In sign language, many morphological processes are not linear. Rather, the sign stem occurs nested within various movements and locations in signing space so that the gestures are simultaneous, an impossibility with spoken languages.

Inflection of sign roots also occurs in ASL and all other sign languages, which characteristically modify the movement of the hands and the spatial contours of the area near the body in which the signs are articulated. For example, movement away from the signer's body toward the "listener" might inflect a verb as in "I see you," whereas movement away from the listener and toward the body would inflect the verb as in "you see me."

Morphological Analysis: Identifying Morphemes

Case Study 1

As we have seen in this chapter, speakers of a language know the internal structure of words because they know the morphemes of their language and the rules for their combination. This is unconscious knowledge of course and it takes a trained linguist to make this knowledge explicit as part of a descriptive grammar of the language. The task is challenging enough when the language you are analyzing is your own, but linguists who speak one language may nevertheless analyze languages for which they are not native speakers.

Suppose you were a linguist from the planet Zorx who wanted to analyze English. How would you discover the morphemes of the language? How would you determine whether a word had one, two, or more morphemes, and what they were?

The first thing to do would be to ask native speakers how they say various words. (It would help to have a Zorxese–English interpreter along; otherwise, copious gesturing is in order.) Assume you are talented in miming and manage to collect the following forms:

Adjective	Meaning
ugly	"very unattractive"
uglier	"more ugly"
ugliest	"most ugly"
pretty	"nice looking"
prettier	"more nice looking"
prettiest	"most nice looking"
tall	"large in height"
taller	"more tall"
tallest	"most tall"

To determine what the morphemes are in such a list, the first thing a field linguist would do is to see whether some forms mean the same thing in different words, that is, to look for *recurring* forms. We find them: *ugly* occurs in *ugly, uglier,* and *ugliest,* all of which include the meaning "very unattractive." We also find that *-er* occurs in *prettier* and *taller,* adding the meaning "more" to the adjectives to which it is attached. Similarly, *-est* adds the meaning "most." Furthermore, by having our Zorxese–English interpreter pose additional questions to our native English-speaking consultant we find that *-er* and *-est* do not occur in isolation with the meanings of "more" and "most." We can therefore conclude that the following morphemes occur in English:

ugly	root morpheme
pretty	root morpheme
tall	root morpheme
-er	bound morpheme "comparative"
-est	bound morpheme "superlative"

As we proceed, we find other words that end with *-er* (e.g., *singer, lover, bomber, writer, teacher*) in which the *-er* ending does not mean "comparative" but, when attached to a verb, changes it to "a noun who 'verbs,'" (e.g., *sings, loves, bombs, writes, teaches*). So, we conclude that this is a different morpheme, even though it is pronounced the same as the comparative. We go on and find words such as *number, somber, butter,* and *member* in which the *-er* has no separate meaning at all—a *somber* is not "one who sombs" and a *member* does not *memb*—and therefore these words must be monomorphemic.

Case Study 2

Once you have practiced on the morphology of English, you might want to go on to describe another language. Paku was invented by the linguist Victoria Fromkin for a 1970s TV series called *Land of the Lost,* made into a major motion picture of the same name starring Will Farrell in 2009. This was the language used by the monkey people called Pakuni. Suppose you found yourself in this strange land and attempted to find out what the morphemes of Paku were. Again, you would collect your data from a native Paku speaker and proceed as the Zorxian did with English. Consider the following data from Paku:

me	"I"	meni	"we"
ye	"you (singular)"	yeni	"you (plural)"
we	"he"	weni	"they (masculine)"
wa	"she"	wani	"they (feminine)"
abuma	"girl"	abumani	"girls"
adusa	"boy"	adusani	"boys"
abu	"child"	abuni	"children"
Paku	"one Paku"	Pakuni	"more than one Paku"

By examining these words, you find that the plural forms end in *-ni* and the singular forms do not. You therefore conclude that *-ni* is a separate morpheme meaning "plural" that is attached as a suffix to a noun.

Case Study 3

Here is a more challenging example, but the principles are the same. Look for repetitions and near repetitions of the same word parts, taking your cues from the meanings given. These are words from Michoacan Aztec, an indigenous language of Mexico:

nokali	"my house"	mopelo	"your dog"
nokalimes	"my houses"	mopelomes	"your dogs"
mokali	"your house"	ikwahmili	"his cornfield"
ikali	"his house"	nokwahmili	"my cornfield"
nopelo	"my dog"	mokwahmili	"your cornfield"

We see there are three base meanings: *house, dog,* and *cornfield.* Starting with *house* we look for commonalities in all the forms that refer to "house." They all contain *kali* so that makes a good first guess. (We might, and you might, have

reasonably guessed *kal,* but eventually we wouldn't know what to do with the *i* at the end of *nokali* and *mokali.*) With *kali* as "house" we may infer that *no* is a prefix meaning "my," and that is supported by *nopelo* meaning "my dog." This being the case, we guess that *pelo* is "dog," and see where that leads us. If *pelo* is "dog" and *mopelo* is "your dog," then *mo* is probably the prefix for "your." Now that we think that the possessive pronouns are prefixes, we can look at *ikali* and deduce that *i* means "his." If we're right about the prefixes, then we can separate out the word for "cornfield" as *kwahmili.* The only morpheme unaccounted for is "plural." We have two instances of plurality, *nokalimes,* and *mopelomes,* but since we know *no, kali, mo,* and *pelo,* it is straightforward to identify the plural morpheme as the suffix *mes.*

The end results of our analysis are:

kali	"house"
pelo	"dog"
kwahmili	"cornfield"
no-	"my"
mo-	"your"
i-	"his"
-mes	"plural"

Case Study 4

Here is a final example of morphological analysis complicated by some changes in spelling (pronunciation), a bit like the way we spell the indefinite article "a" as either *a* before a consonant or *an* before a vowel in English.

Often the data you are given (or record in the field) are a hodge-podge, such as these examples from a Slavic language:

gledati	"to watch"	nazivaju	"they call"
diram	"I touch"	sviranje	"playing (noun)"
nazivanje	"calling (noun)"	gladujem	"I starve"
dirati	"to touch"	kupuju	"they buy"
kupovanje	"buying (noun)"	stanovati	"to live"
sviraju	"they play"	kupujem	"I buy"
gledam	"I watch"	diranje	"touching (noun)"
stanovanje	"living (noun)"	stanujem	"I live"
diraju	"they touch"	gladovanje	"starving (noun)"
nazivati	"to call"	stanuju	"they live"
kupovati	"to buy"	gledaju	"they watch"
gladuju	"they starve"	svirati	"to play"
gladovati	"to starve"	sviram	"I play"
gledanje	"watching (noun)"	nazivam	"I call"

The first step is often merely to rearrange the data, grouping commonalities. Here, we see that after (possibly considerable) perusal, the data involve seven stems, which we group by meaning. We also note that there are exactly four forms for each stem (infinitive, I (first-person singular), they (third-person plural), and the noun form or gerund) and we fold that into the reorganization.

We even alphabetize to emphasize the orderliness. Thus, rearranged the data appear less daunting:

	touch	starve	watch	buy	call	live	play
Infinitive	dirati	gladovati	gledati	kupovati	nazivati	stanovati	svirati
1st, Sing.	diram	gladujem	gledam	kupujem	nazivam	stanujem	sviram
3rd, Plur.	diraju	gladuju	gledaju	kupuju	nazivaju	stanuju	sviraju
Noun	diranje	gladovanje	gledanje	kupovanje	nazivanje	stanovanje	sviranje

Now, the patterns become more evident. We hypothesize that in the first column *dir-* is a stem meaning "touch" and that the suffix *-ati* forms the infinitive; the suffix *-am* is the first-person singular; the suffix *-aju* is the third-person plural; and finally that the suffix *-anje* forms a noun, similar to the suffix *-ing* in English. We need to test our guess and the second column belies our hypothesis, but undaunted we push on and we see that the columns for "watch," "call," and "play" work exactly like the column for "touch," with stems *gled-*, *naziv-*, and *svir-*.

But columns "starve," "buy," and "live" are not cooperating. They follow the pattern for the infinitive (first row) and noun formation (fourth row), and give us stems *gladov-*, *kupov-*, and *stanov-* but something is awry in the second and third row for these three verbs. Instead of *-am* meaning "I" it appears to be *-em*. (Yes, it could be *-ujem* or even *-jem*, but we stay with the form that's nearest to *-am*.) So, the suffix meaning "I" has two forms, *am/em*, again analogous to the English *a/an* alternation.

But horrors, something is going haywire with the stems in just these three cases and now our effort to rearrange the data pays off. We see fairly quickly that the misbehaving cases are all verbs ending in *ov*. And if we stick with our decision that *-am/-em* means "I," then we can hypothesize that the stem alternates pronunciation in certain cases when it ends in ov, kind of like English *democrat/democracy*. If we accept this we are forced into the decision that the third-person plural morpheme also has an alternate form, namely *u*, so its two forms are *-aju/-u*.

We may sum up our analysis as follows:

Stems *dir-*, *gled-*, *naziv-*, *svir-* take suffixes *-ati*, *-am*, *-aju*, *-anje*. The verbs ending in *ov* have stems *gladov-*, *kupov-*, *stanov-* when expressed as infinitives with *-ati*, and noun-forms with *-anje*; and stems *gladuj-*, *kupuj-*, *stanuj-* when expressed as "I" with *-em* or as "they" with *-u*.

Finally, if we discover in our field work that *razarati* means "to destroy" then we immediately know that "I destroy" is *razaram*, "they destroy" is *razaraju*, and "destruction" is *razaranje*. Or, if we're told that *darujem* means "I gift" then we deduce that the noun "gift" is *darovanje*, the infinitive "to gift" is *darovati*, and "they gift" is *daruju*.

In Chapter 6, we'll see *why* the "same" morpheme may be spelled or pronounced differently in different contexts, and that the variation, like most grammatical processes, is rule-governed. By following the analytical principles discussed in the preceding four case studies you should be able to solve the morphological puzzles that appear in the exercises.

Summary

Knowing a language means knowing the **morphemes** of that language, which are the elemental units that constitute words. *Moralizers* is an English word composed of four morphemes: *moral* + *ize* + *er* + *s*. When you know a word or morpheme, you know both its **form** (sound or gesture) and its **meaning;** these are inseparable parts of the **linguistic sign**. The relationship between form and meaning is **arbitrary**. There is no inherent connection between them (i.e., the words and morphemes of any language must be learned).

Morphemes may be free or bound. **Free morphemes** stand alone such as *girl* or *the*, and they come in two types: **open class**, containing the content words of the language, and **closed class**, containing function words such as *the* or *of*. **Bound morphemes** may be **affixes** or bound roots such as *-ceive*. Affixes may be **prefixes, suffixes, circumfixes,** or **infixes**. Affixes may be derivational or inflectional. **Derivational affixes** derive new words; **inflectional affixes**, such as the plural affix *-s*, make grammatical changes to words. Complex words contain a **root** around which **stems** are built by affixation. Rules of morphology determine what kind of affixation produces actual words such as *un* + *system* + *atic*, and what kind produces nonwords such as **un* + *system*.

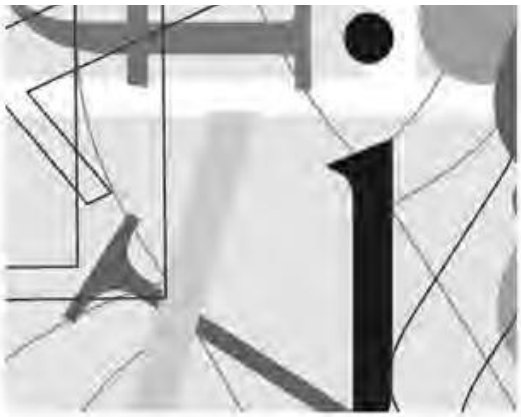
Words have hierarchical structure evidenced by ambiguous words such as *unlockable*, which may be *un* + *lockable* "unable to be locked" or *unlock* + *able* "able to be unlocked."

Some morphological rules are **productive**, meaning they apply freely to the appropriate stem; for example, *re-* applies freely to verbal stems to give words like *redo, rewash,* and *repaint*. Other rules are more constrained, forming words such as *young* + *ster* but not **smart* + *ster*. Inflectional morphology is extremely productive: the plural *-s* applies freely even to nonsense words. **Suppletive forms** escape inflectional morphology, so instead of **mans* we have *men;* instead of **bringed* we have *brought*.

There are many ways for new words to be created other than affixation. **Compounds** are formed by uniting two or more root words in a single word, such as *homework*. The **head** of the compound (the rightmost word) bears the basic meaning, so *homework* means a kind of work done at home, but often the meaning of compounds is not easily predictable and must be learned as individual lexical items, such as *laughing gas*. **Back-formations** are words created by misinterpreting an affix look-alike such as *-er* as an actual affix, so, for example, the verb *peddle* was formed under the mistaken assumption that peddler was *peddle* + *-er*.

The grammars of sign languages also include a morphological component consisting of a root, derivational and inflectional sign morphemes, and the rules for their combination.

Morphological analysis is the process of identifying form-meaning units in a language, taking into account small differences in pronunciation, so that prefixes *in-* and *im-* are seen to be variants of the "same" prefix in English (cf. *intolerable, impeccable*) just as *democrat* and *democrac* are stem variants of the same morpheme, which shows up in *democratic* with its "t" and in *democracy* with its "c."



3

Syntax: Infinite Use of Finite Means

> To grammar even kings bow.
>
> J. B. MOLÈIRE, *Les Femmes Savantes, II*, 1672

It is a remarkable fact that any speaker of a human language can learn and store in his or her mental lexicon thousands of words, each of which is an arbitrary pairing of sound and meaning. Even more astonishing is our ability to combine these words to produce and understand an infinite number of novel sentences, as we showed with the following sentence:

> This is the dog that worried the cat that killed the rat that ate the malt that lay in the house that Jack built . . .

To further illustrate, consider the following:

> Snorlax is asleep.
> The monster is asleep.
> The friend of the monster is asleep.
> The rightmost person in the first row is asleep.
> The person immediately to the left of the rightmost person in the front row is asleep.
> The person behind the person immediately to the left of the rightmost person in the first row is asleep.
> Snorlax is asleep.
> Pikachu noticed that Snorlax is asleep.

Nobody cares that Pikachu noticed that Snorlax is asleep.
Squirtle knows that nobody cares that Pikachu noticed that Snorlax is asleep.

We can do this because we know (a finite number of) rules, which can be applied repeatedly. All spoken language is governed by rules—the set of rules is called a **grammar**. Every speaker has a mental grammar of the rules of his or her language that he or she follows in producing, understanding, and making judgments of well-formedness (grammaticality) about his or her language.

If we modify the order of words or omit some of the words, the sentences sound "weird" or "odd." (Recall that the asterisk or star preceding a sentence is the linguistic conventio or indicating that the sentence is ungrammatical or ill-formed according to the rules of the grammar.)

*Asleep is Homer.
*Professor the is asleep.
*Rightmost person the in the first row is asleep.
*Homer asleep.
*Right most person front row is asleep.

The oddness of these sentences indicates that some rule of the language has been violated. The sentences are ungrammatical.

To further illustrate this idea let's look at a simple made-up rule of English that we'll call the "everybody knows" rule:

Rule: If S is a sentence of English then *Everybody knows that S* is a sentence of English.

This rule can be iterated (repeated) any number of times to produce an arbitrary number of new sentences.

Snorlax is asleep.
Everybody knows that Snorlax is asleep.
Everybody knows that everybody knows that Snorlax is asleep.
Everybody knows that everybody knows that everybody knows that Snorlax is asleep.

This simple rule in the mind of a speaker enables him or her to produce and understand a potentially infinite number of sentences. The "everybody knows" rule describes (generates) an infinite set of sentences. Any sentence that conforms to the rule is judged well-formed and any sentence that does not conform to the rule is judged ungrammatical, such as the following:

*Knows everybody that Snorlax is asleep.

Given any sentence a speaker could create another sentence by adding a (nother) prepositional phrase, relative clause, or by embedding one sentence inside another as in the "everybody knows" examples. Or simply by adding another adjective:

The kindhearted boy had many girlfriends.
The kindhearted, intelligent boy had many girlfriends.
The kindhearted, intelligent, handsome boy had many girlfriends.

All languages have mechanisms of this sort that make the number of sentences limitless. Like words, discussed in the previous chapter, sentences are composed of finitely many discrete units that are combined by rules. Thus languages make infinite use of finite means. In this respect knowledge of language is like knowledge of integers. There is no limit to the number of even integers you could enumerate: 2, 4, 6, 8, 10, ... Clearly, you didn't memorize all of them. Rather, you know a rule that allows you to produce new integers from old ones.

Rule: If E is an integer, E+2 is an integer.

This ability to make infinite use of finite means shows the creative nature of human linguistic knowledge—not creative in the sense that we are all accomplished poets, but creative in that none of us is limited to a fixed repertoire of expressions. Rather, we can exploit the resources of our language and grammar to produce, understand and make judgments about a limitless number of sentences embodying a limitless range of ideas and emotions.

The part of grammar that represents a speaker's knowledge of sentences and their structures is called **syntax**. The aim of this chapter is to first show you what syntactic structures look like and then to familiarize you with some of the rules that determine them. Most of the examples will be from the syntax of English, but the principles that account for syntactic structures are universal.

What the Syntax Rules Do

> "Then you should say what you mean," the March Hare went on.
>
> "I do," Alice hastily replied, "at least—I mean what I say—that's the same thing, you know."
>
> "Not the same thing a bit!" said the Hatter. "You might just as well say that 'I see what I eat' is the same thing as 'I eat what I see'!"
>
> "You might just as well say," added the March Hare, "that 'I like what I get' is the same thing as 'I get what I like'!"
>
> "You might just as well say," added the Dormouse . . . "that 'I breathe when I sleep' is the same thing as 'I sleep when I breathe'!"
>
> "It is the same thing with you," said the Hatter.
>
> LEWIS CARROLL, *Alice's Adventures in Wonderland*, 1865

The rules of syntax combine words into phrases and phrases into sentences. Among other things, the rules define the correct word order for a language. For example, English is a Subject–Verb–Object (SVO) language. The English sentence in (1) is grammatical because the words occur in the right order; the sentence in (2) is ungrammatical because the word order is incorrect for English.

1. The President nominated a new Supreme Court justice.
2. *President the Supreme new justice Court a nominated.

The rules of the syntax also specify the **grammatical relations** of a sentence, such as **subject** and **direct object**. In other words, they provide information

about who is doing what to whom. This information is crucial to understanding the meaning of a sentence. For example, the grammatical relations in (3) and (4) are reversed, so the otherwise identical sentences have very different meanings.

3. Your dog chased my cat.
4. My cat chased your dog.

The word order of a sentence is crucial to its meaning. The sentences in (5) and (6) contain the same words, but the meanings are quite different, as the Mad Hatter points out.

5. I mean what I say.
6. I say what I mean.

Although the structure of a sentence contributes to its meaning, as illustrated in the examples 3–6, grammaticality and meaningfulness are not the same thing. Consider the following sentences:

Colorless green ideas sleep furiously.
A verb crumpled the milk.

Although these sentences do not make much sense, they are syntactically well–formed. They sound funny, but their funniness is different from what we find in the following strings of words, which are not syntactically well-formed:

*Furiously sleep ideas green colorless.
*Milk the crumpled verb a.

There are also sentences that we understand even though they are not well-formed according to the rules of the syntax. We can easily interpret Yoda's words to Luke Skywalker although the word order is incorrect for English.

". . . when gone I am . . . the last of the Jedi will you be"

To be a sentence, words must conform to specific patterns determined by the specific syntactic rules of the language.

Some sentences are grammatical even though they are difficult to interpret because they include nonsense words, that is, words with no agreed-on meaning. This is illustrated by the following lines from the poem "Jabberwocky" by Lewis Carroll:

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe

These lines are grammatical in the linguistic sense that they obey the word order and other constraints of English. Such nonsense poetry is amusing precisely because the sentences comply with syntactic rules and sound like English. Ungrammatical strings of nonsense words are not entertaining:

*Toves slithy the and brillig 'twas
wabe the in gimble and gyre did

Grammaticality does not depend on the truth of sentences. If it did, lying would be easy to detect. Nor does it depend on whether real objects are being discussed or whether something is possible in the real world. Untrue sentences

can be grammatical, sentences discussing unicorns can be grammatical, and sentences referring to pregnant fathers can be grammatical.

The ability to produce, understand, and judge the grammaticality of a sentence depends on whether it conforms to the unconscious rules of our mental grammar. This grammar is different from the prescriptive grammar rules that we are taught in school. We develop the mental rules of grammar long before we attend school, as we shall see in Chapter 9.

Sentence Structure

> I really do not know that anything has ever been more exciting than diagramming sentences.
>
> GERTRUDE STEIN, "Poetry and Grammar," 1935

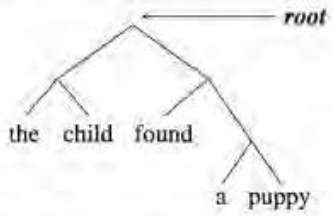
The job of the linguist is to describe the structure of the sentences in a language in a way that matches the linguistic knowledge of its speakers. We can compare two competing hypotheses. The first says that a sentence consists simply of a string of words organized in a flat structure as in (1).

1.

We have already seen that word order is an important aspect of syntactic knowledge and this simple diagram correctly captures the SVO word order of English: The subject (S) *the child*, comes before the verb (V) *found*, which comes before the object (O) *a puppy*.

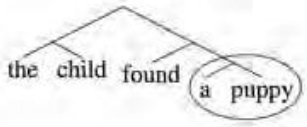
Let us contrast this kind of description with another, one that says that sentences have a tree-like structure in which words are grouped together into natural units nested within other natural units in a hierarchical arrangement, as in (2).

2.

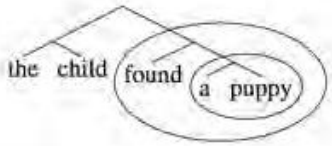


The "tree" in (2) is upside down with its "root" encompassing the entire sentence, "The child found a puppy," and its "leaves" being the individual words *the, child, found, a,* and *puppy*. The **tree diagram** in (2), embodies the hypothesis that these words are organized into subunits (or subtrees) and that speakers mentally represent sentences not as flat strings of words, but as complex structures with an internal organization. The subunits (or subtrees) of the sentence are called **constituents**.

In the tree diagram in (2), the words *a* and *puppy* form a constituent, as indicated below:

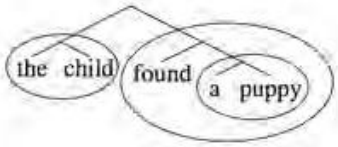


We can also represent constituents by using square brackets around the words [a puppy]. Constituents can be nested inside one another. So, [a puppy] occurs inside the constituent [found a puppy], as illustrated in the following tree.

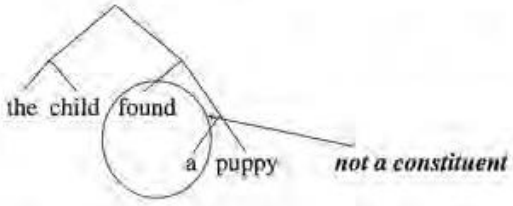


Using bracket notation, we would write this as [found [a puppy]].

There is one more constituent in the tree in (2). Do you know what it is? If you guessed [the child] you would be correct.



A constituent consists not just of the words, but of the subtree that branches into the words, and it ends at the **node** where the branches meet. A constituent corresponds to a node on the tree. And to be a constituent all the words under the node must be included. The words that form a constituent are contiguous (next to one another), but not all contiguous words form a constituent. In the following tree, the words *found a* are contiguous but they do not form a constituent. They are not contained exclusively under the same node.



We began our discussion with a simple sentence "The child found a puppy," but this simple sentence belies a complex internal structure. The tree diagram in (2) groups the words of the sentence into the constituents *the child* and *found*

a puppy, corresponding to the subject and predicate of the sentence. A further division of the phrase *found a puppy* divides naturally into two branches, one for the verb *found* and the other for the direct object *a puppy*. This division conforms to our intuitions about the natural units of the sentence in a way that a different division, say, *found a* and *puppy*, would not.

Constituents and Constituency Tests

In addition to our intuitions of naturalness, various linguistic tests reveal the constituents of a sentence. The first test is the "stand alone" test. If a group of words can stand alone, for example, as an answer to a question, they form a constituent. So, in response to the question "What did the child find?" a speaker might answer *a puppy*, but not *found a*. *A puppy* can stand alone while *found a* cannot. We have a clear intuition that one of these is a meaningful unit and the other is just a list of words.

The second test is "replacement by a pronoun." Pronouns can substitute for natural groups. In answer to the question, "Where did the child find *a puppy*?" a speaker can say, "I found *him* in the park." Words such as *do* (which is not a pronoun per se) can also take the place of the entire predicate *found a puppy*, as in "The boy found a puppy and the girl *did* too." If a group of words can be replaced by a pronoun or a word like *do*, it forms a constituent.

A third test of constituency is the "move-as-a-unit" test. If a group of words can be moved together and remain grammatical, they form a constituent. For example, if we compare the following sentences to the sentence "The child found a puppy," we see that certain elements have moved:

It was *a puppy* that the child found.
A puppy was found by *the child*.

In the first example, the constituent *a puppy* has moved from its position following *found*; in the second example, the positions of *a puppy* and *the child* have been changed. In all such rearrangements, the constituents *a puppy* and *the child* remain intact. *Found a* does not remain intact, because it is not a constituent. Nor does *child found* for the same reason. Even though both these pairs of words occur next to each other in the original sentence *The child found a puppy*; they do not pass constituency tests, illustrating again that sentences are not simply string of words.

Some sentences have prepositional phrases in the predicate, for example:

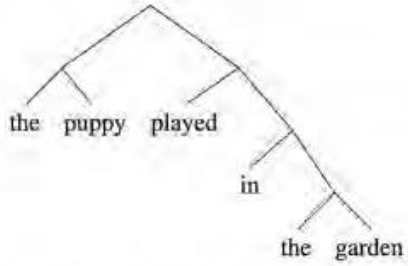
The puppy played in the garden.

We can use our tests to show that *in the garden* is also a constituent, as follows:

Where did the puppy play? *In the garden* (stand alone)
The puppy played *there*. (replacement by a pronoun-like word)
In the garden the puppy played. (move as a unit)
It was *in the garden* that the puppy played. (move as a unit)

The prepositional phrase in this example passes all three constituent tests. But in general a constituent need not pass all three tests. It is sufficient to pass one.

As before, our knowledge of the **constituent structure** of a sentence may be graphically represented by a tree diagram. The tree diagram for the sentence "The puppy played in the garden" is as follows:



The move-as-a-unit test can also tell us when what appears to be a constituent, such as a prepositional phrase, is in fact something different. The two phrases *ran up the hill* and *ran up the bill* are superficially quite similar, but we see in (3) and (4) that they behave quite differently. Consider first the expression *ran up the hill*, as in (3a). The rules of the syntax allow the word orders in (3b, c) as variants, revealing that *up the hill* is a constituent. By contrast, the expression *run up the bill* in (4a) does not have these same options, as shown in (4b, c), which means that *up the bill* is neither a prepositional phrase nor a constituent.

3. **(a)** Jack ran up the hill.
   (b) Up the hill Jack ran.
   (c) Up the hill ran Jack.
4. **(a)** Jack ran up the bill.
   (b) *Up the bill Jack ran.
   (c) *Up the bill ran Jack.

Structural Ambiguity

Hilary B. Price/King Features Syndicate

Syntactic trees reflect our judgments about the internal organization of sentences; flat structures do not. They can also account for other linguistic judgments, such as when a sentence is **ambiguous**. A sentence is ambiguous if it

has two or more meanings. Sometimes an ambiguity arises because a word has more than one meaning, as in the following sentence:

This will make you smart.

The two interpretations of this sentence are due to the two meanings of *smart*—"clever" and "burning sensation." This is referred to as a **lexical ambiguity** and will be discussed further in Chapter 4. Other times multiple meanings arise because a sentence has more than one tree structure associated with it, resulting in a **structural ambiguity**. Each tree will correspond to one of the possible meanings of the sentence. For example, the sentence:

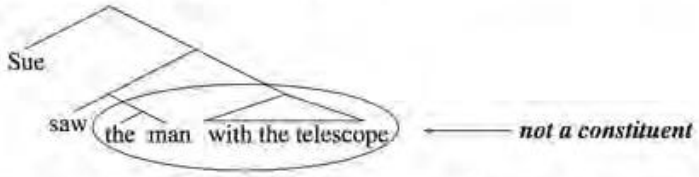
Sue saw the man with the telescope.

has two different meanings:

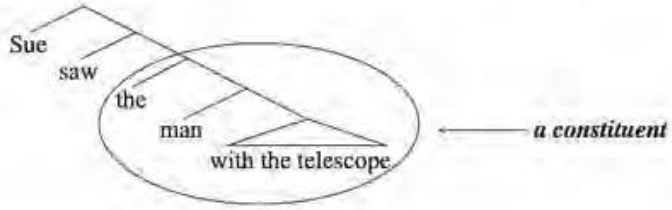
Meaning 1: The seeing is done with the telescope.
Meaning 2: The man is holding the telescope.

Notice that none of the individual words is ambiguous. The ambiguity is structural: The sentence has two different trees. Meaning 1 corresponds to the tree in (1), what we might call the instrumental meaning in which Sue is using the telescope to see the man. In this tree, the *the man* and the prepositional phrase *with the telescope* do not form a constituent.

1.



Meaning 2 corresponds to the tree in (2). In this case, the phrases *the man* and *with a telescope* do form a constituent, reflecting the meaning in which the man is holding the telescope.



The availability of these two structures leads to a prediction: If we do a constituency test that forces *the man with the telescope* to be a constituent (e.g. move it as a unit), then meaning 1 (instrumental) should disappear and we should only have the meaning corresponding to the tree in (2). The following sentences confirm this prediction:

It was the man with the telescope that Mary saw.
The man with the telescope was seen by Mary.
What Mary saw was the man with the telescope.

None of these sentences has the interpretation in which the seeing is done with the telescope. In each, the only possible meaning is that the man is holding the telescope. This shows us that the structure of a sentence contributes importantly to its meaning, a point we will come back to in Chapter 4.

Structural ambiguities of the sort just discussed provide striking evidence in support of our hypothesis that sentences have a tree-like (hierarchical) structure, and against the idea that they are simply strings of words. The flat structure hypothesis could not explain how there can be two different meanings associated with *the same string of words*.

The cartoon at the head of this section illustrates both lexical and structural ambiguity. The lexical ambiguity is on the two meanings of *ring*; the structural ambiguity is whether *nose ring* is understood as a compound noun or a noun followed by a verb.

Syntactic Categories

> There are ten parts of speech, and they are all troublesome.
>
> MARK TWAIN, "The Awful German Language," in *A Tramp Abroad*, 1880

In the previous section, we illustrated how tree structures reflect our knowledge of the hierarchical organization of sentences. Speakers also have implicit knowledge of the categories of each of the subgroupings in a sentence.

Each grouping in the tree diagrams of "The child found a puppy" is a member of a large family of similar expressions. For example, *the child* belongs to a family that includes *the police officer, your neighbor, this yellow cat, he, John*, and countless others. We can substitute any member of this family for *the child* without affecting the grammaticality of the sentence, although the meaning of course would change.

A police officer found a puppy.
Your neighbor found a puppy.
This yellow cat found a puppy.

A family of expressions that can substitute for one another without loss of grammaticality is called a **syntactic category**, or more informally, a "part of speech." *The child, a police officer, John*, and so on belong to the syntactic category **noun phrase (NP)**. NPs may function as subjects or as objects in sentences. An NP often contains a *determiner* (such as *a* or *the*) and a noun, but it may also consist of a proper name (*Ann*), a pronoun (*I*), a noun without a determiner (*fish*), or even a clause or a sentence (*that dogs bark*). Even though a proper noun such as *John* and pronouns such as *he* and *him* are single words, they are technically NPs, because they pattern like NPs in being able to fill a subject, object or other NP slot.

John found the puppy.
He found the puppy.
Boys love puppies.
The puppy loved him.
The puppy loved John.

NPs can be quite complex, as illustrated by the sentence:

The girl that Professor Snape loved married the man of her dreams.

The NP subject of this sentence is *the girl that Professor Snape loved*, and the NP object is *the man of her dreams*. We know this because each of these lengthy expressions fills a slot otherwise occupied by a simpler NP as in *Mary loved John*.

Syntactic categories are part of a speaker's knowledge of syntax. That is, speakers of English know that only items (a), (b), (e), (f), and (g) in the following list are NPs even if they have never heard the term *noun phrase* before.

1. **(a)** a bird
   (b) the red banjo
   (c) have a nice day
   (d) with a balloon
   (e) the woman who was laughing
   (f) it
   (g) John
   (h) went

You can test this claim by inserting each expression into three contexts: *What/who I heard was* _____, *Who found* _____*?* and _____ *was seen by everyone*. For example, **Who found with a balloon?* is ungrammatical, as is **Went was seen by everyone*, as opposed to *Who found it?* or *John was seen by everyone*. Only NPs fit into these contexts because only NPs can function as subjects and objects.

There are other syntactic categories. The expression *found a puppy* is a **verb phrase (VP)**. A verb phrase always contains a **verb (V)**, and it may contain other categories, such as a noun phrase or **prepositional phrase (PP)**, which is a preposition followed by an NP, such as *in the park*, *on the roof*, and *with a balloon*. In (2) the VPs are those phrases that can complete the sentence "The child _____."

2. **(a)** saw a clown
   (b) a bird
   (c) slept
   (d) smart
   (e) ate the cake
   (f) found the cake in the cupboard
   (g) realized that the Earth was round

Inserting (a), (c), (e), (f), and (g) will produce grammatical sentences, whereas the insertion of (b) or (d) would result in an ungrammatical sentence. Thus, (a), (c), (e), (f), and (g) are verb phrases.

Lexical and Functional Categories

"Very traditional. He's the noun. She's the adjective."

Syntactic categories include both phrasal categories such as NP, VP, AP (adjective phrase), PP (prepositional phrase), and AdvP (adverbial phrase), as well as lexical categories such as noun (N), verb (V), preposition (P), adjective (A), and adverb (Adv). Each lexical category has a corresponding phrasal category. Following is a list of phrasal categories and lexical categories with some examples of each type:

Phrasal categories	
Noun Phrase (NP)	*men, the man, the man with a telescope sees, always*
Verb Phrase (VP)	*sees, rarely sees the man, often sees the man with a telescope*
Adjective Phrase (AP)	*happy, very happy, very happy about winning*
Prepositional Phrase (PP)	*over, nearly over, nearly over the hill*
Adverbial Phrase (AdvP)	*brightly, more brightly, more brightly than the Sun*
Lexical categories	
Noun (N)	*puppy, boy, man, soup, happiness, fork, kiss, pillow*
Verb (V)	*find, run, sleep, throw, realize, see, try, want, believe*
Preposition (P)	*up, down, across, into, from, by, with, over*
Adjective (A)	*red, big, happy, candid, hopeless, fair, idiotic, lucky*
Adverb (Adv)	*again, always, brightly, often, never, very, fairly*

Many of these categories may already be familiar to you. Other categories may be less familiar such as the category **determiner (Det)**, which includes the articles *a* and *the*, as well as **demonstratives** such as *this, that, these,* and *those*, and "quantifiers" such as *each* and *every*. Another less familiar category

Our knowledge of syntactic categories is also revealed through our intuitions about nonsensical sentences. Recall the sentences in (1) and (2) below. Although neither of these sentences makes sense, we have a clear intuition that (1) is grammatical in a way that (2) is not.

1. Colorless green ideas sleep furiously.
2. *Sleep colorless green furiously ideas.

This is because sentence (1) obeys the word order constraints of English while sentence (2) does not. In other words, we recognize the category of each of the words: *Colorless* is an adjective, *ideas* is a noun, *colorless green ideas* is a noun phrase, and *sleep furiously* is a verb phrase, and know that they fit properly together in (1) but not in (2). We are not taught these categories nor their word order. We know this implicitly before we go to school. They are part of our grammar that we develop as a child growing up (see Chapter 9).

In these sentences, we can identify when the order is correct and when it is not, even though the meanings of the different words and constituents do not jibe. An idea cannot be green or colorless, (except in a metaphorical sense), but even if ideas had color we would say *colorless green ideas* and not *ideas green colorless* or *green ideas colorless*.

Similarly, we may not be able to make sense of Lewis Carroll's Jabberwocky, but we can identify the words *brillig, slithy*, and *mimsy* as adjectives, *toves, wabe, borogoves, and momeraths* as nouns, and *outgrabe, gyre, and gimble* as verbs, all based on their position in the sentences.

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the momeraths outgrabe.

Speakers know the syntactic category of the various constituents and how they are ordered with respect to one another. They also know how to group words into units—*constituents*. This knowledge is graphically represented in tree structures that reveal the grammatical organization of the words of a sentence. Tree structures also explain how the grouping of words in a sentence relates to its meaning, such as when a sentence or phrase is ambiguous. And even when the meaning is nonsensical the structure must obey the syntactic rules of the language. The rules of syntax also permit speakers to produce and understand a limitless number of sentences never produced or heard before—*the creative aspect of linguistic knowledge*, illustrated at the beginning of this chapter. A major goal of linguistics is to show clearly and explicitly how syntactic rules account for what speakers implicitly know about their language.

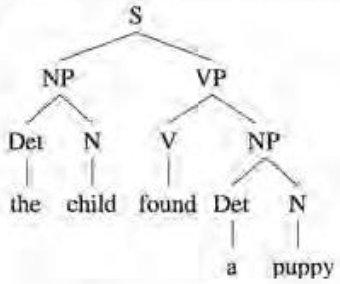
Phrase Structure Trees

Who climbs the Grammar-Tree distinctly knows
Where Noun and Verb and Participle grows.
JOHN DRYDEN, "The Sixth Satyr of Juvenal," 1693

Now that you know something about constituent structure and grammatical categories, you are ready to learn how the phrases and sentences of a language are constructed. We will begin by illustrating trees for simple phrases and then proceed to more complex structures. The trees that we will build here are more detailed than those we saw in the previous sections, because the branches of the tree will have category labels identifying each constituent. In this section, we will also introduce the kind of syntactic rules that **generate** (a technical term for describe or specify) the different structures.

The tree diagram in (1) provides labels for each of the constituents of the sentence "The child found a puppy." These labels show that the entire sentence belongs to the syntactic category of S (because the S-node encompasses all the words). It also reveals that *the child* and *a puppy* belong to the category NP, that is, they are noun phrases, and that *found a puppy* belongs to the category VP or is a verb phrase, consisting of a verb and an NP. It also shows the syntactic category of each of the words in the sentence.

1.



A tree diagram with syntactic category information is called a **phrase structure tree** or a **constituent structure tree**. Phrase Structure trees (PS trees) represent three aspects of a speaker's syntactic knowledge:

1. The linear order of the words in the sentence
2. The identification of the syntactic categories of words and groups of words
3. The hierarchical structure of the syntactic categories (e.g., an S is composed of an NP followed by a VP, a VP is composed of a V that may be followed by an NP, and so on).

The syntactic category of each word is listed in our mental dictionaries, as we will discuss in more detail in Chapter 4. This lexical information guides the syntax of the language. Words appear in trees under labels that correspond to their syntactic category. Nouns are under *N*, determiners under *Det*, verbs under *V*, and so on.

The larger syntactic categories such as *VP* consist of all the syntactic categories and words below that node in the tree. The *VP* in the PS tree above consists of syntactic category nodes *V* and *NP* and the words *found*, *a*, and *puppy*. Because *a puppy* can be traced up the tree to the node *NP*, this constituent is a noun phrase. Because *found* and *a puppy* can be traced up to the node *VP*, this constituent is a verb phrase. In discussing trees, every higher node is said to **dominate** all the categories beneath it. S dominates every node. A node is said to **immediately dominate** the categories one level below it. VP immediately dominates V and NP, the categories of which it is composed. Categories that

are immediately dominated by the same node are **sisters**. V and NP are sisters in the phrase structure tree of "the child found a puppy."

PS trees are also useful for defining various grammatical relations in a precise way. For example, the subject of a sentence is the NP immediately dominated by S (*the child* in the tree in (1) and the direct object is the NP immediately dominated by VP (*the puppy* in the tree in (1).

Phrase Structure Rules

The information shown in a PS tree can also be represented by another formal device: phrase structure (PS) rules. PS rules capture the knowledge that speakers have about the possible structures of a language. Just as a speaker cannot have an infinite list of sentences in his or her head, so he or she cannot have an infinite set of PS trees in his or her head. Rather, a speaker's knowledge of the permissible and impermissible structures must exist as a finite set of rules that characterize a tree for any sentence in the language. To express the structure given above, we need the following PS rules:

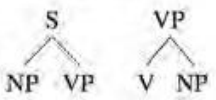
1. S → NP VP
2. NP → Det N
3. VP → V NP

You can think of PS rules as templates that a tree must match to be grammatical. They express the regularities of the language and make explicit a speaker's knowledge of the order of words and the grouping of words into syntactic categories. For example in English an NP may contain a determiner followed by a noun. This is represented by rule 2. This rule conveys two facts:

A noun phrase may contain a determiner followed by a noun in that order.
A determiner followed by a noun is a noun phrase.

Phrase structure rules specify the well-formed structures of a language precisely and concisely. To the left of the arrow is the dominating category NP. The categories that it immediately dominates appear on the right side, in this case Det and N. The right side of the arrow also shows the linear order of these components. Thus, the subtree for the English NP looks like this:

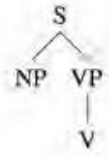
Rule 1 says that a sentence (S) contains (immediately dominates) an NP and a VP in that order. Rule 3 says that a verb phrase consists of a verb (V) followed by an NP. These rules are general statements and do not refer to any specific VP, V, or NP. The subtrees represented by rules 1 and 3 are as follows:



A VP need not contain an NP object, however. It may include a verb alone, as in the following sentences:

The woman laughed.
The man danced.
The horse galloped.

These sentences have the structure:



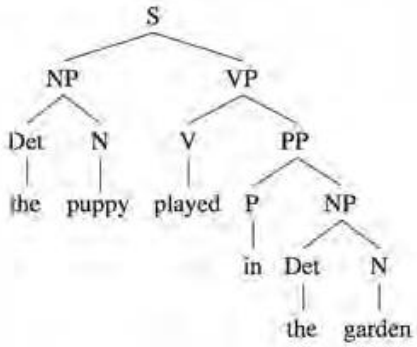
Thus, a tree may have a VP that immediately dominates only V, as specified by rule 4, which we include in our grammar:

4. VP → V

The following sentences contain prepositional phrases following the Verb:

The puppy played in the garden.
The boat sailed up the river.
A girl laughed at the monkey.
The sheepdog rolled in the mud.

The PS tree for such sentences is

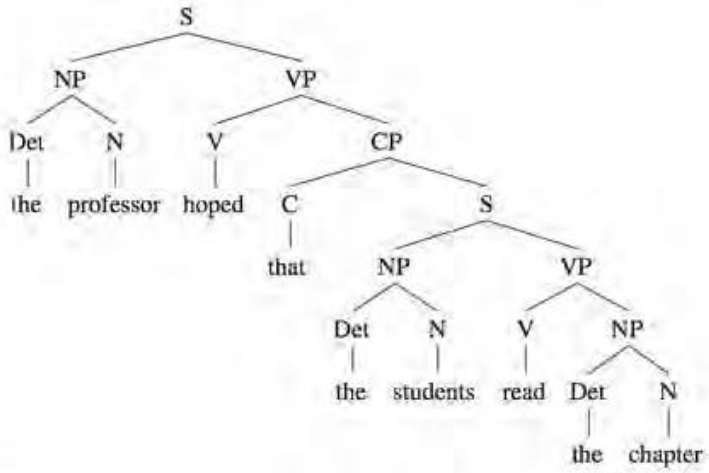


To generate structures of this type we need two additional PS rules as in 5 and 6.

5. VP → V PP
6. PP → P NP

Another option open to the VP is to contain or *embed* a sentence. For example, the sentence "The professor hoped that the students read the chapter" contains the sentence "the students read the chapter." Preceding the **embedded sentence** is the word *that*, which belongs to the category of complementizers

C(omp), a functional category like T(ense) and Det. Here is the structure of such sentence types:



To allow such embedded sentences, we need to add these two new rules to our set of phrase structure rules.

7. VP → V CP
8. CP → C S

CP stands for complementizer phrase. Rule 8 says that CP contains a complementizer such as *that* followed by the embedded sentence. Other complementizers are *if* and *whether* in sentences such as

I don't know whether I should talk about this.
The teacher asked if the students understood the syntax lesson.

which have structures similar to the one above.

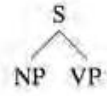
Here are the PS rules we have discussed so far. The rules have been slightly renumbered to keep all the VP rules together. We will introduce some other rules later.

1. S → NP VP
2. NP → Det N
3. VP → V NP
4. VP → V
5. VP → V PP
6. VP → V CP
7. PP → P NP
8. CP → C S

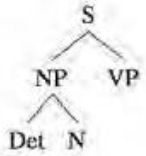
Building Phrase Structure Trees

> Everyone who is master of the language he speaks . . . may form new . . . phrases, provided they coincide with the genius of the language.
>
> JOHANN DAVID MICHAELIS, "Dissertation," 1739

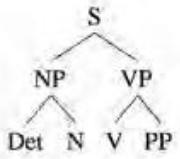
The phrase structure rules can be used as a guide for building trees that follow the structural constraints of the language. In so doing, certain conventions are followed. The S occurs at the top or "root" of the tree (remember the tree is upside down). So, first find the rule with S on the left side of the arrow (rule 1) and put the categories on the right side below the S, as shown here



Continue by matching any syntactic category at the bottom of the partially constructed tree to a category on the left side of a rule, then expand the tree with the categories on the right side. For example, we may expand the tree by applying the NP rule to produce:

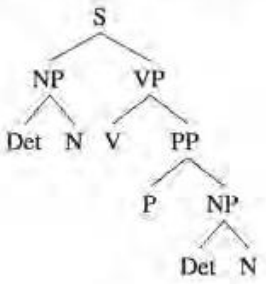


The categories at the bottom are Det, N, and VP, but only VP occurs to the left of an arrow in the set of rules and so needs to be expanded using one of the VP rules. Any one of the rules will work. The order in which the rules appear in the list of rules is irrelevant. (We could have begun by expanding the VP rather than the NP.) Suppose we use rule 4 next. Then, the tree has grown to look like this:



We continue in this way until all phrasal categories are expanded, that is, none of the categories at the bottom of the tree appears on the left side of any rule. The PP must expand into a P and an NP (rule 7), and the NP into a Det and an N. (Proper names and pronouns which are NPs and not nouns are an

exception to the "full expansion convention.") We can use a rule as many times as it can apply. In this tree, we used the NP rule twice. After we have applied all the rules that can apply, the tree looks like this:



By following these conventions, we generate only trees specified by the PS rules, and hence only trees that conform to the syntax of the language. By implication, any tree not so specified will be ungrammatical, that is, not permitted by the syntax. At any point during the construction of a tree, any rule may be used as long as its left-side category occurs somewhere at the bottom of the tree. By choosing different VP rules, we could specify different structures corresponding to sentences such as:

The boys left. (VP → V)
The wind blew the kite. (VP → V NP)
The senator hopes that the bill passes. (VP → V CP)

Because the number of possible sentences in a language is infinite, there are also an infinite number of trees. However, all trees are built out of a finite set of phrase structure rules.

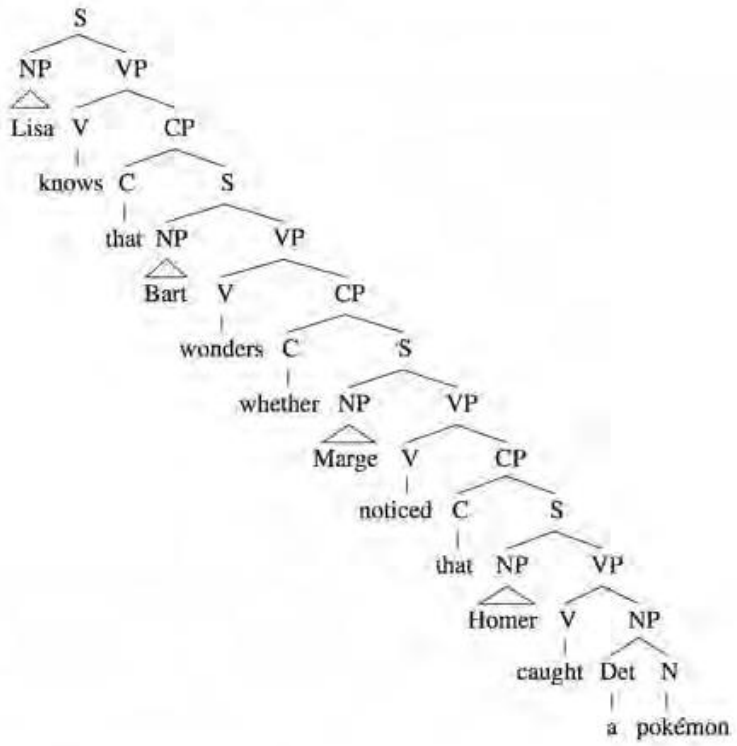
The Infinity of Language: Recursive Rules

Though incomplete, the set of PS rules we have introduced thus far is sufficient to illustrate the mechanisms by which languages generate a limitless number of sentences. Consider the following set of sentences, similar to those discussed at the beginning of this chapter.

1. Homer caught a pokémon.
2. Marge noticed that Homer caught a pokémon.
3. Bart wonders whether Marge noticed that Homer caught a pokémon.
4. Lisa knows that Bart wonders whether Marge noticed that Homer caught a pokémon.

We see that sentence 1 is embedded inside sentence 2, sentence 2 inside sentence 3, sentence 3 inside sentence 4. We could continue this process indefinitely. This is made possible by the fact that rule phrase structure rule 6 (VP → V CP) in combination with rules 8 (CP → C S) and 1 (S → NP VP) form a **recursive** set, in which the symbols S and VP occur on both the left and right side of the rules. Therefore, the rules allow S to contain VP, which in turn contains CP, which in

turn contains S, which in turn again contains VP and so on, potentially without end. Recursive rules are of critical importance because they allow the grammar to generate an infinite set of sentences. The PS tree for sentence 4 illustrates the application of these rules (here we use triangles under the NPs to indicate that proper names are full NPs, not nouns):



The property of recursion also illustrates the difference between competence and performance, discussed in Chapter 1. All speakers of English (and all other languages) have as part of their linguistic competence—their mental grammars—the ability to embed phrases within each other ad infinitum. However, as the structures grow longer, they become increasingly more difficult to produce and understand. This can be due to short-term memory limitations, muscular fatigue, breathlessness, boredom, or any number of performance factors. (We will discuss performance factors more fully in Chapter 10.) Nevertheless, these very long sentences would be well-formed according to the rules of the grammar.

Below, we will see other examples of recursive rule sets such as the one responsible for the potentially infinite number of prepositional phrases in sentences like:

> The person behind the person immediately to the left of the rightmost person in the first row is asleep.

The Internal Structure of Phrases

> I really do think that science has an internal structure, and it makes sense, and we can test it.
>
> LISA RANDALL, Theoretical Physicist

In the previous sections, we focused on the hierarchical organization of sentences into phrasal categories such as NP, VP, and PP. In this section, we will look at the internal structure of phrases themselves.

Heads, Complements, and Selection

One of the striking things we observe when we consider the various phrase structure rules given above (and the subtrees they generate) is that they have a similar organization. Consider the following examples of each of the phrasal categories we have discussed:

NP: the *mother* of James Whistler
VP: *sing* an aria
PP: *over* the hill

For completeness, we add the category AP (adjective phrase), illustrated by the example

AP: *wary* of snakes
generated by the following rule:

9. AP → A PP

As we noted in our discussion of grammatical categories, the core of every phrase is a lexical category of its same syntactic type (italicized), which is its **head**; for example, the NP *the mother of James Whistler* is headed by the noun *mother;* the VP *sing an aria* is headed by the verb *sing;* the AP *wary of snakes* is headed by the adjective *wary;* the PP *over the hill* is headed by the preposition *over*. Loosely speaking, the entire phrase refers to whatever the head refers to. For example, the VP *sing an aria* refers to a "singing" event; the NP *the mother of James Whistler* to someone's mother.

In addition to the head, the phrasal categories may contain other categories such as NP, PP or CP. These sister categories are called **complements**. A complement is a phrasal category that occurs next to a head, and only there, and which elaborates on the meaning of the head. The complements are underlined: For example, the head N *mother* takes the PP complement of James Whistler; the head V *sing* takes the NP complement an aria; the head A(djective) *wary* takes the PP of snakes, and the P(reposition) *over* takes the NP the hill as complement.

Selection

Complements are not always present in the phrase structure. They are optional; only the head is obligatory. The choice of complement type for any particular phrase depends on the specific properties of the head of that phrase. For

example, verbs select different kinds of complements: *find* is a transitive verb and requires an NP complement (direct object), as in *The boy found the ball*, but not **The boy found*, or **The boy found in the house.* Some verbs such as *eat* are optionally transitive. *John ate* and *John ate a sandwich* are both grammatical. *Sleep* is an **intransitive verb**; it cannot take an NP complement:

Michael slept.
*Michael slept the baby.

Some verbs, such as *think*, may select both a PP and a sentence complement (underlined):

Let's think about it.
I think a girl won the race.

Other verbs, such as *tell*, select an NP and a sentence:

I told the boy a girl won the race.

Yet other verbs such as *feel* select either an AP or a sentence complement:

Paul felt strong as an ox.
He feels he can win.

Categories besides verbs also select their complements. For example, the noun *belief* selects either a PP or a sentence, while the noun *sympathy* selects a PP, but not a sentence, as shown by the following examples:

the belief in freedom of speech
the belief that freedom of speech is a basic right
their sympathy for the victims
*their sympathy that the victims are so poor

Adjectives can also have complements. For example, the adjectives *tired* and *proud* select PPs:

tired of stale sandwiches
proud of her children

The information about the complement types selected by particular verbs and other lexical items is called **C-selection** or **subcategorization**, and is included in the lexical entries of the items in our mental lexicons. (C stands for "category.")

A verb also includes in its lexical entry a specification that imposes certain semantic requirements its subjects and complements, just as it selects for syntactic categories. This kind of selection is called **S-selection**. (S stands for "semantic.") For example, the verb *murder* requires its subject and object to be animate, while the verb *quaff* requires its subject to be animate and its object liquid. Verbs such as *like*, and *hate* select animate subjects. The following sentences violate S-selection and can only be used in a metaphorical sense. (We will use the symbol "!" to indicate a semantic anomaly.)

!Golf plays John.
!The beer drank the student.
!The tree liked the boy.

The famous sentence *Colorless green ideas sleep furiously* cited above is anomalous because (among other things) S-selection is violated (e.g., the verb *sleep* requires an animate subject). In Chapter 4, we will discuss the semantic relationships between a verb and its subject and objects in far more detail.

The well-formedness of a phrase depends, then, on at least two factors: whether the phrase conforms to the structural constraints of the language as expressed in the PS rules, and whether it obeys the selectional requirements of the head—both syntactic (C-selection) and semantic (S-selection).

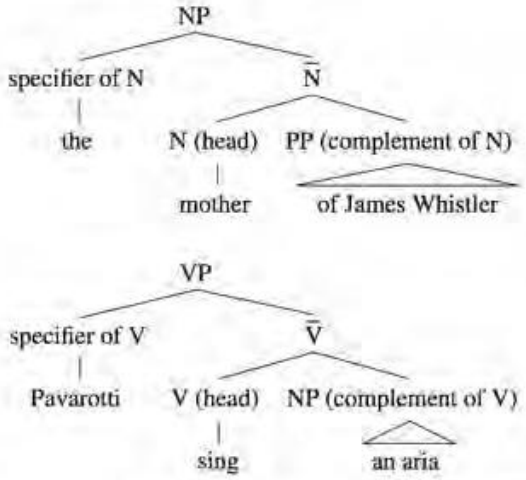
The Three Levels of Phrases

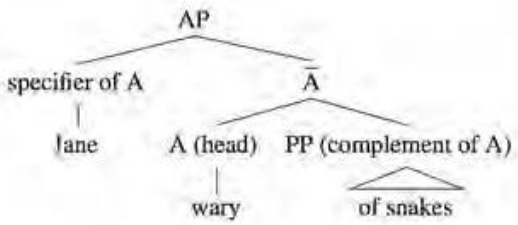
In addition to the head and its complements, a phrase may have an element preceding the head. These elements are called **specifiers**. For example, in the NP *the mother of James Whistler,* the determiner *the* is the specifier of the NP. In English, possessives may also be specifiers of NP, as in *Nellie's ball.* The specifier position may also be empty, as in the NP *dogs with bones.* PPs, APs, and VPs also have specifiers, but for various reasons they are harder to see. They usually show up when the phrase is embedded in another sentence, as in

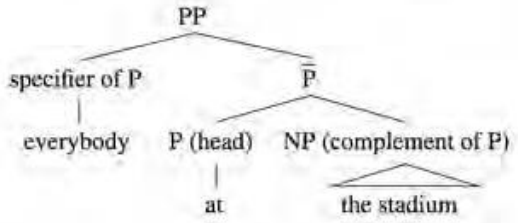
a. Betty made [Jane wary of snakes].
b. I heard [Pavarotti sing an aria].
c. I saw [everyone at the stadium].

In (a) *Jane* is the specifier of the AP *wary of snakes,* in (b) *Pavarotti* is the specifier of the VP *sing an aria,* and in (c) *everyone* is the specifier of the PP *at the stadium. Specifier* is a purely structural notion. In English, it is the first position in the phrase, if it is present at all, and a phrase may contain at most one specifier.

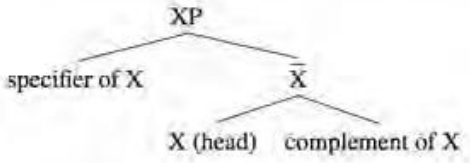
Unlike complements, specifiers are not sisters of the head, but rather sisters of the phrase formed by the head and the complement. These observations tell us that all of the phrasal categories, NP, VP, AP, and PP, have a similar three-tiered structure, as follows:







To capture the generalization that each phrasal category has the same internal structure, we substitute X in place of N, V, P, A and we get the following tree:



This three-tiered structure, referred to as **X-bar ($\bar{X}$) schema**, is a template or blueprint that specifies how the phrases of a language are organized, or alternatively, how PS rules are formed. The X-bar schema "stands for" the various phrasal categories given above (and others we will see later) and applies to all syntactic phrases. The parentheses around the specifier and complement indicate that these expansions are optional and depend on the selectional properties of the head. The head is the only obligatory category of a phrase. The "bar" category is an intermediate level category necessary to account for certain syntactic phenomena that we'll see shortly.

Assuming X-bar schema we must modify our PS rules to incorporate the three tiers. Here are the revised rules for NP:

2a: $NP \rightarrow (Det)\ \bar{N}$
2b: $\bar{N} \rightarrow N\ (XP)$

Under the new rules, NP expands as an optional Det and $\bar{N}$ and $\bar{N}$ expands as N and an optional complement of any category (XP). These rules will generate the PS tree for phrase *the mother of Whistler*, illustrated on the previous page, where XP stands for the PP *of Whistler* as complement to the head N *mother*.

We have several VP rules in our list showing the different complements to V (rules 3–6). X-bar allows us to collapse these VP rules as follows:

3a: VP → (Spec) $\overline{V}$
3b: $\overline{V}$ → V (XP)

Under the new rules, VP expands to include an optional specifier (*Pavarotti* in sentence b above), and $\overline{V}$, which in turn contains V and an optional complement of any category such as NP as direct object in *found a puppy*. Here is the revised set of rules. Notice that the rules have been renumbered and are more compact:

1. S → NP VP
2. NP → (Det) $\overline{N}$
3. $\overline{N}$ → N (XP)
4. VP → (Spec) $\overline{V}$
5. $\overline{V}$→V (XP)
6. PP → P NP
7. CP → C S
8. AP → A PP

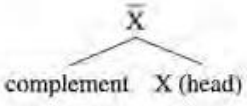
Our PS rules for PP, and AP (rules 6 and 8) also adhere to X-bar (e.g., PP → (Spec) $\overline{P}$ etc.) but we omit the details. We will revisit the rules for S (rule 1) and CP (rule 7) below.

The X-bar schema is hypothesized to be part of Universal Grammar. As such, all languages have phrases that consist of heads, specifiers, and complements that relate to each other as just described. However, the order of the head and complement may differ in different languages. In English, for example, we see that the head comes first, followed by the complement. In Japanese, complements precede the head, as shown in the following examples:

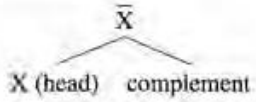
Taro-ga	inu-o	mitsuketa	
Taro-subject marker	dog-object marker	found	"Taro found a dog"

Inu-ga	niwa-de	asonde	iru	
Dog-subject marker	garden-in	playing	is	"The dog is playing in the garden"

In the first sentence, the direct object complement *inu-o*, "dog," precedes the head verb *mitsuketa*, "found." In the second, the NP complement *niwa*, "garden," precedes the head preposition *de*, "in." English is a VO language, meaning that the verb ordinarily precedes its object. Japanese is an OV language, and this difference is reflected in the head/complement word order. For Japanese, the X-bar schema looks like this:



Compare this to the English schema:



X-bar schema specifies a vast amount of syntactic knowledge in a concise way. If, as many linguistics believe, X-bar is universal (order aside) and hence part of children's innate endowment for language, it also helps explain how they so quickly learn the abstract hierarchical structures of phrases in their language (see Chapter 9). Upon hearing *Taro-ga inu-o mitsuketa* (Taro dog finds), the Japanese child automatically knows not only that NP complements precede the verb in his or her language, but also that all other complements do so as well. For example, NPs precede their prepositional heads, as in *niwa-de* (garden in). The English-speaking child will just as easily come to the opposite order based on sentences such as *John found the dog.*

What Heads the Sentence

Might, could, would—they are contemptible auxiliaries.

GEORGE ELIOT (MARY ANN EVANS), *Middlemarch*, 1872

We have suggested that the structure of all phrasal categories follows the X-bar schema. One category that we have not yet discussed in this regard is sentence (S). To preserve the powerful syntactic generalization that the X-bar schema offers, we want all the phrasal categories to have a three-tiered structure with specifiers, heads, and complements, but what would these be in the case of S? To answer this question, we first observe that sentences are always "tensed." Tense provides a time-frame for the event or state described by the verb. In English, present and past tenses are marked on the verb:

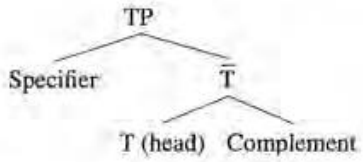
John dance<u>s</u>. (present)
John danc<u>ed</u>. (past)

Future tense is expressed with the modal *will* (*John* will *dance*). Modals also express notions such as possibility (*John* may *dance*); necessity (*John* must *dance*); and ability (*John can dance*). A modal such as *may* says it is possible that the event will occur at some future time, *must* that it is necessary that the event occur at some future time, and so on. The English modals are inherently "tensed," as shown by their compatibility with various time expressions:

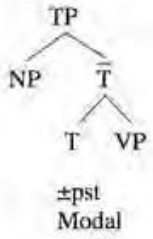
John may/must/can win the race today/tomorrow.
*John may/must/can win the race yesterday.
John could/would have tantrums when he was a child.
John could leave the country tomorrow.

Just as the VP is about the situation described by the verb—*eat ice cream* is about "eating"—so a sentence is about a situation or state of affairs that occurs at some point in time. Thus, the category Tense is a natural category to head S.

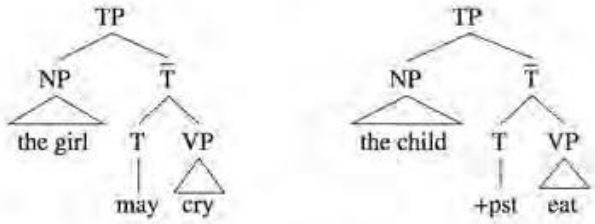
Using this insight, linguists refer to sentences as TPs (Tense Phrases) with the following structure conforming to the X-bar schema:



For sentences, or TPs, the specifier is the subject of the sentence and the complement of the T is a verb phrase. The head T contains the tense (± pst) and modal verbs such as *can* or *would* and takes VP as its complement. The introduction of T̄ gives the sentence its traditional subject–predicate form.



The NP left daughter of the TP functions as the subject of the sentence; the T̄ right daughter is what is traditionally called the predicate. We are now able to represent the structures of such sentences as *The girl may cry* and *The child ate*:



In these structures, the T containing +pst and *eat* is ultimately pronounced *ate*. When there is no modal under T, the present or past tense is realized on the verbal head of the VP.

Another way tense is expressed in English is by the tense-bearing word *do* that is inserted into negative sentences such as *John did not go* and questions such as *Where did John go?* In these sentences, *did* means "past tense." Later in this chapter, we will see how *do*-insertion works.

While many of the details of X-bar syntax are beyond the scope of an introductory text, we will briefly show how the inclusion of an intermediate $\overline{X}$ tier allows the grammar to generate a wide range of sentences that could not be otherwise produced, and also further explains the recursive property of human languages.

The Infinity of Language Revisited

So, naturalists observe, a flea

Hath smaller fleas that on him prey;

And these have smaller still to bite 'em,

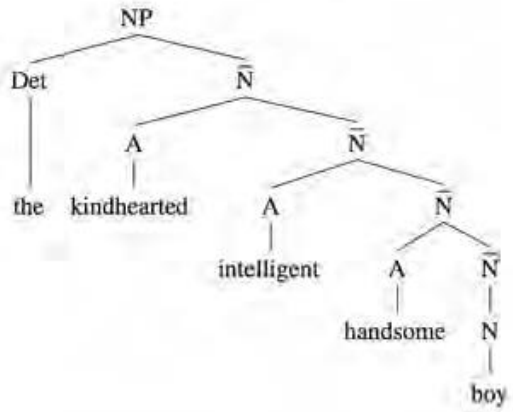
And so proceed ad infinitum.

JONATHAN SWIFT, "On Poetry, a Rhapsody," 1733

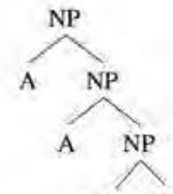
We noted at the beginning of the chapter that languages have various means of creating longer and longer sentences. For example, an NP may contain any number of adjectives as in the *kind-hearted, intelligent, handsome boy*. One benefit of positing the abstract category $\overline{N}$ is that it allows us to account for the potentially limitless number of adjectives. Here we need a recursive rule—one that repeats itself—on $\overline{N}$:

9. $\overline{N} \rightarrow A\ \overline{N}$

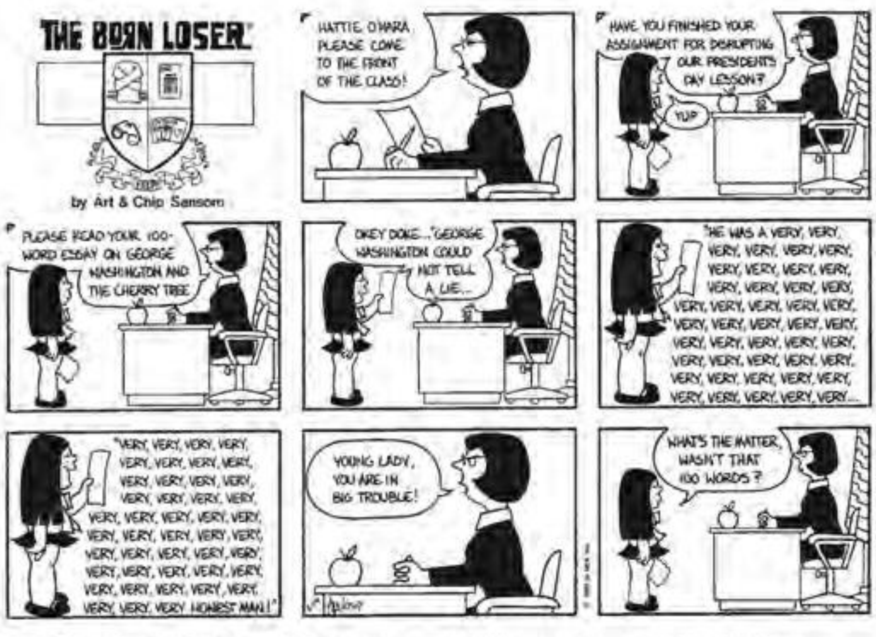
This rule generates the NP structure in question:



Without $\bar{N}$ we would be forced to have a recursive rule on NP such as NP → A NP. Such a rule would capture the recursion of the adjective, but it would also allow the Det to show up in an impossible place as in *kind-hearted, intelligent, the boy:*

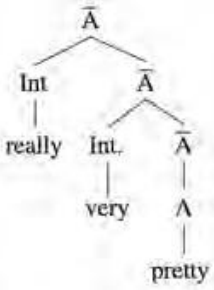


A similar kind of recursion occurs in this cartoon:



Another way speakers of English can build structures of theoretically limitless size is by repeating the category of Intensifier (Int) within an AP. The recursive rule looks like this and would not only handle Hattie's 100-word essay but also takes care of the more modest expression *really very pretty:*

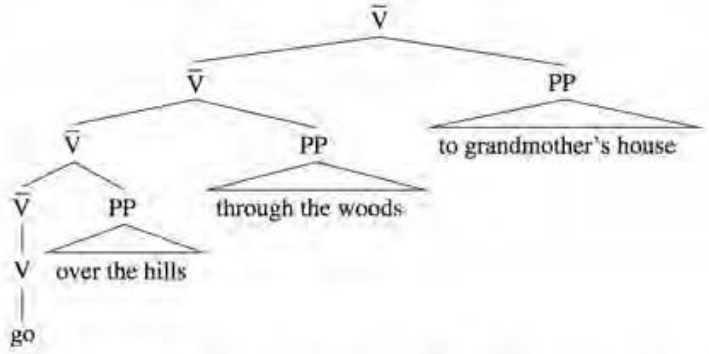
10. $\bar{A} \rightarrow$ Int $\bar{A}$



A slightly different form of recursion involves PP recursion, as illustrated by *she went over the hills through the woods to grandmother's house.* . . . Sentences of this sort requires recursion on $\bar{V}$.

11. $\bar{V} \rightarrow \bar{V}$ PP

giving rise to the following subtree

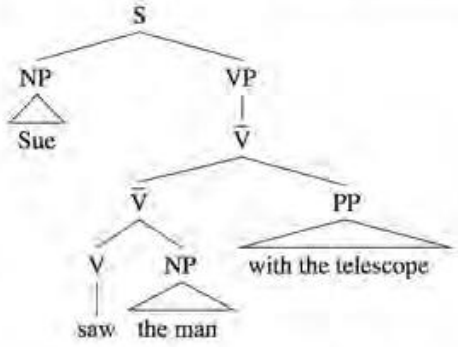


Note that the PP in (11), like the adjective in (9) and the intensifier in (10), are not complements, they are not sisters to the head of the phrase. Rather, they are sisters to $\bar{V}$, $\bar{N}$, and $\bar{A}$ respectively. A phrasal category that is sister to an $\bar{X}$ and daughter of a higher $\bar{X}$, as in the above structures, is called an **adjunct**. Like complements, adjuncts may be of any grammatical category.

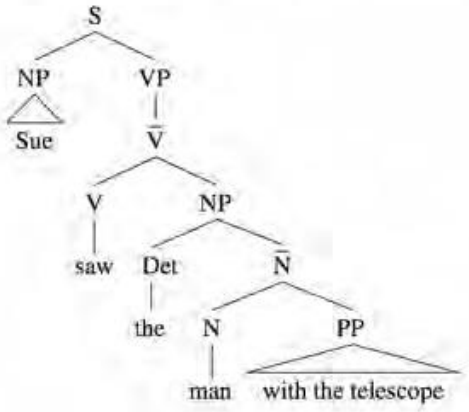
Distinguishing between complements and adjuncts is not always straightforward. Structurally, the distinctions are unambiguous: complements are sisters to X; adjuncts are sisters to $\bar{X}$. But in analyzing sentences it is not always clear whether an addendum to a head is a complement or an adjunct. Here's one example illustrating the difference between a complement and an adjunct, an example that will bring us back to our discussion of the structural ambiguity of the sentence:

Sue saw the man with the telescope.

As discussed earlier, this sentence has more than one PS tree, each corresponding to a different meaning. Under the "instrumental" meaning (Sue used the telescope to see the man) the complement of *saw* is the simple NP *the man* and the PP is an *adjunct* introduced by rule 11. The sentence has the following constituent structure: (From now on we'll adopt the convention of using a triangle when we are not concerned with the internal structure of the category.)



Under the second meaning of the sentence (the man is holding the telescope), *the man* and *with the telescope* form an NP constituent and the PP is a *complement* to the head noun, as illustrated in the following structure:



Thus, the different meanings arise from the fact that in the first case the PP *with the telescope* is sister to (hence modifies) the V̄ *see the man*; but in the second case it is sister to (hence modifies) *man*. The two interpretations of this sentence are possible because the rules of syntax permit different structures for the same linear order of words.

Let us sum up our discussion thus far. We have seen that sentences have a tree-like organization. They are not simply "flat" strings of words, as shown by

various constituency tests, as well as structural ambiguities. Phrase structure trees specify (i) the grammatical categories of words and groups of words in a sentence, for example, N, V, VP, and so on, (ii) the position of categories with respect to each other, that is, word order, and (iii) the internal organization of words into hierarchically arranged phrases. The PS rules for a language thus define the (infinite set) of well-formed (grammatical) structures in that language.

Grammatical Dependencies

> Method consists entirely in properly ordering and arranging the things to which we should pay attention.
>
> RENÉ DESCARTES, *Oeuvres*, vol. X, c. 1637

In addition to the properties discussed above, the syntactic component of the grammar must describe various relationships and dependencies that hold across and within sentences. It is clear that certain sentence types are related, for example, the declarative-question pair below:

Homer will sleep.
Will Homer sleep?

Our grammar must reflect the speaker's knowledge of relationships of this sort.

Similarly, within a sentence two elements can be related even when they are separated by an arbitrary number of words. These "dependencies at a distance" provide further evidence for the hierarchical organization of sentences provided by the PS rules. Two such rules are subject–verb agreement, and question formation.

Subject–Verb Agreement

In many languages, including English, the verb must agree with the subject. The verb (in English) is marked with an *-s* when the subject is third-person singular and otherwise unmarked.

1. This **guy seems** kind of cute.
2. These **guys seem** kind of cute.

A simple rule that expresses the agreement relationship in terms of the linear adjacency of the noun (*guy/guys*) and verb (*seem/seems*) would work for the sentences in 1 and 2:

Linear Agreement Rule

The verb agrees in person and number with the word to its left.

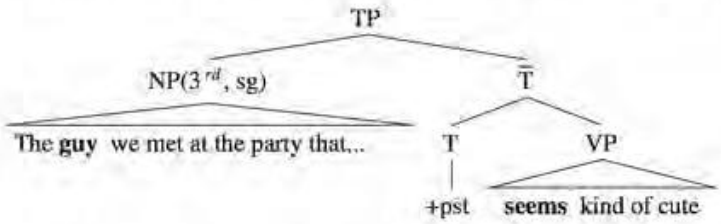
But what about the sentences in 3 and 4?

3. The **guy** we met at the party next door **seems** kind of cute.
4. The **guys** we met at the party next door **seem** kind of cute.

The verb *seem* must agree with the head of the subject NP, *guy* or *guys*, regardless of the number of words between the head noun and the verb. Moreover, there is no limit to how many words may intervene, or whether they are singular or plural, as the following sentence illustrates:

> The **guy (guys)** we met at the party next door that lasted until 3 a.m. and was finally broken up by the cops who were called by the neighbors **seems (seem)** kind of cute.

The (much abbreviated) phrase structure tree below explains why this is so.



In the tree, the NP may in principle be indefinitely long and complex. However, speakers of English (and all other languages) know that agreement depends on sentence structure and not on the linear order of words: agreement is between the head of the subject NP and the main verb. As far as the rule of agreement is concerned, all other material can be ignored. (Although in actual performance, if the distance is too great, the speaker may forget what the subject was.) Thus, the rules of grammar that relate different elements in the sentence are **structure dependent** and therefore a more accurate agreement rule must be stated in terms of hierarchical structure:

> ***Structure dependent agreement rule***: The verb agrees in person and number with the *subject* of the sentence, where *subject* is defined as the NP immediately dominated by S (TP).

The fact that rules are structure dependent supports the tree-like arrangement of constituents in a sentence. If sentences were just flat strings of words, it would be impossible to state an agreement rule.

Structure dependency is a principle of Universal Grammar, and is thus found in all languages. In languages that have subject–verb agreement, the dependency is between the verb and the subject, and never some other NP such as the closest one, as shown in the following examples from Italian, German, Swahili, and English, respectively (the third-person singular agreement affix in the verb is in boldface and is governed by the boldfaced NP, not the underlined one, even though the latter is nearest the main verb):

> **La madre** con tanti figli lavora molto.
> **Die Mutter** mit den vielen Kindern arbeitet viel.
> **Mama** anao watoto wengi **anajitahidi**.
> **The mother** with many children works a lot.

Question Formation Rules

Yes–no questions

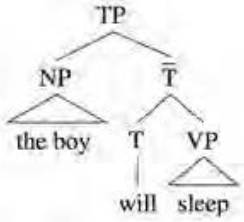
> I put the words down and push them a bit.
>
> EVELYN WAUGH, quoted in *The New York Times*, April 11, 1966

Within any language certain sentence types relate systematically to other sentence types, such as the following pairs:

The boy will sleep.	Will the boy sleep?
The dog is barking.	Is the dog barking?
The man has eaten a fish.	Has the man eaten a fish?

Each pair of sentences is about the same situation. For example, the first sentence asserts that a "boy-sleeping" situation will happen. Such sentences are called **declarative** sentences. The corresponding question asks whether such a "boy-sleeping" situation will occur. Sentences of the second sort are called **yes–no questions**. The only actual difference in meaning between these sentences is that one asserts information while the other asks for confirmation of information. This meaning difference is indicated by the different word orders, illustrating that two sentences may have a structural difference that corresponds *in a systematic way* to a meaning difference. The grammar of the language must account for this fact.

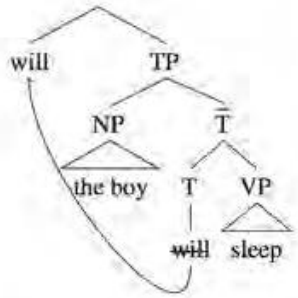
The standard way of describing these relationships is to say that the related sentences come from a common underlying structure. Yes–no questions are a case in point. A yes–no question begins life as a declarative sentence, a TP in the X-bar schema, for example:



The head of the TP, namely T (the modal *will* in this example), is central to the formation of yes–no questions as well as certain other types of sentences in English. In yes–no questions, the modal or auxiliary verb *have* or *be* appears in a different position; it precedes the subject.

The relationship between a declarative sentence and a yes–no question can be described by a rule that moves the material in T before the subject NP. This rule applies to the tree structure.

For the sentence *The boy will sleep* shown on the previous page to derive the structure below:



For descriptive purposes, we'll call this rule **Aux inversion**. Aux inversion is an example of what is traditionally referred to as a **transformational rule**. For now, we will leave unspecified the structural position that the auxiliary moves to in the tree above. We return to that below.

Thus, yes–no questions are thus generated in two steps:

1. PS-rules generate a basic structure.
2. Aux inversion applies to the basic structure to produce the derived structure.

By generating questions in two steps, we are claiming that a principled structural relationship exists between a question and its corresponding statement. Intuitively, we know that such sentences are related. The transformational rule is a formal way of representing this knowledge.

More generally, the basic structures of sentences are called **deep structures** or **d-structures**. Variants on the basic sentence structures are derived via transformational rules. The derived structures—the ones that follow the application of transformational rules—are called **surface structures** or **s-structures**. Loosely said, we *speak* and *hear* s-structures but mentally connect s-structures to d-structures. If no transformations apply, then d-structure and s-structure are the same. If transformations apply, then s-structure is the result after all transformations have taken effect.

In our discussion of the constituency test "move as a unit," we saw other rules that dislocate elements of a sentence, for example, the active-passive pair in 1 and PP-preposing in 2:

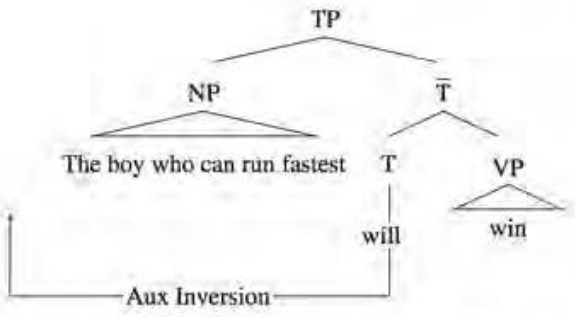
1. The child found a puppy → A puppy was found by the child.
2. The puppy played in the garden → In the garden the puppy played.

We saw earlier that the rule of subject–verb agreement is sensitive to structure and not to the linear position of elements in a sentence. We can now go further and state that all grammatical rules are structure dependent. For example, the PP-preposing rule in 2 cannot move just any string of words that begins with a preposition: It looks at the specific structure of the sentence containing the PP. This is made evident by the fact that *with a telescope, Sue saw the man* is not ambiguous. It has only the meaning "Sue used a telescope to see the man," corresponding to the first phrase structure on page 106 where the PP is immediately dominated by the $\overline{V}$. In the structure corresponding to the other meaning, "the boy saw a man who had a telescope," the PP is in the NP, as in the second tree on page 106. The PP-preposing transformation applies to the first structure but not the second.

Aux inversion provides yet another illustration of structure dependency.

1. The boy who **can** run fastest **will** win.
2. **Will** the boy who **can** run fastest win?
3. ***Can** the boy who run fastest **will** win?

The contrast in grammaticality of the sentences in 2 and 3 shows that to form a question Aux inversion applies to the modal within the $\overline{T}$ that is dominated by the root (highest) TP, and not simply to the *first* modal in the sentence, as illustrated in this highly abbreviated structure.



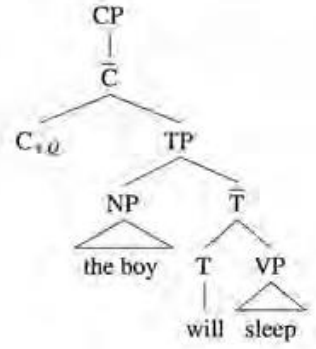
Let's now look at the structure of "Will the boy sleep?" in more detail. Thus far we have been assuming S (TP) is the root of the sentence. Strictly speaking, this is not correct. Remember our PS rule 7, repeated below.

7. CP → C S

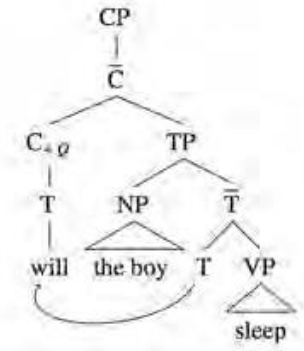
From this rule, we see that CP (Complementizer Phrase) dominates S (TP). Though this rule was previously used only for embedded sentences such as *Marge noticed that Homer caught a pokémon*, yes–no questions (and many other structures) tell us that all sentences have CP as their root. Like all other categories, CP conforms to X-bar schema and hence we modify rule 7 accordingly:

7(a).: CP → (Spec) $\overline{C}$
7(b).: $\overline{C}$ → C TP

The sentence root is CP and TP is the complement to the head C. C contains the abstract element +Q for questions or −Q for declaratives. Putting aside the specifier of CP for the moment, the X-bar analysis of CP has the advantage that C provides a home for T when Aux inversion relocates it. The d-structure for questions is:



and the modal is moved to C:



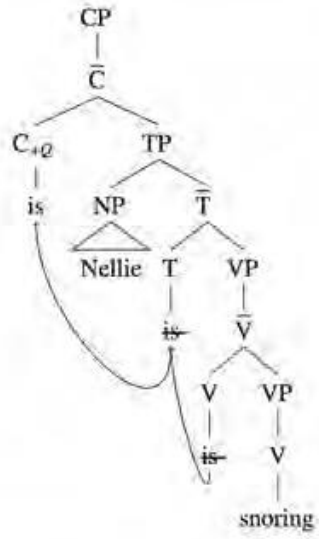
The auxiliaries *have* and *be* also undergo Aux inversion in yes–no question:

Spot has chased a squirrel.	Has Spot chased a squirrel?
Nellie is snoring.	Is Nellie snoring?

But the d-structure position of these auxiliaries is not under T. We know this because they can also occur with modals (which occupy the T position) as in:

Nellie may be snoring.
Spot must have found a squirrel.

Moreover, like other verbs in English (and unlike modals) *have* and *be* inflect for tense (and agreement): *am, is, are,* was, were, *have, has, had.* These observations lead us to conclude that *have/be* originate under V. When there is no modal in the sentence, *have* or *be* can undergo a movement that is not available to other verbs: they can "raise" from the position under V to T, and then undergo a second movement to C to form a question, as follows:

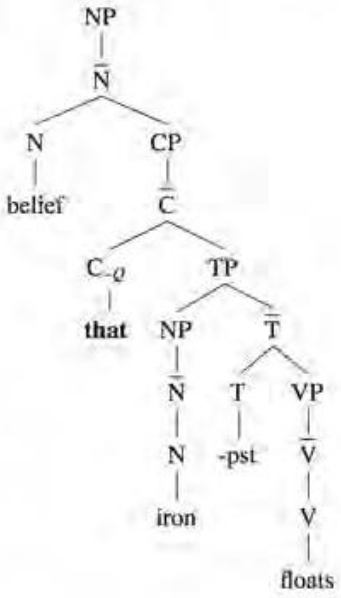


Additional PS rules would be needed to account for sentences with both *have* and *be* such as *Spot has been chasing squirrels* and even such unusual sentences as *The squirrels have been being chased by Spot.*

In addition to questions, the need for the complementizer phrase (CP) is provided by phrasal categories that take sentences (TPs) in their complements (underlined):

belief that iron floats (CP complement to head N)
wonders if iron floats (CP complement to head V)
happy that iron floats (CP complement to head A)
about whether iron will sink (CP complement to head P)

The words *that, if,* and *whether* are complementizers and the CP has a place for them under its head C, for example:



Wh Questions

> Whom are you? said he, for he had been to night school.
>
> GEORGE ADE, "The Steel Box," in *Bang! Bang!*, 1928

We have shown that syntactic rules are structure dependent and do not pay attention to the length or content of the words in a sentence. Nowhere is this better illustrated than in ***wh* questions** such as the following.

1. **(a)** What will Max chase _____?
   (b) Where should Pete put his dog bone _____?
   (c) Which toys does Pete like _____?

Wh questions contain *wh* phrases of various syntactic categories, for example, *what* is an NP, *which* is a determiner, and *where* is a PP. They are inserted into a PS tree under the appropriate category node, like all other words. In English and many other languages, *wh* phrase generally have to move from their d-structure position, indicated by the _____ in the sentences in (1), to the beginning of the sentence ("echo questions" like *you ate what!*? behave differently and we'll ignore them here).

Several clues tell us that the *wh* phrases in (1) have undergone movement. For example, the verb *chase* in sentence (a) is transitive, yet there is no direct object

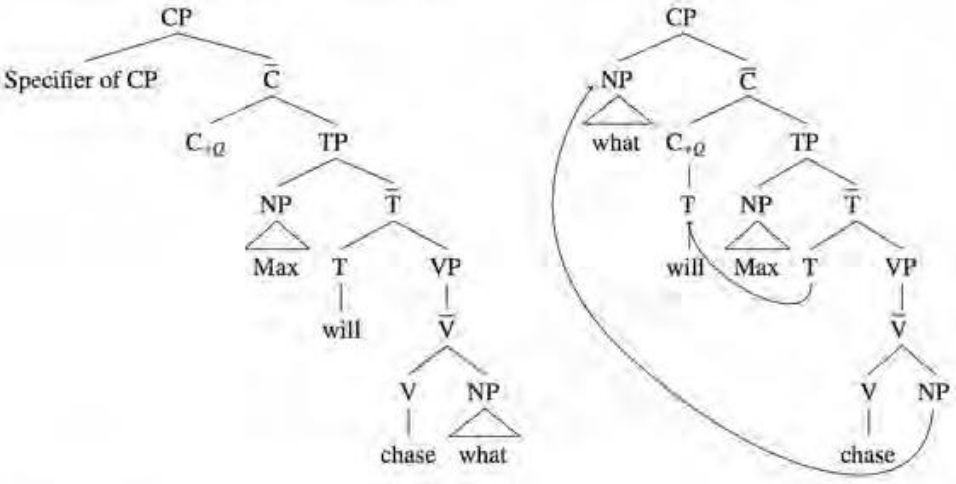
following it. There is a "gap" where the direct object should be. The verb *put* in sentence (b) is subcategorized for a direct object and a prepositional phrase, yet there is no PP following *his bone*. Finally, in sentence (c) *like* is followed by a gap and also has the third-person singular *-s* morpheme though it is preceded by a plural noun.

We can explain the grammaticality of the sentences in (1) despite these "abnormalities" by assuming that in each case the *wh* phrase originates in the position of the gap, as in (2), and is then moved to the beginning of the sentence by transformational rule.

2. **(a)** Max will chase *what?*
(b) Pete should put his dog bone *where?*
(c) Pete likes *which toys?*

The sentences in (1) are grammatical because the requirement that *chase* and *like* have a direct object is satisfied by the *what* and *which toys*, while the PP requirement of *put* is satisfied by *where*. The subcategorization requirements of the verbs are met prior to movement of the *wh* phrase. In any *wh* question, there is a dependency between the *wh* phrase at the beginning of the sentence and a gap somewhere else in the sentence.

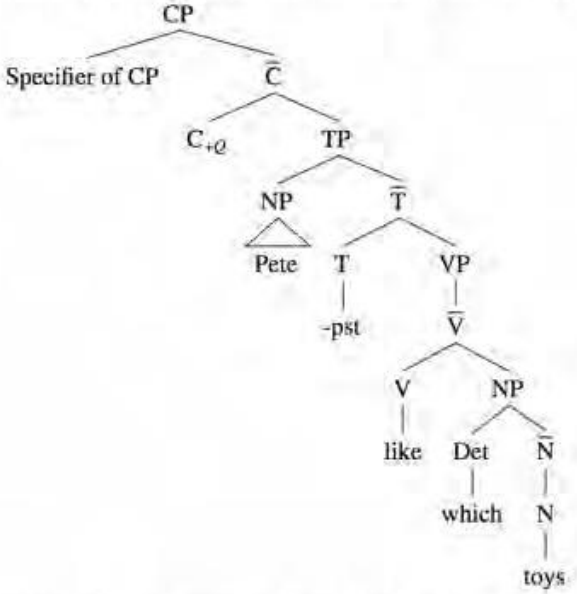
Wh questions such as those in (1) are generated in several steps: phrase structure principles provide the basic declarative word orders in (2) (or more precisely the d-structure) with the *wh* expression in complement position, as required by the X-bar schema and the selectional properties of the verbs *chase*, *put* and *like*. Transformational operations then apply. Taking (2a) as illustrative, the rule *wh* movement relocates the *wh* expression from its d-structure position to a structural position at the beginning of the sentence, which we now identify as the Specifier of CP. Aux inversion moves the modal to the C, as in the derivation of yes–no questions. Following are the d-structure and s-structure trees for the sentence "What will Max chase?" is:



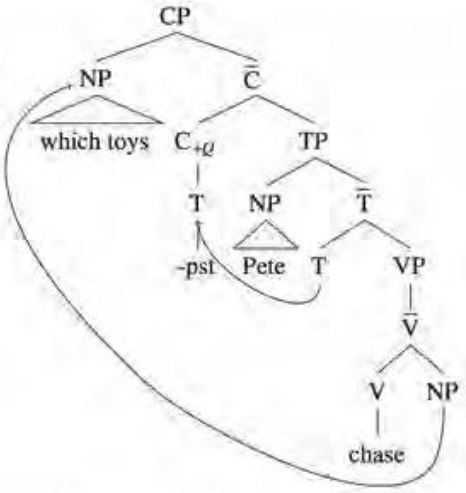
At this point, it is worth observing that like proper names and pronouns, *wh* expressions such as *what* and *who* are full NPs, not Ns. Unlike nouns, *who* and *what* cannot appear with a determiner, an adjective, or any other NP element.

*The what did you see?
*The fast who won the race?

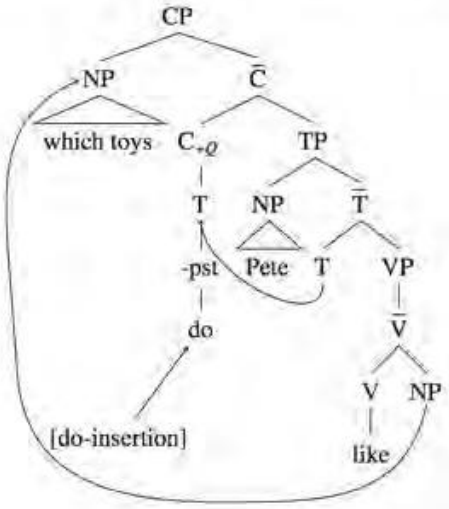
However, *what* can be a determiner, like *which*. This is reflected in the structure for the sentence *Which toys does Pete like?* Following is the d-structure of this sentence:



After *wh* movement and Aux Inversion have done their work we have this near s-structure:



Additionally, when T lacks an actual word and carries only the present tense, as in this sentence, it still undergoes movement because Aux Inversion is *structure dependent* and doesn't pay attention to the particular words (or lack thereof) under a category. With T separated from the main verb by an NP, something is needed to carry the tense. That something is the "dummy" word *do*, and it is put in place by a transformational rule of *do-insertion*, yielding the final s-structure:



Do combines with [-pst] to yield the present tense *does*. Rules that convert inflectional features such as *past tense* or *third-person present tense* into their proper phonological forms are called **spell-out rules**. They apply to the syntactic output of s-structures.

A notable property of *wh* questions is that the *wh* phrase is relocated to a position outside its original d-structure clause. Indeed, there is no limit to the distance that a *wh* phrase can move, as illustrated by the following sentences. The dashes indicate the d-structure position from which the *wh* phrases has been moved.

Who did Helen say the senator wanted to hire _____?
Who did Helen say the senator wanted the congressional representative to try to hire _____?
Who did Helen say the senator wanted the congressional representative to try to convince the Speaker of the House to get the Vice President to hire _____?

"Long-distance" dependencies such as those created by *wh* movement are a fundamental part of human language. They provide still further evidence that sentences are not simply strings of words but are supported by a rich scaffolding of phrase structure trees. These trees express the underlying structure of a sentence as well as its relation to other sentences in the language, and as always reflect a person's knowledge of syntax.

UG Principles and Parameters

Whenever the literary German dives into a sentence, that is the last you are going to see of him till he emerges on the other side of the Atlantic with his Verb in his mouth.

MARK TWAIN, *A Connecticut Yankee in King Arthur's Court*, 1889

In this chapter, we have largely focused on English syntax, but many of the grammatical structures we have described for English also hold in other languages. This is because Universal Grammar (UG) provides the basic design for all human languages, and individual languages are simply variations on this basic blueprint. Imagine a new housing development. All of the houses have the same floor plan, but the occupants have some choices to make. They can have carpet or hardwood floors, curtains or blinds; they can choose their kitchen cabinets and the countertops, the bathroom tiles, and so on. This is more or less how the syntax operates. Languages conform to a basic design, and then there are choice points or points of variation.

All languages have structures that conform to the X-bar schema. Phrases consist of specifiers, heads, and complements; barred categories express recursive properties; sentences are headed by T, which is specified for information such as tense and modality; and so on.

However, languages may have different orders within the phrases and sentences. The word order differences between English and Japanese, discussed earlier, illustrate this interaction of general and language-specific properties. UG specifies the structure of a phrase. It must have a head and may take a complement of some type and have adjuncts. However, each language defines for itself the relative order of these constituents: English is head-initial, Japanese is head-final. We call the points of variation **parameters**.

All languages appear to have transformational rules for reordering elements to achieve certain purposes such as creating questions or emphasizing certain

constituents. In Dutch, for example, in which the modal moves, if there is one, as in (1), and otherwise the main verb moves, as in (2):

1. Zal Femke fietsen? (from "Femke zal fietsen.")
   will Femke bicycle ride
   (Will Femke ride her bicycle?)
2. Leest Meindert veel boeken? (from "Meindert leest veel boeken.")
   reads Meindert many books
   (Does Meindert read many books?)

Main verbs in Standard American English do not move. Instead, *do* spells out the stranded tense and agreement features. All languages have expressions for requesting information about *who, when, where, what,* and *how.* Even if the question words in other languages do not necessarily begin with "wh," we will refer to such questions as *wh* questions. In some languages, such as Japanese and Swahili, the *wh* phrase does not move. It remains in its original d-structure position. In Japanese the sentence is marked with a question suffix *-no:*

Taro-ga	nani-o	mitsuketa-no?
Taro	what	found

Recall that Japanese word order is SOV, so the *wh* phrase *nani* ("what") is an object and occurs before the verb.

In Swahili, the *wh* phrase—*nani* by pure coincidence—also stays in its base position:

Ulipatia	nani	kitabu?
you gave	who	a book

However, in all languages with *wh* movement (i.e., movement of the question phrase), the question element moves to the same sentence-initial position. The "landing site" of the moved phrase is determined by UG. Among the *wh* movement languages, there is some variation. In the Romance languages, such as Italian, the *wh* phrase moves as in English, but when the *wh* phrase questions the object of a preposition, the preposition must move together with the *wh* phrase. In English the preposition can be "stranded" (i.e., left behind in its original position):

A chi hai dato il libro?
To whom (did) you give the book?
*Chi hai dato il libro a?
Who(m) did you give the book to?

In some dialects of German, long-distance *wh* movement leaves a trail of *wh* phrases:

Mit	Wem	glaubst	Du	Mit	wem	Hans	spricht?
With	whom	think	you	with	whom	Hans	talks

(Whom do you think Hans talks to?)

Wen	willst	Du	wen	Hans	anruft?
Whom	want	you	whom	Hans	call

(Whom do you want Hans to call?)

In Czech a quantity question phrase can be moved, leaving behind the NP it modifies:

Jak	velké	Václav	koupil	auto?
How	Big	Václav	bought	car

(How big a car did Vàclav buy?)

Despite these variations and despite the fact the wh phrase can move a very long distance, there are certain instances in which it cannot apply and these constraints are universal and structure dependent. For example, consider the following three "sentences:" (Remember that the position from which the *wh* phrase has moved is indicated with _____.)

1. **(a)** Spock asked Kirk if Scotty had fixed the warp drive?
   (b) Who did Spock ask _____ whether Scotty had fixed the warp drive?
   (c) *Who did Spock ask Kirk whether _____ had fixed the warp drive?

The only difference between the grammatical (1b) and the ungrammatical (1c) is that in (1b) the *wh* phrase originates in the higher clause, whereas in (1c) the *wh* phrase comes from inside the *whether* clause. This illustrates that the constraint against movement depends on structure and not on the length of the sentence. Some sentences can be very short and still not allow *wh* movement:

2. **(a)** George admired Martha's mother.
   (b) Who did George admire?
   (c) Whose mother did George admire?
   (d) *Whose did George admire mother?

The sentences in (2) show that a *wh* phrase cannot be extracted from inside a possessive NP. In (2b) it is okay to question the whole direct object. In (2c) it is even okay to question a piece of the possessive NP, providing the entire *wh* phrase is moved, but (2d) shows that moving the *wh* word alone out of the possessive NP is illicit.

The principle of structure dependency, the X-bar principles governing the organization of phrases, and the constraints on movement just illustrated, are part of UG. These aspects of grammar need not be learned. They are part of the innate blueprint for language that the child brings to the task of acquiring a language. What children must learn are the language-specific aspects of grammar. Where there are parameters of variation, children must determine the correct choices for their language. The Japanese child must determine that the verb comes after the object in the VP, and the English-speaking child that the verb comes before it. The Dutch-speaking child acquires a rule that moves the

verb to make a question, while the English-speaking child has a more restrictive rule regarding such movement. Italian, English, and Czech children learn that to form a question the *wh* phrase moves, whereas Japanese and Swahili children determine that there is no movement. As far as we can tell, children fix these parameters very quickly. We will have more to say about how children set UG parameters in Chapter 9.

Sign Language Syntax

All languages have rules of syntax similar in kind, if not in detail, to those that we have seen for English, and sign languages are no exception. Signed languages have phrase structure (PS) rules that build hierarchical structures out of linguistic constituents and specify the word order of a given signed language. ASL is an SVO language. The signer of ASL knows that the first two sentences below are grammatical sentences of ASL, but the third is not. [The capitalized words represent signs.]

CAT CHASE DOG
"The cat chased the dog."
DOG CHASE CAT
"The dog chased the cat."
*CHASE CAT DOG

Unlike in English, however, adjectives can follow the head noun in ASL, as in Spanish, for example, and other spoken languages.

The PS rules also determine the grammatical functions of a sentence such as subject and object, so that a signer of ASL knows that while the first two sentences are both grammatical, they differ with respect to who is chasing whom. Finally, the PS rules of signed languages exhibit language-specific variation, just as those of spoken languages do. The grammatical sentences given above for ASL would not be grammatical for signers of Italian Sign Language (LIS or "Lingua dei Segni Italiana"), because LIS is an SOV language.

In ASL, as in English and other spoken languages, the basic word order can be modified by movement rules. For example, a direct object or other constituent such as a temporal adverb can be moved to the beginning of the sentence in a process called *topicalization*. This is done to bring attention to this constituent:

BOOK, JOHN READ YESTERDAY
YESTERDAY, JOHN READ BOOK

It is also possible for movement to apply iteratively, giving a double topicalization structure, as in:

YESTERDAY, BOOK, JOHN READ

Topicalization in ASL is accompanied by raising the eyebrows and tilting the head upward, marking the special word order, much as intonation does in English. The use of such non-manual markers is a salient feature of signed languages and something that distinguishes them from spoken languages. Spoken

language may be accompanied by facial expressions and other non-manual gestures. But however expressive or informative such gestures are, they do not form part of the grammatical system of a spoken language as they do in signed languages.

Wh questions in ASL may also be formed via movement. In contrast to English, the movement is optional. In ASL, *wh* phrases may remain in the d-structure position as in Japanese and Swahili. The ASL equivalents of *Who did Bill see yesterday?* and *Bill saw who yesterday?* are both grammatical. As in English and other spoken languages, *wh* movement in signed languages is constrained in various ways (see Appendix D). For example, in ASL it is not possible to question one member of a coordinate structure:

*WHO JOHN KISS MARY AND _____ YESTERDAY?
*"Who did John kiss Mary and yesterday?"

Similar constraints operate in topicalization. For example, a constituent cannot be moved out of the clause beginning with another *wh* phrase:

*MOTHER, I NOT-KNOW WHAT LIKE
*"(As for) Mother, I don't know what _____ likes."

Wh questions in ASL are accompanied by an obligatory facial expression with a tilted head and furrowed brows. These nonmanual markers are analogous to the special intonation that indicates interrogatives in many spoken languages.

Signed languages also have complex structural means to express notions such as tense, modality, and negation. In ASL, as in English, there are several forms of negation, including NO, NOT, NONE, and NEVER, and they may follow different rules. The sign NOT, for example, can come at the end of an ASL sentence, quite unlike the behavior of the English word *not*. The structural rules for negation in ASL also require that the signer shake his or her head while producing a negative sentence, and even allow a signer to "shorten" or "reduce" the negation of a sentence to just a head shake, without producing the actual sign for NOT or NEVER. This is similar to how a speaker of English can shorten *not* to *n't*.

ASL and other sign languages show an interaction of universal and language-specific properties. The rules of sign languages are structure-dependent, and movement rules are constrained in various ways. Other properties such as the nonmanual markers and the use of space are an integral part of the grammar of sign languages but not of spoken languages. The fact that sign languages appear to be subject to the same principles and parameters of UG that spoken languages are subject to shows us that the human brain is designed to acquire and use language, not simply speech.

Summary

Speakers of a language recognize the grammatical sentences of their language and know how the words in a sentence must be ordered and grouped to convey a certain meaning. All speakers are capable of producing and understanding an unlimited number of new sentences that have never before been spoken or heard. They also recognize ambiguities, know when different sentences mean the same thing, and correctly interpret the grammatical relations in a sentence,

such as **subject** and **direct object**. This kind of knowledge comes from their knowledge of the rules of syntax.

Sentences have structure that can be represented by **phrase structure trees** containing **syntactic categories**. Phrase structure trees reflect the speaker's mental representation of sentences. Ambiguous sentences may have more than one phrase structure tree.

Phrase structure trees reveal the linear order of words and the constituency of each syntactic category. There are different kinds of syntactic categories: **Phrasal categories**, such as NP and VP, are composed of other syntactic categories; **lexical categories**, such as Noun and Verb, and **functional categories**, such as Det and T, often correspond to individual words. The hierarchical structure of the phrasal categories is universal and is specified by ***X-bar schema***. NPs, VPs, and so on are headed by nouns, verbs, and the like. The sentence (S or TP) is headed by T, which carries such information as tense and modality.

The particular order of elements within the phrase is subject to language-particular variation and can be expressed through the **phrase structure rules** of each language, which conform to the X-bar schema. Here is a composite of all the phrase structure rules given in this chapter renumbered to keep phrasal types together.

1. S (=TP) → NP $\overline{\text{T}}$
2. $\overline{\text{T}}$ → T VP
3. NP → (Det) $\overline{\text{N}}$
4. $\overline{\text{N}}$ → N (XP)
5. $\overline{\text{N}}$ → A $\overline{\text{N}}$
6. VP → (Spec) $\overline{\text{V}}$
7. $\overline{\text{V}}$→V (XP)
8. $\overline{\text{V}}$ → $\overline{\text{V}}$ PP
9. PP → P NP
10. CP → (Spec) $\overline{\text{C}}$
11. $\overline{\text{C}}$ → C TP (=S)
12. AP → A PP
13. $\overline{\text{A}}$ → Int $\overline{\text{A}}$

A grammar is a formally stated, explicit description of the mental grammar or the speaker's linguistic competence. The **lexicon** represents the knowledge that a speaker has about the vocabulary of his or her language. This knowledge includes the syntactic categories of words as well as the **subcategorization** or **C-selection** properties of particular lexical items that specify the complements they can take, for example, whether a verb is **transitive** or **intransitive**. The lexicon also contains semantic information, including the kinds of NPs that can function as semantically coherent subjects and objects: **S-selection**. Selectional restrictions must be satisfied in the **d-structure** representation of the sentence.

Transformational rules such as Aux Inversion, Wh Movement, and do-insertion account for relationships between sentences such as declarative and interrogative pairs, including *wh* questions. The output of the transformational rules is the **s-structure** of a sentence, the structure that most closely determines

how the sentence is to be pronounced (or signed). Inflectional information, such as tense, may be represented as abstract features in the phrase structure tree. After the rules of the syntax have applied, these features are sometimes spelled out as affixes such as *-ed* or as function words such as *do*.

The basic design of language is universal. Universal Grammar specifies that syntactic rules are **structure-dependent** and that movement rules may not move phrases out of certain structures, among many other constraints, including a need to not violate the X-bar schema. These constraints exist in all languages—spoken and signed—and need not be learned. UG also contains parameters of variation, including the order of heads and complements, and the variations on movement rules. A child acquiring a language must fix the parameters of UG for that language.

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Exercises

1. Besides distinguishing grammatical from ungrammatical sentences, the rules of syntax account for other kinds of linguistic knowledge, such as:
   a. when a sentence is structurally ambiguous. (Cf. *The boy saw the man with a telescope.*)
   b. when two sentences with different structures mean the same thing. (Cf. *The father wept silently.* and *The father silently wept.*)
   c. systematic relationships of form and meaning between two sentences, like declarative sentences and their corresponding interrogative forms. (Cf. *The boy can sleep.* and *Can the boy sleep?*)

   Draw on your linguistic knowledge of English to come up with an example illustrating each of these cases. (Use examples that are different from the ones in the chapter.) Explain why your example illustrates the point. If you know a language other than English, provide examples in that language, if possible.

End of Linguistics 1