Syntax: The Analysis of Sentence Structure

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> *. . . the game is to say something new with old words*
> – RALPH WALDO EMERSON, *Journals*, 1849

OBJECTIVES

In this chapter, you will learn:
- how we categorize words
- how words can be combined into phrases and sentences according to a systematic schema
- that words "choose" what they can combine with in the same phrase
- how questions are derived from statements
- how to diagram the structure of sentences
- how all languages are alike in the way sentences are constructed
- how languages can differ systematically in the way sentences are constructed

In a language like English not much can be said with a single word. If language is to express complex thoughts and ideas, it has to have a way to combine words into sentences. In this chapter, we will consider how this is done, focusing on the component of the grammar that linguists call **syntax**.

As noted in Chapter 1, speakers of a language are able to combine words in novel ways, forming sentences that they have neither heard nor seen before. However, not just any combination of words will give a well-formed sentence. English speakers recognize that the pattern in *1* is not permissible even though the same words can be combined in a different way to form the acceptable sentence in *2*.

1) *House painted student a the.

2) A student painted the house.

We say that an utterance is **grammatical** if native speakers judge it to be a possible sentence of their language.

The study of syntax lies very close to the heart of contemporary linguistic analysis and work in this area is notorious both for its diversity and for its complexity. New ideas are constantly being put forward, and there is considerable controversy over how the properties of sentence structure should be described and explained.

This chapter will introduce a simple version of **transformational** (or **generative**) **grammar**. Although many linguists disagree with various features of this approach, it is very widely used in linguistics and other disciplines concerned with language (especially cognitive science). For this reason, it is the usual point of departure for introductions to the study of sentence structure.

An intriguing aspect of work within transformational syntax is the emphasis on **Universal Grammar (UG)**, the system of categories, operations, and principles that are shared by all languages. The key idea is that despite the many superficial differences among languages, there are certain commonalities with respect to the manner in which sentences are formed.

As things now stand, it is widely believed that the syntactic component of any grammar must include at least two subcomponents. The first of these is a **lexicon**, or mental dictionary, that provides a list of the language's words along with information about their pronunciation, their category, and their meaning.

LANGUAGE MATTERS   What's the Longest Sentence in English?

George Bernard Shaw wrote one that was 110 words long. William Faulkner's novel *Absalom, Absalom!* includes a 1,300-word sentence. James Joyce managed to produce a 4,391-word sentence (that goes on for 40 pages) in *Ulysses*. But even that's not the longest known sentence—*The Rotter's Club* by Jonathon Coe contains a sentence that is 13,955 words long!

The bottom line is that there's no such thing as the world's longest sentence—any sentence can be made longer. That's because the words and structure-building operations involved in sentence formation can be used over and over again, without limit.

a man . . . and a woman
a man . . . and a woman . . . and a child
a man . . . and a woman . . . and a child . . . and a dog
a book . . . on a table . . . near the bed . . . in the room . . . at the back . . .
of the house . . . on the tree-lined street . . .

The possibility of creating an ever more complex structure is called **recursion**, and it's an essential part of our ability to build sentences.

The second subcomponent consists of what can be called a **computational system**, by which we simply mean operations that combine and arrange words in particular ways. As we will see later in this chapter, the two principal structure-building operations made available by Universal Grammar are **Merge** (which combines elements to create phrases and sentences) and **Move** (which transports an element to a new position within a particular structure).

We will begin our discussion of these matters in Section 1 by introducing some of the most common categories of words found in language and by investigating how they can be combined into larger structural units.

1   Categories and Structure

A fundamental fact about words in all human languages is that they can be grouped together into a relatively small number of classes called **syntactic categories**. This classification reflects a variety of factors, including the type of meaning that words express, the type of affixes that they take, and the type of structures in which they can occur.

1.1   Categories of Words

Table 5.1 provides examples of the word-level categories that are most central to the study of syntax. The four most studied syntactic categories are **noun (N)**, **verb (V)**, **adjective (A)**, and **preposition (P)**. These elements, which are often called **lexical categories**, play a very important role in sentence formation, as we will soon see. A fifth and less studied lexical category consists of **adverbs (Adv)**, most of which are derived from adjectives.

Table 5.1   Syntactic categories

Lexical categories (content words)	Examples
Noun (N)	Harry, boy, wheat, policy, moisture, bravery
Verb (V)	arrive, discuss, melt, hear, remain, dislike
Adjective (A)	good, tall, old, intelligent, beautiful, fond
Preposition (P)	to, in, on, near, at, by
Adverb (Adv)	slowly, quietly, now, always, perhaps
Nonlexical categories (function words)	*Examples*
Determiner (Det)	the, a, this, these, no (as in *no books*)
Degree word (Deg)	too, so, very, more, quite
Auxiliary (Aux)	
Modal	will, would, can, could, may, must, should
Nonmodal	be, have
Conjunction (Con)	and, or, but

Languages may also contain **nonlexical** or **functional categories**, including **determiner (Det)**, **auxiliary verb (Aux)**, **conjunction (Con)**, and **degree word (Deg)**. Such elements generally have meanings that are harder to define and paraphrase than those of lexical categories. For example, the meaning of a determiner such as *the* or an auxiliary such as *would* is more difficult to describe than the meaning of a noun such as *hill* or *vehicle*.

A potential source of confusion in the area of word classification stems from the fact that some items can belong to more than one category.

3) *comb* used as a noun:
   The woman found a comb.

   comb used as a verb:
   The boy should comb his hair.

4) *near* used as a preposition:
   The child stood near the fence.

   near used as a verb:
   The runners neared the finish line.

   near used as an adjective:
   The end is nearer than you might think.

How then can we determine a word's category?

Meaning

One criterion involves meaning. For instance, nouns typically name entities (people and things), including individuals (*Harry, Sue*) and objects (*book, desk*). Verbs, on the other hand, characteristically designate actions (*run, jump*), sensations (*feel, hurt*), and states (*be, remain*). Consistent with these tendencies, *comb* in 3 refers to an object when used as a noun but to an action when used as a verb.

The typical function of an adjective is to designate a property or attribute of the entities denoted by nouns. Thus, when we say *that tall building*, we are attributing the property *tall* to the building designated by the noun.

In a parallel way, adverbs typically denote properties and attributes of the actions, sensations, and states designated by verbs. In the following sentences, for example, the adverb *quickly* indicates the manner of Janet's leaving and the adverb *early* specifies its time.

5) Janet left quickly.
   Janet left early.

A word's category membership does not always bear such a straightforward relationship to its meaning, however. For example, there are nouns such as *difficulty, truth,* and *likelihood,* which do not name entities in the strict sense. Moreover, even though words that name actions tend to be verbs, nouns may also denote actions (*push* is a noun in *give someone a push*).

Matters are further complicated by the fact that in some cases, words with very similar meanings belong to different categories. For instance, the words *like* and *fond* are very similar in meaning (as in *Mice like/are fond of cheese*), yet *like* is a verb and *fond* an adjective.

Inflection

Most linguists believe that meaning is only one of several criteria that enter into determining a word's category. As shown in Table 5.2, inflection can also be very useful for distinguishing among different categories of words. (For a discussion of inflection, see Chapter 4, Section 4.)

Table 5.2 Lexical categories and their inflectional affixes

Category	Inflectional affix	Examples
N	plural -*s* possessive -*'s*	books, chairs, doctors John's, (the) man's
V	past tense -*ed* progressive -*ing* third person, singular -*s*	arrived, melted, hopped arriving, melting, hopping arrives, melts, hops
A	comparative -*er* superlative -*est*	taller, faster, smarter tallest, fastest, smartest

However, even inflection does not always provide the information needed to determine a word's category. In English, for example, not all adjectives can take the comparative and superlative affixes (**intelligenter, *beautifulest*) and some nouns cannot be pluralized (*moisture, bravery, knowledge*).

Distribution

A third and often more reliable criterion for determining a word's category involves the type of elements (especially functional categories) with which it can co-occur (its **distribution**). For example, nouns can typically appear with a determiner, verbs with an auxiliary, and adjectives with a degree word in the sort of patterns illustrated in Table 5.3.

Table 5.3 Distributional properties of nouns, verbs, and adjectives

Category	Distributional property	Examples
Noun	occurrence with a determiner	a car, the wheat
Verb	occurrence with an auxiliary	has gone, will stay
Adjective	occurrence with a degree word	very rich, too big

Of course, a verb cannot occur with a determiner or degree word in these sorts of patterns, and a noun cannot occur with an auxiliary.

6) a verb with a determiner:
   *the destroy

   a verb with a degree word:
   *very appreciate

   a noun with an auxiliary:
   *will destruction

Distributional tests for category membership are simple and highly reliable. They can be used with confidence when it is necessary to categorize unfamiliar words.

LANGUAGE MATTERS   A Poem That Syntacticians Love

Thanks to distributional and inflectional clues, it's often possible to identify a word's category without knowing its meaning. The poem "Jabberwocky," by Lewis Carroll, illustrates this point in a particularly brilliant way—it's interpretable precisely because readers are able to figure out that *gyre* is a verb (note the auxiliary verb to its left), that *borogoves* is a noun (it's preceded by a determiner and takes the plural ending), and so on.

> 'Twas brillig, and the slithy toves
> Did gyre and gimble in the wabe;
> All mimsy were the borogoves,
> And the mome raths outgrabe.
>
> "Beware the Jabberwock, my son!
> The jaws that bite, the claws that catch!
> Beware the Jubjub bird, and shun
> The frumious Bandersnatch!"

1.2   Phrase Structure

Sentences are not formed by simply stringing words together like beads on a necklace. Rather, they have a hierarchical design in which words are grouped together into larger structural units called **phrases**. In the sentence *The doctor arrived quickly*, for example, the words *the* and *doctor* form a phrase, and *arrived* and *quickly* make up another.

7) [The doctor] [arrived quickly].

Similarly, in the following sentence, *those* and *students* are grouped together, as are *ride* and *bicycles*.

8) [Those students] [ride bicycles].

In traditional syntactic analysis, *the doctor* and *those students* are identified as the subject of the sentence, while *arrived quickly* and *ride bicycles* make up the predicate. Further analysis reveals that the verb *ride* is **transitive**, since it takes a **direct object** (*bicycles*), whereas *arrive* is **intransitive** since it has no direct object.

Terms such as *subject* and *direct object* are very useful tools for syntactic description, and you can find out more about them at our Web site (go to **bedfordstmartins.com/ linguistics/syntax** and click on **Grammatical Relations**). For the purposes of this chapter, however, we will present a different (and more popular) system of syntactic description that focuses on a sentence's internal geometry.

The Blueprint

As a first approximation, it is often suggested that a typical phrase can be broken down into three parts—a **head**, a **specifier**, and a **complement**—arranged in accordance with the blueprint or **X′ schema** shown in Figure 5.1 (**X′** is pronounced 'X-bar').
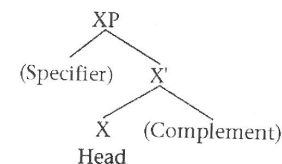

Figure 5.1   The X′ schema

Such structures, which are often called (inverted) **trees**, capture the hierarchical organization of phrases and sentences. In particular, the X′ schema captures four generalizations:

1. All phrases have a three-level structure (X, X′, and XP).

2. All phrases contain a head, X.

3. If there is a complement, it is attached at the intermediate X′ level, as a sister of the head.

4. If there is a specifier, it is attached at the XP level.

Let us consider each part of a phrase's architecture in turn.

Heads

The head is the obligatory nucleus around which a phrase is built. For now, we will focus on four categories that can function as the head of a phrase—nouns, verbs, adjectives, and prepositions. Thus, to start out, the X in the X′ schema can be N, V, A, or P.

Although phrases usually consist of two or more words, a head may form a phrase all by itself as shown in the examples in Figure 5.2. When this happens, the resulting structure has a single straight branch from which only the head hangs.
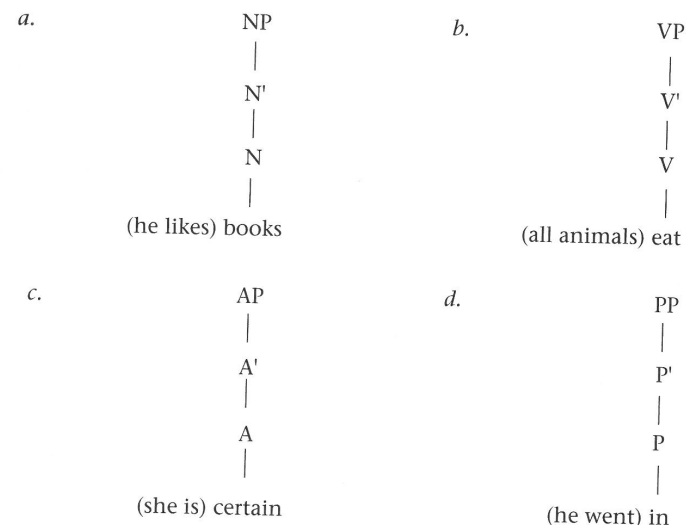

Figure 5.2   Phrases consisting of just a head

Specifiers

The type of specifier that appears in a particular phrase depends on the category of the head. Determiners serve as the specifiers of Ns, while preverbal adverbs typically function as the specifiers of Vs and degree words as the specifiers of As and (some) Ps (see Table 5.4).

Table 5.4 Some specifiers

Category	Typical function	Examples
Determiner (Det)	specifier of N	the, a, this, those, no
Adverb (Adv)	specifier of V	never, perhaps, often, always
Degree word (Deg)	specifier of A or P	very, quite, more, almost

When a specifier is present, it attaches to XP, in accordance with the X' schema. This gives structures such as the ones shown in Figure 5.3.

Syntactically, specifiers typically mark a phrase boundary. In English, specifiers occur at the left boundary (the beginning) of their respective phrases. Semantically, specifiers help to make the meaning of the head more precise. Hence, the determiner (Det) *the* in *a* indicates that the speaker has in mind specific books, the adverb *never* in *b* indicates nonoccurrence of the event, and the degree words (Deg) *quite* and *almost* in *c* and *d* indicate the extent to which a particular property or relation is manifested.

Exercise 3 at the end of the chapter provides practice in identifying specifiers and heads.
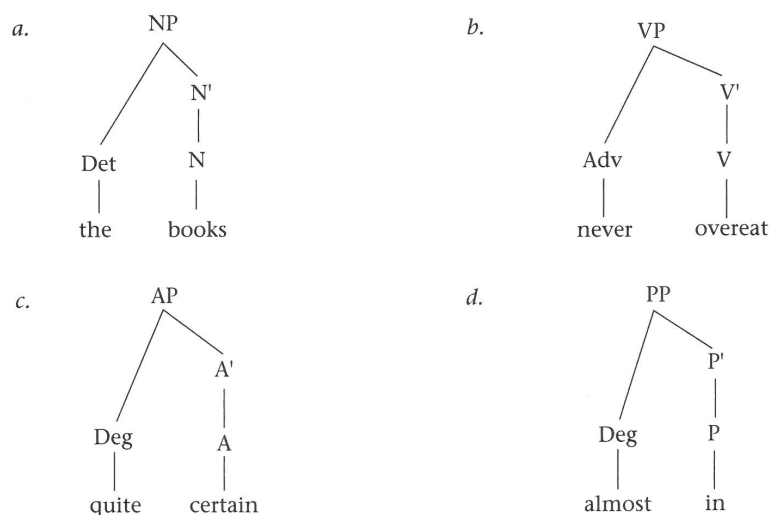

Figure 5.3 Some phrases consisting of a specifier and a head

Complements

Consider now some examples of slightly more complex phrases.

9) a. [NP a picture of the ocean]
   b. [VP never trust a rumor]
   c. [AP quite certain about Mary]
   d. [PP almost in the house]

In addition to a specifier and the underlined head, the phrases in *9* also contain a complement. These elements, which are themselves phrases, provide information about entities and locations whose existence is implied by the meaning of the head. For example, the meaning of *trust* implies something that is trusted, the meaning of *in* implies a location, and so on.

10) A vegetarian would never eat [a hamburger].
                                    ↑   ↑
                                  head   *complement naming the thing eaten*

11) in   [the house]
    ↑   ↑
  head   *complement naming a location*

Figure 5.4 illustrates the structure of a phrase consisting of a specifier, a head, and a complement. (The NP serving as complement of a V corresponds to the sentence's direct object.) As illustrated in examples *9–11*, complements are themselves phrases. Thus, the complement of the V *trust* is an NP that itself consists of a determiner (*a*) and a head (*rumor*).
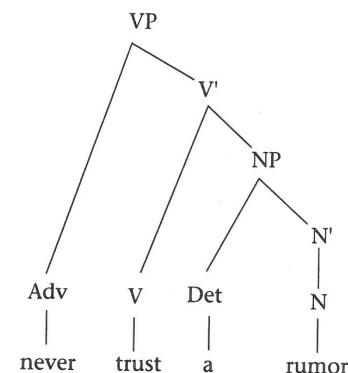

Figure 5.4 A VP consisting of a specifier, a head, and a complement

NPs, APs, and PPs have a parallel internal structure, as the examples in Figure 5.5 illustrate. (In order to save space, we do not depict the internal structure of the complement phrases in these examples. The full structure of any tree abbreviated in this way can be found at the Web site; go to **bedfordstmartins.com/linguistics/syntax** and click on **Full Trees**.)

a.

```
          NP
         /  \
        /    N'
       /    /  \
      Det  N    PP
       |   |    /\
      the books about the war
```

b.

```
          AP
         /  \
        /    A'
       /    / \
      Deg  A   PP
       |   |   /\
     quite certain about Mary
```

c.

```
          PP
         /  \
        /    P'
       /    / \
      Deg  P   NP
       |   |   /\
    almost in the house
```
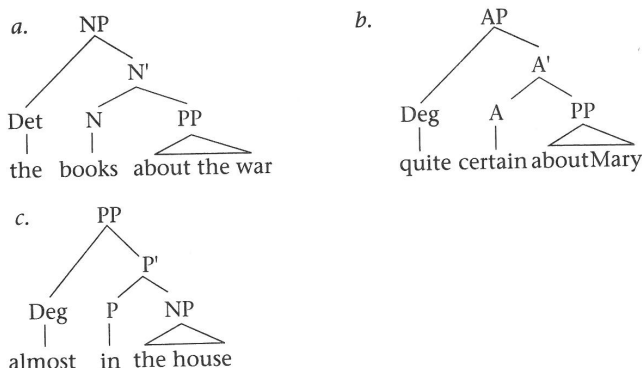
Figure 5.5 Other phrases consisting of a specifier, a head, and a complement

Of course, it is also possible to have phrases that consist of just a head and a complement, with no specifier. This results in the type of bottom-heavy structures depicted in Figure 5.6.

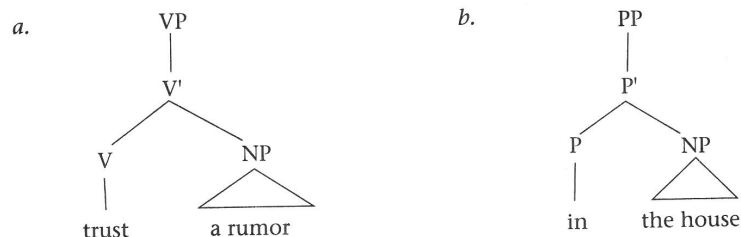Exercise 4 at the end of the chapter provides practice in identifying complements.

a.

```
        VP
        |
        V'
       /  \
      V    NP
      |    /\
    trust a rumor
```

b.

```
        PP
        |
        P'
       /  \
      P    NP
      |    /\
      in  the house
```

Figure 5.6 Phrases consisting of a head and a complement

The Merge Operation

We can now formulate the following operation for sentence building.

12) *Merge*

Combine words in a manner compatible with the X' schema.

The Merge operation is able to take a determiner such as *the* and combine it with an N' consisting of the N *house* to form the NP *the house*. It is then able to take a head such as the preposition *in* and combine it with the NP *the house* to form the P' and PP *in the house* (see Figure 5.7).

Continued application of the Merge operation to additional words can lead to the formation of phrases and sentences of unlimited complexity.
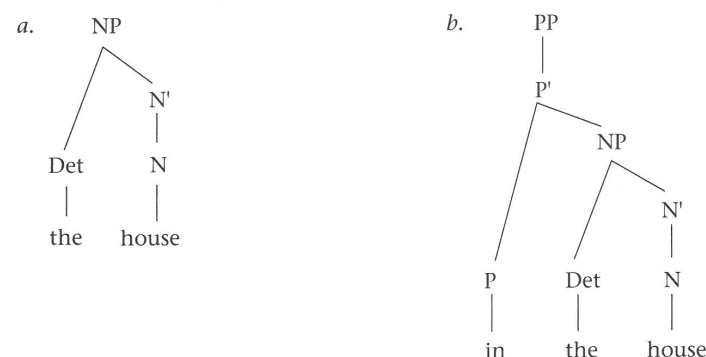
a.

```
         NP
        /  \
       /    N'
      /     |
     Det    N
      |     |
     the   house
```

b.

```
         PP
         |
         P'
        /  \
       /    NP
      /    /  \
     /    /    N'
    /    /    / \
   P    Det  N
   |    |    |
   in  the house
```

Figure 5.7 The Merge operation in action

LANGUAGE MATTERS   The Mirror Image

Many languages have a phrase structure whose X' level is the mirror image of the one found in English—the complement occurs before the head, rather than after it. (In both types of language, the specifier appears before the head.) Japanese works that way: the V occurs at the end of the VP, the P at the end of the PP, and the N at the end of the NP.

NP + V	NP + P	PP + N
[sono hon] yonda	[sono gakko]-ni	[Mary-no] shashin
that book read (Pst)	that school at	Mary of picture
'read that book'	'at that school'	'(a) picture of Mary'

The version of the X' schema needed for these languages looks like this—with the head to the right of its complement:

```
              XP
             /  \
      (Specifier)  X'
                  /  \
         (Complement)  X
                      (Head)
```
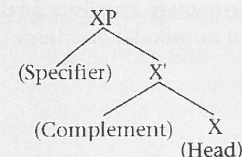
About half of the world's languages use this version of the X' schema.

1.3   Sentences

The largest unit of syntactic analysis is the sentence. Sentences typically consist of a subject (typically an NP) and a VP, which are linked together by an abstract category dubbed I or Infl (for inflection) that indicates the sentence's tense. As illustrated in Figure 5.8, I serves as head of the sentence, taking the VP as its complement and the subject as its specifier (Pst = Past).
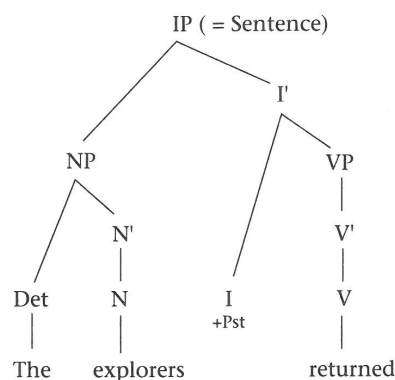
IP (= Sentence)

Figure 5.8 structure tree: IP branches to NP and I'. NP branches to Det (The) and N' which branches to N (explorers). I' branches to I (+Pst) and VP. VP branches to V' which branches to V (returned).

Figure 5.8   The structure of a sentence. *Note*: The inflectional suffix on the verb matches the tense feature under I.

The tense feature in I must be compatible with the form of the verb. So a sentence like the one above whose head contains the feature +Pst must contain a verb marked for the past tense.

Although somewhat abstract, this analysis has the advantage of giving sentences the same internal structure as other phrases (with a specifier, a head, and a complement), making them consistent with the X' schema. Moreover, because I, like all heads, is obligatory, we also account for the fact that all sentences have tense (i.e., they are all past or nonpast).

The structure in Figure 5.8 also provides us with a natural place to locate **modal auxiliaries** such as *can*, *will*, and *must*, most of which are inherently nonpast, as shown by their incompatibility with time adverbs such as *yesterday*—e.g., **He can/will/must work yesterday*. (The auxiliaries *could* and *would* can be either past or nonpast—e.g., *He could swim tomorrow/He could swim when he was three*.) Although traditionally analyzed as auxiliary verbs, these words are treated as instances of the I category in contemporary linguistic analysis, as depicted in Figure 5.9. (We will discuss the status of **nonmodal auxiliaries** such as *have* and *be* in Section 4.1.)
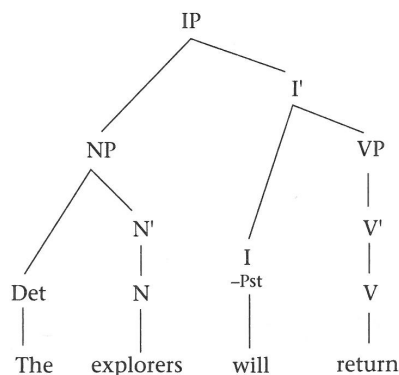
IP

Figure 5.9 structure tree: IP branches to NP and I'. NP branches to Det (The) and N' which branches to N (explorers). I' branches to I (-Pst, will) and VP. VP branches to V' which branches to V (return).

Figure 5.9   An IP with an auxiliary in the I position

This neatly accounts not only for the fact that modals have an inherent tense, but also for their occurrence between the subject (the specifier) and the VP (the complement)—in the position reserved for the head of the sentence. (It must be admitted, however, that the use of the term *inflection* by syntacticians to include free morphemes is unfortunate.)

The appendix at the end of the chapter outlines a procedure that should help you assign sentences an appropriate structure. Exercise 5 provides an opportunity to practice this procedure.

1.4   Tests for Phrase Structure

How can linguists be sure that they have grouped words together into phrases in the right way? The existence of the syntactic units, or **constituents**, found in tree structures can be independently verified with the help of special tests. We will consider three such tests here as they apply to XP-level constituents. (Not every test is applicable to every constituent, though.)

The Substitution Test

Evidence that phrases are syntactic units comes from the fact that they can often be replaced by an element such as *they*, *it*, or *do so*. This is illustrated in *13*, where *they* replaces the NP *the children* and *do so* replaces the VP *stop at the corner*. (This is called a **substitution test**.)

13)   [NP The children] will [VP stop at the corner] if *they* see us *do so*.
      (*they* = the children; *do so* = stop at the corner)

The substitution test also confirms that a PP such as *at the corner* is a unit since it can be replaced by a single word in a sentence such as *14*.

14)   The children stopped [PP at the corner] and we stopped *there* too.
      (*there* = at the corner)

Elements that do not form a constituent cannot be replaced in this way. Thus, there is no word in English that we can use to replace *children stopped*, for example, or *at the*.

The Movement Test

A second indication that *at the corner* forms a constituent is that it can be moved as a single unit to a different position within the sentence. (This is called a **movement test**.) In *15*, for instance, *at the corner* can be moved from a position after the verb to the beginning of the sentence.

15)   They stopped [PP at the corner] → [PP At the corner], they stopped.

Of course, *at the*, which is not a syntactic unit, cannot be fronted in this manner (**At the, they stopped corner*).

The Coordination Test

Finally, we can conclude that a group of words forms a constituent if it can be joined to another group of words by a conjunction such as *and*, *or*, or *but*. (This is known as the **coordination test** since patterns built around a conjunction are

called **coordinate structures**.) The sentence in *16* illustrates how coordination can be used to help establish that *stopped at the corner* is a constituent.

16) The children [VP stopped at the corner] and [VP looked both ways].

2   Complement Options

How can we be sure that individual words will occur with a complement of the right type in the syntactic structures that we have been building? Information about the complements permitted by a particular head is included in its entry in a speaker's lexicon. For instance, the lexicon for English includes an entry for *devour* that indicates its syntactic category (V), its phonological representation, its meaning, and the fact that it takes an NP complement.

17) *devour*:   category: V
       phonological representation: /dəvawɪ/
       meaning: EAT HUNGRILY
       complement: NP

The term **subcategorization** is used to refer to information about a word's complement options.

Subcategorization information helps ensure that lexical items appear in the appropriate types of tree structures. For example, because *devour* belongs to the subcategory of verbs that require an NP complement, it can occur in patterns such as *18a*, but not *18b*.

18) a. *devour* with an NP complement:
        The child devoured [NP the sandwich].

     b. *devour* without an NP complement:
        *The child devoured.

2.1   Complement Options for Verbs

Table 5.5 illustrates some of the more common complement options for verbs in English. The subscripted prepositions indicate subtypes of PP complements, where this is relevant. *Loc* stands for any preposition expressing a location (such as *near*, *on*, and *under*).

The verbs in the first line of Table 5.5 (*vanish*, *arrive*, and *die*) occur without any complement, those in the second line occur with an NP complement, and so on.

A word can belong to more than one subcategory. The verb *eat*, for example, can occur either with or without an NP complement and therefore belongs to both of the first two subcategories in our table.

19) After getting home, they ate (the sandwiches).

Of course, not all verbs exhibit this flexibility. As we have already seen, *devour*—although similar in meaning to *eat*—requires an NP complement and therefore belongs only to the second subcategory in our table.

Table 5.5   Some examples of verb complements

Complement option	Sample heads	Example
∅	vanish, arrive, die	The rabbit vanished ___.
NP	devour, cut, prove	The professor proved [NP *the theorem*].
AP	be, become	The man became [AP *very angry*].
PP$_{to}$	dash, talk, refer	The dog dashed [PP *to the door*].
NP NP	spare, hand, give	We handed [NP *the man*] [NP *a map*].
NP PP$_{to}$	hand, give, send	He gave [NP *a diploma*] [PP *to the student*].
NP PP$_{for}$	buy, cook, reserve	We bought [NP *a hat*] [PP *for Andy*].
NP PP$_{loc}$	put, place, stand	He put [NP *the muffler*] [PP *on the car*].
PP$_{to}$ PP$_{about}$	talk, speak	I talked [PP *to a doctor*] [PP *about Sue*].
NP PP$_{for}$ PP$_{with}$	open, fix	We opened [NP *the door*] [PP *for Andy*] [PP *with a crowbar*].

As the examples in Table 5.5 also show, some heads can take more than one complement. The verb *put* is a case in point, since it requires both an NP complement and a PP complement (or a locative adverb such as *there*).

20) *put* with an NP complement and a PP complement:
    The librarian put [NP the book] [PP on the shelf].

21) *put* without an NP complement:
    *The librarian put [PP on the shelf].

22) *put* without a PP complement:
    *The librarian put [NP the book].

The VP *put the book on the shelf* has the structure in Figure 5.10, in which the V' consists of the head *put* and its two complements—the NP *the book* and the PP *on the shelf*.
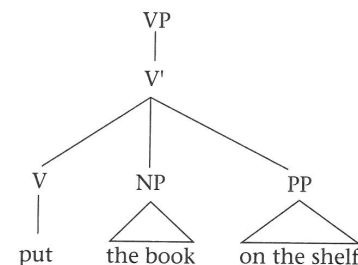

Figure 5.10   A verb with two complements

2.2   Complement Options for Other Categories

Various complement options are also available for Ns, As, and Ps. Tables 5.6, 5.7, and 5.8 provide examples of just some of the possibilities.
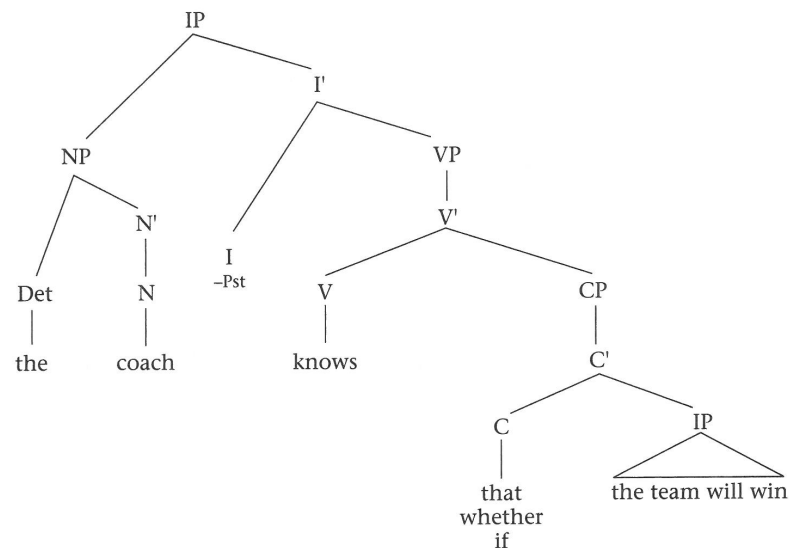
Table 5.6   Some examples of noun complements

Complement option	Sample heads	Example
Ø	car, boy, electricity	the car __
PP$_{of}$	memory, failure, death	the memory [$_{pp}$ *of a friend*]
PP$_{of}$ PP$_{to}$	presentation, description, donation	the presentation [$_{pp}$ *of a medal*] [$_{pp}$ *to the winner*]
PP$_{with}$ PP$_{about}$	argument, discussion, conversation	an argument [$_{pp}$ *with Stella*] [$_{pp}$ *about politics*]

Table 5.7   Some examples of adjective complements

Complement option	Sample heads	Example
Ø	tall, green, smart	very tall __
PP$_{about}$	curious, glad, angry	curious [$_{pp}$ *about China*]
PP$_{to}$	apparent, obvious	obvious [$_{pp}$ *to the student*]
PP$_{of}$	fond, full, tired	fond [$_{pp}$ *of chocolate*]

Table 5.8   Some examples of preposition complements

Complement option	Sample heads	Example
Ø	near, away, down	(he got) down __
NP	in, on, by, near	in [$_{NP}$ *the house*]
PP	down, up, out	down [$_{pp}$ *into the cellar*]

Here again, subcategorization ensures that particular heads can appear in tree structures only if there is an appropriate type of complement. Thus, the adjective *sick* takes an '*of*-PP' as its complement, while the adjective *satisfied* takes a '*with*-PP'.

23) a. sick [$_{pp}$ of cafeteria food] (compare: *sick with cafeteria food)
    b. satisfied [$_{pp}$ with cafeteria food] (compare: *satisfied of cafeteria food)

A good deal of what we know about our language consists of information about words and the type of complements with which they can appear. Much of this information must be stored in the lexicon, since it cannot be predicted from a word's meaning.

2.3   Complement Clauses

All human languages allow sentence-like constructions to function as complements. A simple example of this from English is given in *24*.

24)
```
           ┌─────────complement clause───────┐
   [The coach knows [that/whether/if the team will win]].
   └──────────────── matrix clause ───────────────┘
```

The smaller bracketed phrase in *24* is called a **complement clause**; the larger phrase in which it occurs is called the **matrix clause**.

Words such as *that*, *whether*, and *if* are known as **complementizers** (**C**s). They take an IP complement, forming the CP (complementizer phrase) depicted in Figure 5.11.

Figure 5.11   The structure of a CP

Given our X' schema, we must also ask about a possible specifier position for CP. As we will see in Section 3.4, there is even a type of element that can occur in the specifier position under CP.

When a CP occurs in a sentence such as *24*, in which it serves as complement of the verb *know*, the entire sentence has the structure in Figure 5.12. Table 5.9 provides examples of some verbs that are often found with a CP complement.

There is no limit on the number of embedded clauses that can occur in a sentence, as *25* helps show.

25) A man thought [$_{CP}$ that a woman said [$_{CP}$ that Sue reported [$_{CP}$ that . . .

This structure is made possible by the fact that any CP can contain a verb that itself takes a complement CP. The first clause contains the verb *think*, whose complement clause contains the verb *say*, whose complement clause contains *report*, and so on.

Figure 5.12   The structure of a sentence with an embedded CP

Table 5.9   Some verbs permitting CP complements

Complement(s)	Sample heads	Example
CP	believe, know, think, remember	They believe [$_{CP}$ *that Eric left*].
NP CP	persuade, tell, convince, promise	They told [$_{NP}$ *Mary*] [$_{CP}$ *that Eric had left*].
PP$_{to}$ CP	concede, admit	They admitted [$_{PP}$ *to Mary*] [$_{CP}$ *that Eric had left*].

3 Move

As we have seen, it is possible to build a very large number of different sentences by allowing the Merge operation to combine words and phrases in accordance with the X' schema and the subcategorization properties of individual words. Nonetheless, there are still many sentences that we cannot build. This section considers two such patterns and discusses the sentence-building operation needed to accommodate them.

3.1 *Yes-No* Questions

To begin, let us consider the question sentences exemplified in *26*. (Such structures are called *yes-no* **questions** because the expected response is usually 'yes' or 'no'.)

26) a. *Should* that guy go?
    b. *Can* the cat climb this tree?

A curious feature of these sentences is that the auxiliary verb occurs at the beginning of the sentence rather than in its more usual position after the subject, as illustrated in *27*.

27) a. That guy *should* go.
    b. The cat *can* climb this tree.

Given that auxiliary verbs such as *should* and *can* are instances of the I category, the X' schema dictates that they should occur between the subject NP and the VP, as depicted in Figure 5.13.
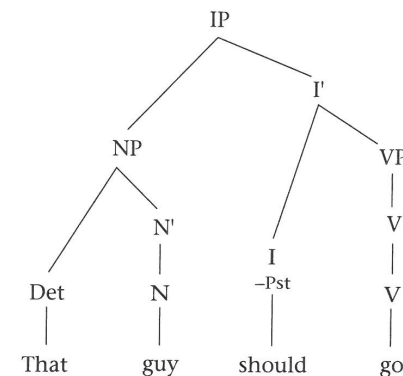
Figure 5.13   *Should* occurring in the head position between the subject (its specifier) and the VP (its complement)

How, then, does the word order in *26* come about? The formation of question structures requires the use of a structure-building operation that we have called *Move*. Traditionally known as a **transformation** because it transforms an existing structure, Move transports the auxiliary verb in the I position to a new position in front of the subject.

28) Should that guy ___ go?

The transformational analysis has at least two advantages. First, it allows us to avoid positing two types of auxiliary verbs in English: one that occurs between the subject and the VP and one that occurs in front of the subject. Under the transformational analysis, there is just one type of auxiliary. Auxiliaries that occur in front of the subject have simply undergone an extra process—the Move operation that transports the I category to the left of the subject in order to signal a question.

Second, the transformational analysis automatically captures the fact that the sentence *Should that guy go?* is the question structure corresponding to *That guy should go*. According to the analysis presented here, both sentences initially have the same basic structure. They differ only in that the Move operation has applied to the I category in the question structure.

A Landing Site for I

In what position does the auxiliary verb land when it is moved to the left of the subject? This question can be answered if we assume that IPs occur within larger CPs, as depicted in Figure 5.14.
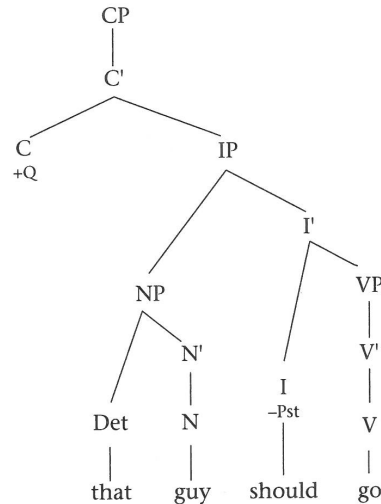

Figure 5.14   An IP inside a CP shell

By adopting this structure, we take the position that all IPs occur within a CP, whether they are embedded or not. It may help to think of the CP category as a shell that forms an outer layer of structure around an IP. When embedded within a larger sentence, the CP can contain an overt complementizer such as *that* or *whether*. Elsewhere, the C position simply contains information about whether the sentence is a statement or a question. For the sake of illustration, we use the symbol '+Q' to indicate a question; sentences with no such symbol in their C position will be interpreted as statements.

In some languages, the **Q feature** is spelled out as a separate morpheme (for further discussion of this, go to **bedfordstmartins.com/linguistics/syntax** and click on **Variation**) (see the "Language Matters" box on page 176). In languages like English, where there is no such morpheme, the feature must attract another element to its position. The auxiliary verb in the I position is that element. This is illustrated in Figure 5.15, where the Q feature in the C position attracts the auxiliary verb in the I position, causing it to move to the beginning of the sentence.

A transformation (i.e., a Move operation) can do no more than change an element's position. It does not change the categories of any words and it cannot eliminate any part of the structure created by the Merge operation. Thus, *should* retains its I label even though it is moved into the C position, and the position that it formerly occupied remains in the tree structure. Called a **trace** and marked by the symbol *t*, it records the fact that the moved element comes from the head position within IP.
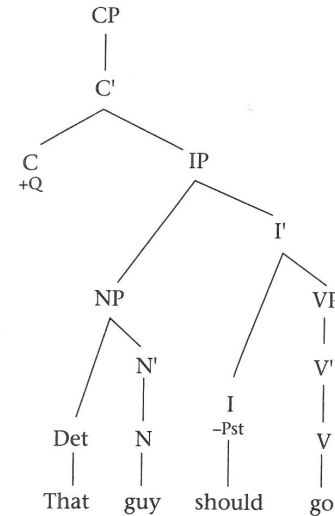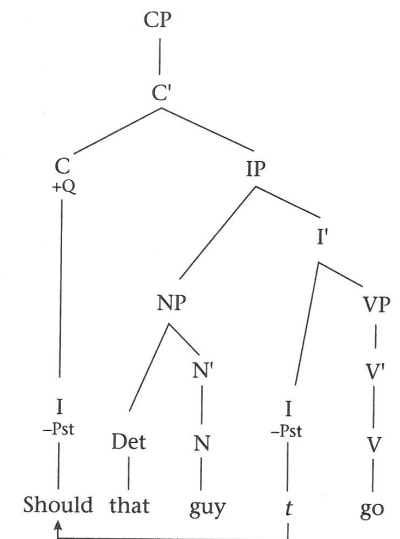
Figure 5.15   Movement of an auxiliary from the I position to C

The Move operation used for *yes-no* questions is often informally called **Inversion** and is formulated as follows.

29) Inversion:
Move I to C.

Is there any way to be sure that this idea is on the right track and that the auxiliary verb in the I position really does move to the C position? Some interesting evidence comes from the analysis of the embedded CPs in sentences such as the following.

30) He asked [CP whether we would return].

Notice that the C position in the embedded clause is occupied by the complementizer *whether*. Assuming that no more than one word can occur in a particular position, we predict that Inversion should not be able to apply in the embedded clause since there is nowhere for the moved auxiliary verb to land. The ungrammaticality of *31* shows that this is correct.

31) Inversion in an embedded CP that includes a complementizer:
*He asked [CP whether would we *t* return].

Interestingly, the acceptability of Inversion improves quite dramatically when there is no complementizer and the C position is therefore open to receive the moved auxiliary. (In fact, such sentences are perfectly acceptable in Appalachian

English. For other English speakers, they may sound most natural when the embedded clause is interpreted as a sort of quote.)

32) Inversion in an embedded CP that does not have a complementizer:

He asked [CP would we *t* return].

Although some speakers prefer not to apply Inversion in embedded clauses at all (especially in formal speech), most speakers of English find *32* to be much more natural than *31*. This is just what we would expect if Inversion moves the auxiliary to an empty C position, as required by our analysis.

To summarize before continuing, we have introduced two changes into the system of syntactic analysis used until now. First, we assume that all IPs occur inside CPs. Second, we assume that the Inversion transformation moves the auxiliary from the I position to an empty C position to the left of the subject NP. This not only gives the correct word order for question structures, it also helps explain why inversion sounds so unnatural when the C position is already filled by another element, as in *31*.

LANGUAGE MATTERS   Another Way to Ask a *Yes-No* Question

Although inversion is a widely used question-marking strategy in the world's languages, many languages go about things in an entirely different way. Instead of moving a verb to the C position, they place a special question morpheme there to begin with. Japanese and Tamil (a Dravidian language of India) work that way. (The diacritic [̪] indicates a dental point of articulation; the diacritic : marks a long vowel; ɭ is a retroflex liquid.)

Japanese	Tamil
Hiro-ga kimasu-ka?	Muṭṭu paḷam pariṭṭa:n-a:.
Hiro-NOM come-QUES	Muṭṭu fruit picked-QUES
'Did Hiro come?'	'Did Muttu pick the fruit?'

The C position in both languages occurs at the end of the sentence, since they employ the "mirror-image" X' scheme discussed in Section 1.2.

```
        CP
        |
        C'
       /  \
     IP     C
    /  \
Hiro-ga kimasu -ka
```
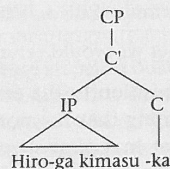
3.2   Deep Structure and Surface Structure

The preceding examples show that at least some sentences must be analyzed with the help of two distinct types of mechanisms. The first of these is the Merge operation, which creates tree structures by combining categories in a manner consistent with their subcategorization properties and the X' schema. The second is the Move

operation, which can modify these tree structures by moving an element from one position to another. The process whereby a syntactic structure is formed by these operations is called a **derivation**.

In traditional work in transformational syntax, all instances of the Merge operation take place before any instances of the Move operation. As a result, the derivation for a sentence typically yields two distinct levels of syntactic structure, as shown in Figure 5.16. The first, called **deep structure** (or **D-structure**), is formed by the Merge operation in accordance with the X' schema and the subcategorization properties of the individual words making up the sentence. As we will see in the chapter on semantics, deep structure plays a special role in the interpretation of sentences.

The second level of syntactic structure corresponds to the final syntactic form of the sentence. Called **surface structure** (or **S-structure**), it results from applying whatever other operations are appropriate for the sentence in question.
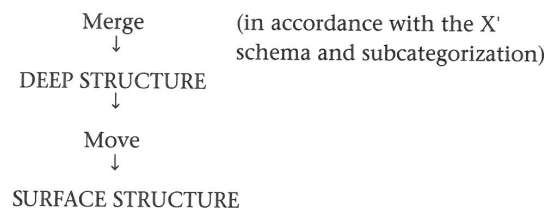
Merge   (in accordance with the X'
↓   schema and subcategorization)
DEEP STRUCTURE
↓
Move
↓
SURFACE STRUCTURE

Figure 5.16   How a derivation works

3.3   *Do* Insertion

As we have just seen, formation of *yes-no* questions in English involves moving the I category, and the auxiliary verb that it contains, to the C position. How, then, do we form the questions corresponding to sentences such as those in *33*, which contain no auxiliary verb?

33) a. The students liked the movie.
    b. Those birds sing.

Since the I category in these sentences contains only an abstract tense marker (see Figure 5.17a), applying the Inversion transformation would have no visible effect and there would be no indication that the sentence was being used as a question. English circumvents this problem by adding the special auxiliary verb *do*.

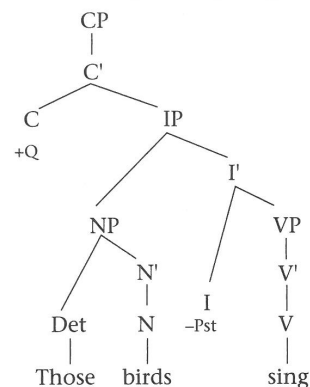34) a. *Did* the students like the movie?
    b. *Do* those birds sing?

As these examples show, *do* is inserted into sentences that do not already have an auxiliary verb, thereby making Inversion possible. We can capture this fact by formulating an **insertion rule** that adds an element to a tree structure.
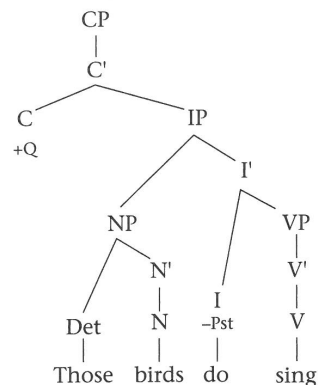
35) *Do* Insertion:
    Insert interrogative *do* into an empty I position.

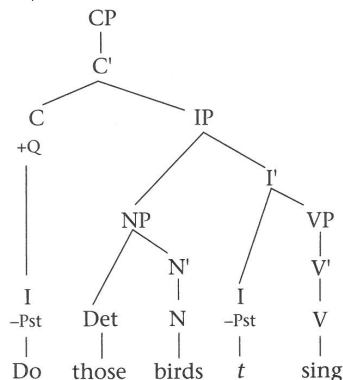The sentence in *34b* can now be analyzed as shown in Figure 5.17b.

a. D-structure formed by Merge

```
            CP
            |
            C'
        ┌───┴───┐
        C       IP
       +Q    ┌───┴───┐
            NP       I'
          ┌──┴──┐  ┌──┴──┐
         Det    N' I     VP
              ┌─┘  |     |
              N  -Pst    V'
                         |
                         V
       Those  birds      sing
```

b. After Do Insertion

```
            CP
            |
            C'
        ┌───┴───┐
        C       IP
       +Q    ┌───┴───┐
            NP       I'
          ┌──┴──┐  ┌──┴──┐
         Det    N' I     VP
              ┌─┘  |     |
              N  -Pst    V'
                         |
                         V
       Those  birds  do  sing
```

c. After Inversion (S-structure)

```
            CP
            |
            C'
        ┌───┴───┐
        C       IP
       +Q    ┌───┴───┐
            NP       I'
          ┌──┴──┐  ┌──┴──┐
         Det    N' I     VP
                    |     |
                   -Pst   V'
                          |
        I                 V
       -Pst
       Do  those birds  t  sing
```

Figure 5.17 A sentence formed with the help of *Do* Insertion

As these tree structures show, the sentence *Do those birds sing?* is built in three steps. In the initial step, the Merge operation interacts with the X' schema to give the D-structure in Figure 5.17a, which contains no auxiliary verb in the I position. The *Do* Insertion rule then adds the special interrogative auxiliary *do*, creating an intermediate level of structure in Figure 5.17b. The Move operation then moves I to the C position, creating the sentence's S-structure in Figure 5.17c.

3.4   *Wh* Movement

Consider now the set of question constructions exemplified in *36*. These sentences are called **wh questions** because of the presence of a question word beginning with *wh*.

36) a. Which languages could Aristotle speak?
    b. What can the child sit on?

There is reason to believe that the *wh* elements at the beginning of these sentences have been moved there from the positions indicated in Figure 5.18. (We take the question word *which* to be a determiner and *what* to be a noun in these sentences.)

a.

```
            CP
            |
            C'
        ┌───┴───┐
        C       IP
       +Q    ┌───┴───┐
            NP       VP
            |        |
            N'       V'
            |     ┌──┴──┐
            N     I     NP
                 +Pst ┌──┴──┐
                    V Det   N'
                              |
                              N
       Aristotle could speak which languages
```

b.

```
            CP
            |
            C'
        ┌───┴───┐
        C       IP
       +Q    ┌───┴───┐
            NP       I'
            |      ┌─┴──┐
            N'          VP
                        |
                        V'
                     ┌──┴──┐
                           PP
                           |
                           P'
                        ┌──┴──┐
                              NP
                              |
                              N'
                              |
      Det  N  -Pst  V   P     N
      the child can sit on  what
```
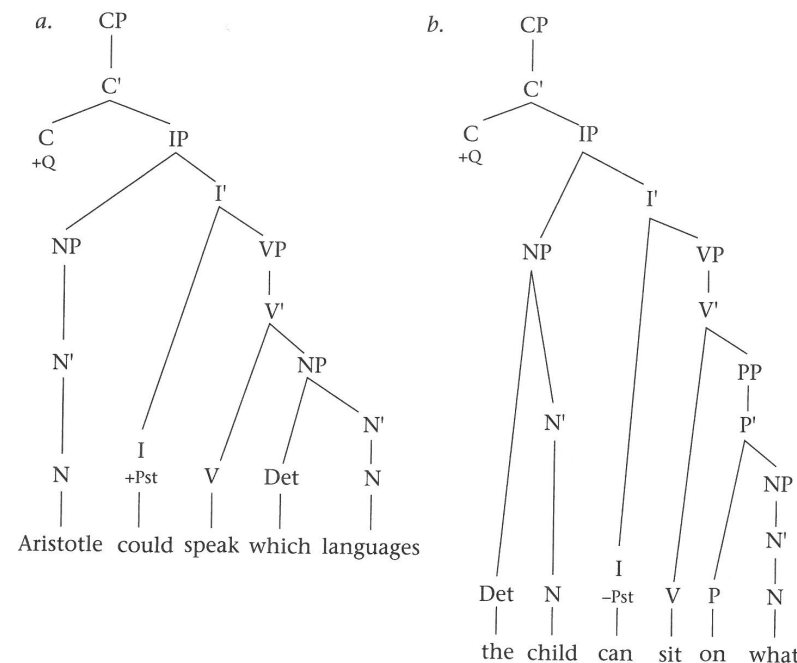
Figure 5.18 D-structures depicting the original positions of the *wh* expressions in *36*. *Note*: In Fig. 5.18*b*, *what* is N since X' theory requires the NP to have N as its head.

Notice that *which languages* occurs as complement of the verb *speak* while *what* appears as complement of the preposition *on*, in accordance with the subcategorization requirements of these words. As the sentences in *37* show, both *speak* and *on* commonly occur with an NP complement.

37) a. Aristotle could speak *Greek*.
    b. The child can sit on *the bench*.

The structures in Figure 5.18 capture this fact by treating the *wh* phrase as complement of the verb in the first pattern and complement of the preposition in the second.

How then do the *wh* phrases end up at the beginning of the sentence? The answer is that they are attracted there by the Q feature, which results in the application of a second Move operation. (Recall that we have already posited one Move operation, which we have been calling Inversion.)

38) Which languages could Aristotle *t* speak *t*?

Move 1

Move 2
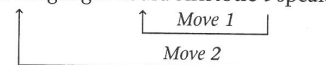
Application of the same two transformations to the structure in Figure 5.18b yields the *wh* question in *39*.

39) Movement of the NP *what*:
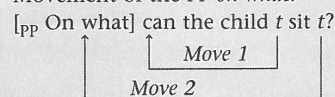[_{NP} What] can the child *t* sit on *t*?

| Move 1 |
| Move 2 |
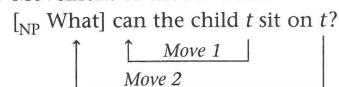
LANGUAGE MATTERS   Pied Piping

In more formal varieties of English, there is a second possibility—the *wh* word can take the preposition with it when it moves.

Movement of the PP *on what*:
[_{PP} On what] can the child *t* sit *t*?

| Move 1 |
| Move 2 |

This phenomenon is known as *pied piping*, a whimsical reference to *The Pied Piper of Hamelin* folktale, in which (in the words of Robert Browning) "the Piper advanced and the children followed."

A Landing Site for *wh* Words

As the examples in *38* and *39* help illustrate, the Move operation carries the *wh* phrase to the beginning of the sentence, to the left even of the fronted auxiliary. But where precisely does the *wh* phrase land?

Given that the moved auxiliary is located in the C position (see Figure 5.15 above, e.g.), it seems reasonable to conclude that the fronted *wh* phrase ends up in the specifier position of CP. Not only is this the only position in syntactic structure to the left of the C, it is empty prior to the application of the Move operation.

We can make this idea precise by formulating the Move operation that applies to *wh* phrases as follows.

40) *Wh* Movement:
Move a *wh* phrase to the specifier position under CP.

The sentence *Which languages could Aristotle speak?* can now be analyzed in steps, the first of which involves formation of the structure in Figure 5.19 on page 181 by the Merge operation. Consistent with our earlier assumption, the IP here occurs within a CP shell. *Wh* Movement and Inversion then apply to this structure, yielding the structure in Figure 5.20 on page 181.

Like other transformations, *Wh* Movement cannot eliminate any part of the previously formed structure. The position initially occupied by the *wh* phrase is therefore not lost. Rather, it remains as a trace (an empty category), indicating that the moved element corresponds to the complement of the verb *speak*.
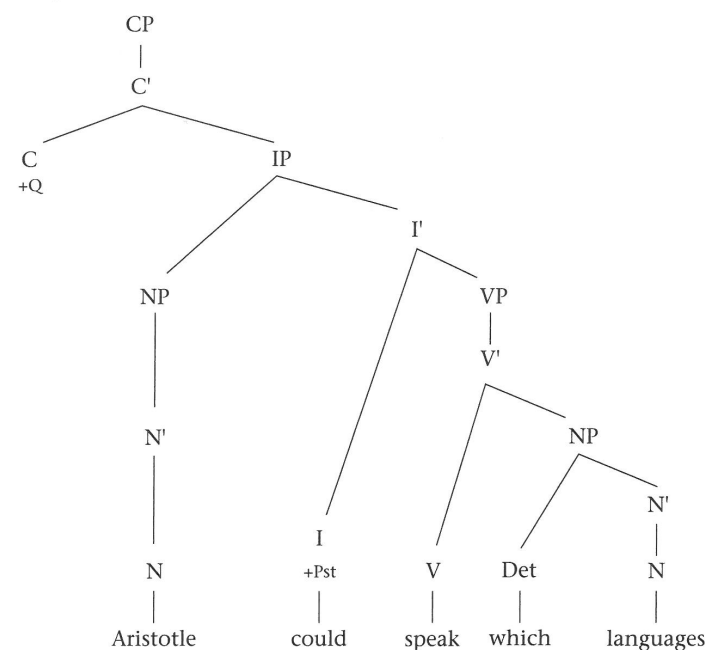
Figure 5.19   Deep structure for *Which languages could Aristotle speak?*
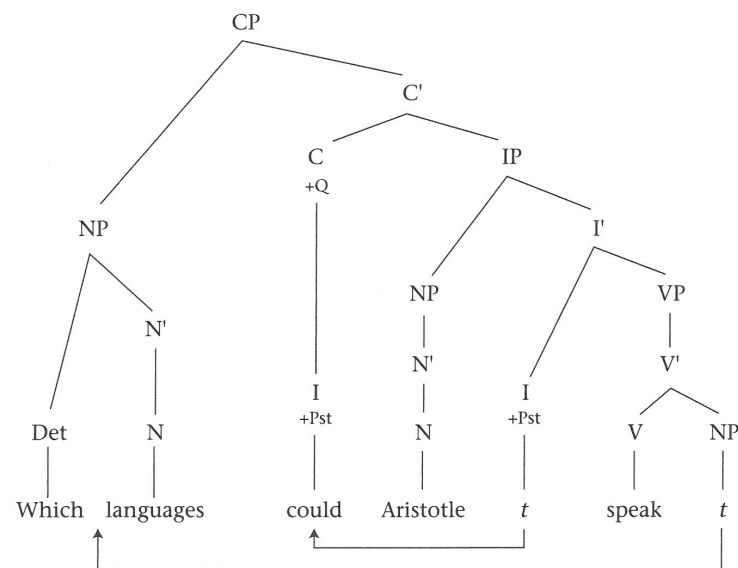
Figure 5.20   Surface structure for *Which languages could Aristotle speak?* The I category moves to the C position and the *wh* phrase moves to the specifier of CP position.

In the examples considered so far, the *wh* word originates as the complement of a verb or preposition. In sentences such as the following, however, the *wh* word asks about the subject (the person who does the criticizing).

41) Who criticized Maxwell?

In such patterns, the *wh* word originates in the subject position and subsequently moves to the specifier position within CP even though the actual order of the words in the sentence does not change as a result of this movement (see Figure 5.21). (For reasons that are not fully understood, there is no *Do* Insertion in this type of question structure, except for purposes of emphasis, as in *Who DID criticize Maxwell?*)
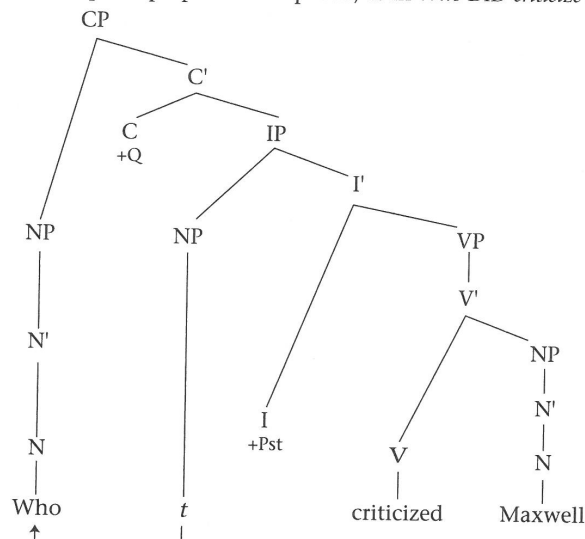
Figure 5.21 Movement of a subject *wh* word. Since there is nothing for the *wh* word to move over in such cases, there is no visible change in word order.

For more about Move, and particularly about limits on its operation, go to **bedfordstmartins.com/linguistics/syntax** and click on **Constraints**.

LANGUAGE MATTERS   *Wh* Questions without Movement

In many languages, *wh* words are ambiguous between an interrogative sense ('who', 'what', 'when', etc.) and an indefinite sense ('someone/anyone', 'something/anything', 'sometime/anytime', etc.). Mandarin Chinese works that way—*shei* can mean either 'who' or 'anyone', *shenme* can mean either 'what' or 'anything', and so on. Many languages of this type do not make use of *wh* movement. Instead, the *wh* word remains in its original position; instead, intonation is used to signal that the sentence is intended as a *wh* question.

Ni	mai-le	**shenme?**	wo	bu	xiang	mai	**shenme**
you	buy-ASP	what	I	not	want	buy	anything
'What did you buy?'			'I don't want to buy anything.'				

---

4 Universal Grammar and Parametric Variation

Thus far, our discussion has focused on English. Before looking at any further phenomena in this language, it is important to extend the scope of our analysis to other languages.

As noted at the beginning of this chapter, recent work on Universal Grammar suggests that all languages are fundamentally alike with respect to the basics of syntax. For instance, all languages use the Merge operation to combine words on the basis of their syntactic category and subcategorization properties, creating phrases that comply with the X' schema.

This does not mean that languages must be alike in all respects though. Universal Grammar leaves room for variation, allowing individual languages to differ with respect to certain **parameters**. (You can think of a parameter as the set of options that UG permits for a particular phenomenon.) The next section presents an example of this that involves the Move operation. Some additional instances of cross-linguistic differences in syntax are considered at the Web site; go to **bedfordstmartins.com/linguistics/syntax** and click on **Variation**.

4.1 Verb Raising

Consider the contrast between the following two English sentences.

42) a. Paul always works.
b. *Paul works always.

The ungrammaticality of the second sentence is expected since the preverbal adverb *always* functions as specifier of the verb and therefore should occur before it, as in *42a*. Surprisingly, however, the equivalent adverb must follow the verb in French, even though specifiers in French normally precede the head, just as they do in English.

43) a. The adverb precedes the verb; the sentence is ungrammatical:
*Paul toujours travaille. (= English *42a*)
Paul always works.
'Paul always works.'

b. The adverb follows the verb; the sentence is grammatical:
Paul travaille toujours. (= English *42b*)
Paul works always
'Paul always works.'

Why should this be? One possibility is that the tense feature in the I category attracts the verb to that position in French, just as the Q feature can attract verbs to the C position in some languages. As a result, French has the **Verb Raising transformation** outlined in *44*. (It's called 'Raising' because the verb moves upward in the tree.)

44) Verb Raising:
Move V to I.

This Move operation brings about the change depicted in Figure 5.22.
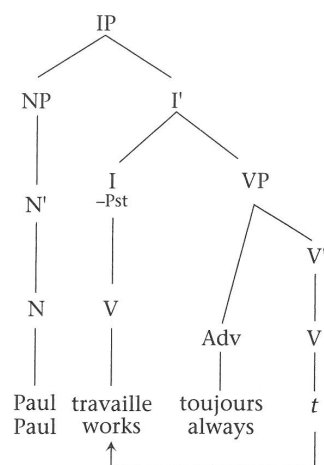
a. Before Verb Raising
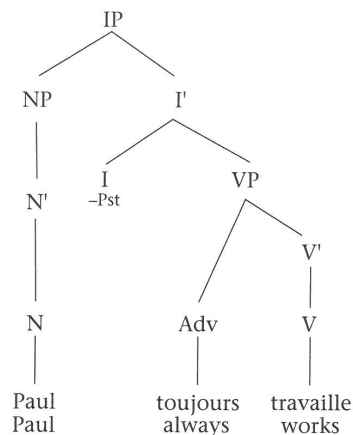
b. After Verb Raising

Figure 5.22 Verb Raising in French. The verb moves from within the VP to the I position.

An important piece of independent evidence for the existence of Verb Raising in French comes from the operation of the Inversion transformation. As we have already seen (Section 3.1), this transformation moves the I category to the C position. In English only auxiliary verbs occur in the I position, which explains why only they can undergo Inversion.

45) a. Inversion of an auxiliary verb in English:

Will you *t* stay for supper?

b. Inversion of a nonauxiliary verb in English:

*Stay you *t* for supper?

In French, however, regular verbs can occur in the I position, thanks to the Verb Raising transformation. This predicts that Inversion should be able to apply to these Vs in French as well as to auxiliaries. This is correct. Like English, French can form a question by moving an auxiliary leftward, as *46* illustrates.

46) Inversion of an auxiliary:

As-tu *t* essayé?

'Have you tried?'

However, unlike English, French also allows inversion of nonauxiliary Vs.

47) Inversion of a nonauxiliary verb:

Vois-tu *t* le livre?

see you the book
'Do you see the book?'

Figure 5.23 depicts the interaction between Verb Raising and Inversion needed to form this sentence. As you can see, the V first raises to the I position, and the I category then moves to the C position. (We treat the pronoun *tu* 'you' as a type of N.)
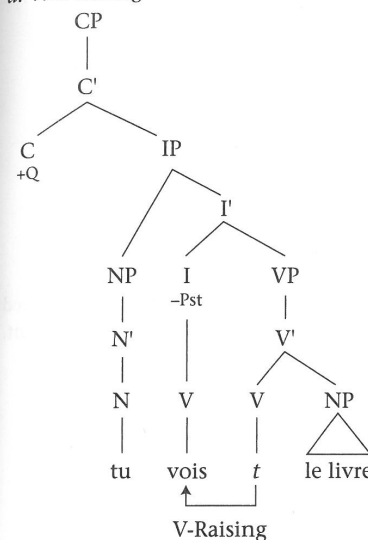
a. Verb Raising   *b. Inversion*
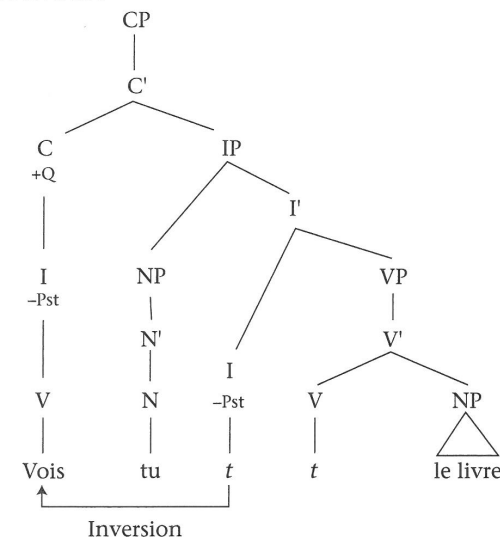
Figure 5.23 The interaction of Verb Raising and Inversion in French

Verb Raising in English

At this point, it might seem that there is a simple Verb Raising parameter with two options—raising (as in French) and no raising (as in English). This neatly accounts for the facts that we have considered so far, but matters are not so simple. As we'll see next, Verb Raising can apply in English, but only to *have* and *be*.

To begin, consider the sentences in *48*, which contain two auxiliaries—one modal and one nonmodal.

48) a. The children should have waited.
    b. Those guys could be sleeping.

As we have already seen, the modal auxiliary occurs under I, but what of the nonmodal auxiliary? As depicted in Figure 5.24, it is considered to be a special type of V that takes a VP complement.
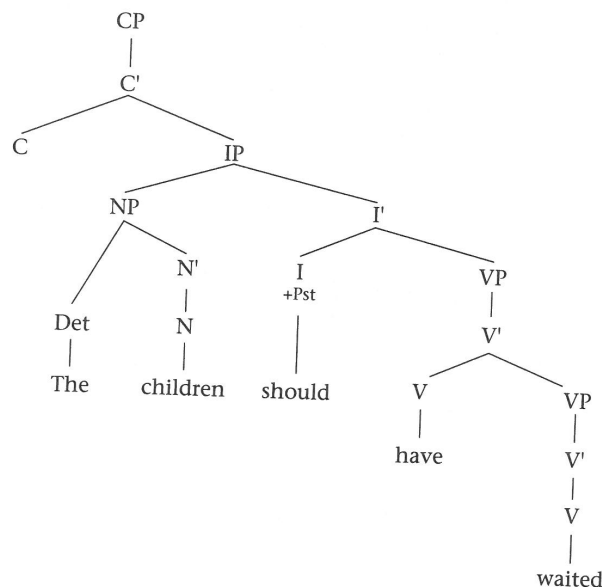
Figure 5.24 A structure containing two auxiliary verbs. The modal auxiliary is treated as an instance of the I category, which takes the VP headed by *have* as its complement. *Have* in turn is a V that takes the VP headed by *wait* as its complement.

As expected, only the modal auxiliary can undergo inversion in this structure.

49) a. The modal auxiliary verb moves to the C position:

   [CP Should [IP the children *t* have waited]]

b. The nonmodal auxiliary moves to the C position:

   *[CP Have [IP the children should *t* waited]]

Crucially, however, a nonmodal auxiliary can undergo Inversion when there is no modal auxiliary in the sentence.

50) a. Have the children *t* waited for two hours?
      (from: The children have waited for two hours)

   b. Is the dog *t* sleeping?
      (from: The dog is sleeping)

Since Inversion involves movement from I to C, the auxiliary in the sentences in example *50* must have moved to the I position, as depicted in Figure 5.25—an instance of the same V Raising operation that is used more generally in French. Once in the I position, it can undergo inversion (I-to-C movement), giving the question structure.

In sum, then, it appears that the two options permitted by the Verb Raising parameter are: (a) any type of verb raises (the case in French), and (b) only auxiliary verbs raise (the case in English).
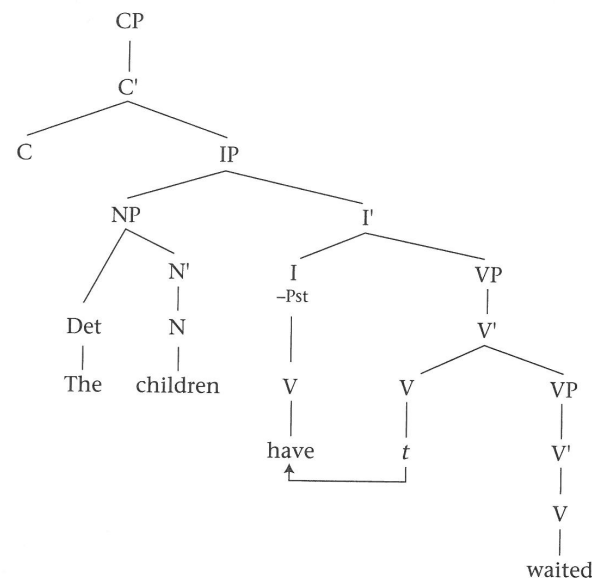
Figure 5.25 The result of V-to-I movement in the sentence *The children have waited*

5   Some Additional Structures

Now that we have in place a basic system for forming sentences, it is possible to extend it to encompass various other syntactic phenomena. We will consider three such phenomena here.

5.1   Coordination

A common syntactic phenomenon in English and other languages involves **coordination**—the grouping together of two or more categories with the help of a conjunction such as *and* or *or*.

51) coordination involving NPs:
    [NP the man] and [NP a child]

52) coordination involving VPs:
    [VP go to the library] and [VP read a book]

53) coordination involving PPs:
   [PP down the stairs] and [PP out the door]

Coordination exhibits several important properties, three of which will be considered here. First, a category at any level (a head, an X', or an entire XP) can be

coordinated. The preceding examples illustrate coordination of XPs; following are examples involving word-level and X'-level categories.
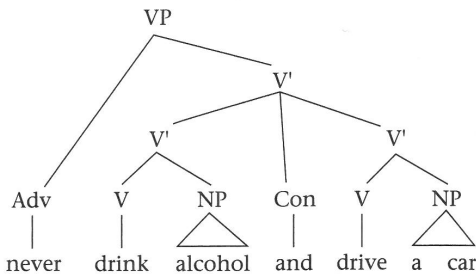
54) coordination involving P:
[$_P$ up] and [$_P$ down] the stairs

55) coordination involving V:
[$_V$ repair] and [$_V$ paint] the deck.

56) coordination involving V':
never [$_{V'}$ drink alcohol] and [$_{V'}$ drive a car]

Second, the category of the coordinate structure must be identical to the category of the elements being conjoined. Hence, if NPs are conjoined, the coordinate structure is a NP; if V's are conjoined, the coordinate structure is a V'; if Ps are conjoined, the coordinate structure is a P; and so on (see Figure 5.26).

a. Coordination involving NPs:
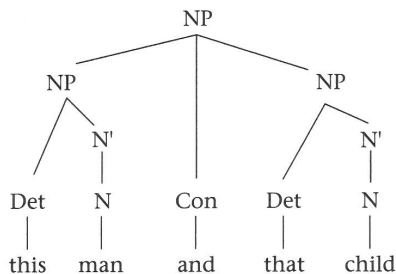
b. Coordination involving V's:

c. Coordination involving Ps:
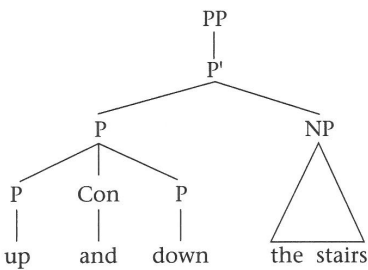
Figure 5.26 Some coordinate structures

Third, conjoined categories are usually of the same type—they must both be NPs, or V's, or Ps; and so on. As *57* shows, coordination that involves different categories generally gives a quite unnatural result.

57) a. coordination involving an NP and a PP:
*He read [$_{NP}$ the book] and [$_{PP}$ in the library]

b. coordination involving an NP and an AP:
*He left [$_{NP}$ the house] and [$_{AP}$ very angry]

We can accommodate these facts if we assume that the X' schema is supplemented by the **coordination schema** depicted in Figure 5.27.
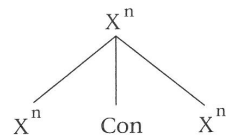
Figure 5.27 The coordination schema

The superscripted symbol ^{n} stands for a category at any structural level, indicating that a coordinate structure can involve Xs, X's, or XPs. Moreover, because the same symbol (X) is used both for the categories that are conjoined and for the larger resulting phrase, we also neatly capture the fact that the conjoined elements and the resulting phrase must all be of the same type.

5.2   Modifiers

Another important syntactic phenomenon involves the use of **modifiers**—words and phrases that denote properties of heads. For example, adjective phrases (APs) commonly serve as modifiers of Ns, while adverb phrases (AdvPs) modify Vs.

58) a. The [$_{AP}$ very tall] man walked into the room.
b. The guests left [$_{AdvP}$ rather quickly].

The AP *very tall* denotes a property of the man, while the AdvP describes the manner in which the guests left.

How do modifiers fit into phrase structure? For the purposes of this introduction to syntax, we will attach modifiers at the XP level of phrase structure, as sister of X'. As illustrated in Figure 5.28, adjectival phrases occur in front of the head, while most adverbial phrases occur after it.
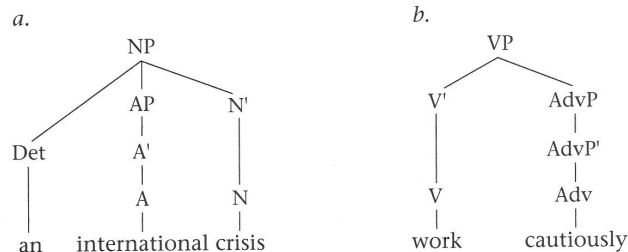
Figure 5.28 Phrases containing modifiers

Where there is a complement, a modifier that occurs after the head will normally occur after the complement as well. This is to be expected: as illustrated in Figure 5.29, the head and the complement are grouped together within the X' constituent, leaving no room for a modifier, which attaches at a higher level, to intervene between them.
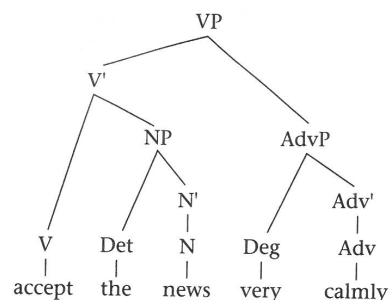
Figure 5.29 A phrase in which both the complement and the modifier occur after the head. In such cases, the modifier occurs after the complement.

5.3   Passives

Another important syntactic phenomenon involves the relationship between particular types of sentences. A famous example of this involves sentences such as the following. (The first type of sentence is called **active** because the subject denotes the 'agent' or 'instigator' of the action denoted by the verb, while the second type is called **passive**.)

59) a. A thief stole the painting. (active sentence)
     b. The painting was stolen (by a thief). (passive sentence)

We will focus here on three key properties of passive constructions.

First, passive constructions involve a major reduction in the importance of the agent. Indeed, whereas the agent serves as subject of an active clause, it is not expressed at all in the vast majority of passive sentences in English.

60) The painting was stolen.

When it does appear, as in 59b, it is relegated to a position inside a PP at or near the end of the sentence.

Second, some other NP—usually the direct object of the corresponding active sentence—functions as subject in the passive sentence. This can be seen in example 59 above, where the NP *the painting* serves as direct object in the active sentence and as subject in the passive sentence.

Third, and related to the second point, verbs that cannot occur with a direct object NP in an active sentence typically cannot occur in a passive sentence. Take the verb *arrive*, for instance. It cannot be used with an NP complement in an active sentence, nor can it occur in a passive sentence.

61) a. *Arrive* with an NP complement in an active sentence:
        *The waiter arrived the dinner.
     b. *Arrive* in a passive sentence:
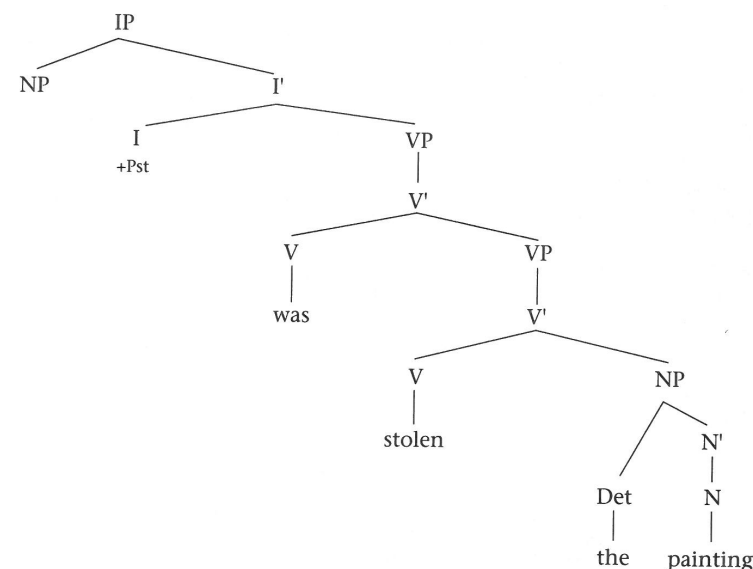   *The dinner was arrived (by the waiter).

Figure 5.30 D-structure for *The painting was stolen (by the thief)*

The D-structure for a passive sentence such as *The painting was stolen* is depicted in Figure 5.30. (Note that the auxiliary *be* is treated as a V that takes a VP complement. To save space, we drop the CP level here. We include an empty specifier position under IP to capture the fact that all sentences require a subject.)

This D-structure is admittedly abstract—it does not sound like any sentence that we actually utter. However, it does neatly capture the first and third properties of passive constructions: the agent is not expressed, and the verb occurs with a direct object. (When the agent is expressed as a PP (e.g., *by a thief*), it is attached to the V' headed by *stolen*.)

This leaves just the second property to be accounted for—the NP that functions as direct object in the active sentence becomes the subject in the passive. This is accomplished by moving the direct object NP to the subject position. The Move operation needed to bring about this result can be stated as follows.

62) **NP Movement:**
     Move NP into the subject position.

This gives the S-structure depicted in Figure 5.31. (Note that *be* also raises to I for the reasons discussed in Section 4.1.)

The Web site provides additional information about passives and how other approaches to syntax deal with them; go to **bedfordstmartins.com/linguistics/syntax** and click on **Passive**.
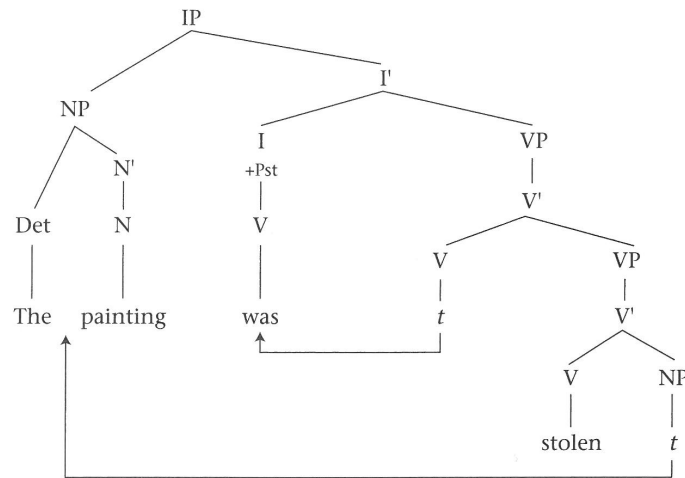
Figure 5.31 S-structure resulting from NP movement

LANGUAGE MATTERS   The World's Most Controversial Language

In 2005, a linguist-anthropologist, Daniel Everett, published a startling report on Pirahã, a language spoken by a few hundred mostly monolingual tribespeople in the rainforest of northwestern Brazil. Pirahã, it was claimed, lacks complex syntactic structure in general, including complement clauses, and coordination—unlike any other known language, it supposedly permits only short, simple sentences. (It is also said to lack color terms, numerals, and quantity-denoting expressions such as *every* and *some*.)

Although the report has received quite widespread attention in the media, its accuracy is being hotly debated within linguistics. A great deal of additional research and scrutiny will be required before a consensus is reached on the status of this fascinating language.

For more reading:

Colapinto, John. 2007. "The Interpreter," *The New Yorker*, April 16, pp. 118–37.

Everett, Daniel. 2007. "Cultural Constraints on Grammar in Pirahã." Available at **http://ling.auf.net/lingBuzz**.

Nevins, Andrew, David Pesetsky, and Cilene Rodrigues. 2007. "Pirahã Exceptionality." Available at **http://ling.auf.net/lingBuzz**.

Summing Up

Universal Grammar provides all languages with the same general type of syntactic mechanisms. As we have seen, this includes a **Merge** operation that combines words in accordance with their **syntactic category** and their **subcategorization** properties, creating a representation called **deep structure**. Deep structure must comply with the **X'** **schema**, which stipulates the place of **heads**, **specifiers**, and **complements** in phrase structure. **Move** operations (**transformations**) can modify deep structure by moving words and phrases in particular ways to produce a **surface structure**.

Although the form of sentences can vary considerably from language to language, such differences can for the most part be attributed to a small set of **parameters**, each of which makes available a variety of alternatives from which individual languages may choose.

Key Terms

General terms

computational system	syntax
grammatical	transformational (generative) grammar
lexicon	Universal Grammar (UG)
recursion	

Terms concerning syntactic categories

adjective (A)	modal auxiliaries
adverbs (Adv)	nonlexical (functional) categories
auxiliary verb (Aux)	nonmodal auxiliaries
conjunction (Con)	noun (N)
degree word (Deg)	preposition (P)
determiner (Det)	syntactic categories
distribution	verb (V)
lexical categories	

Terms concerning combining words into phrases

complement	phrases
direct object	specifier
head	transitive
intransitive	trees
Merge	X' schema

Terms concerning tests for phrase structure

constituents	movement test
coordinate structures	substitution test
coordination test	

Terms concerning complement options

complement clause	matrix clause
complementizers (C)	subcategorization

Terms concerning the Move operation and parametric variation

deep structure (D-structure)   surface structure (S-structure)
derivation   trace
Do Insertion   transformation
insertion rule   Verb Raising transformation
Inversion   *Wh* Movement
Move   *wh* questions
parameters   *yes-no* questions
Q feature

Terms concerning additional structures

active   NP Movement
coordination   passive
coordination schema
modifiers

For more information on the sources used in this chapter, see the Sources section at the back of the book, or go to **bedfordstmartins.com/linguistics/syntax** and click on **Sources**.

Recommended Reading

Carney, Andrew. 2007. *Syntax: A Generative Introduction*. 2nd ed. Cambridge, MA: Blackwell.

Haegeman, Liliane. 1994. *Introduction to Government and Binding Theory*. 2nd ed. Cambridge, MA: Blackwell.

Palmer, F.R. 1994. *Grammatical Roles and Relations*. New York: Cambridge University Press.

Payne, Thomas. 1997. *Describing Morphosyntax: A Guide for Field Linguists*. New York: Cambridge University Press.

Radford, Andrew. 1997. *Syntax: A Minimalist Introduction*. New York: Cambridge University Press.

Appendix:
How to Build Tree Structures

In building a tree structure from scratch for a phrase or sentence that you are analyzing, you will probably find it easiest to proceed in steps, working from the bottom up and from right to left. As an illustration, let us first consider the phrase *near the door*.

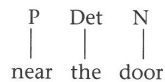The first step involves assigning each word to the appropriate category, as depicted in Figure 5.32.

P   Det   N
| | |
near   the   door

Figure 5.32   The first step: determining the word-level categories

Then, working from right to left, the appropriate phrasal structure (X' and XP) is built above each head as shown in Figure 5.33. Thus, we first build an N' and an NP above the N *door*. There is clearly no complement here, but there is a specifier (the determiner *the*), which combines with the N' in accordance with the X' schema.
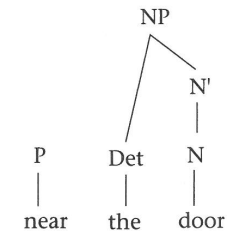
NP
/ \
P   N'
| |
Det   N
| |
near   the   door

Figure 5.33   Building the NP

Next, we carry out the same procedure for the P *near*. The NP after the P clearly functions as its complement, since it names the location entailed by the meaning of *near*. We therefore combine the P and the NP, forming the P' and PP depicted in Figure 5.34.
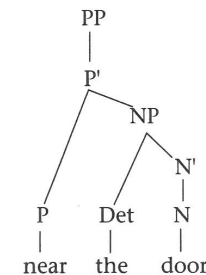
PP
|
P'
/ \
P   NP
| / \
Det   N'
| |
N
near   the   door

Figure 5.34   The complete PP

A Simplified Tree Structure

In order to abbreviate and simplify, linguists sometimes use tree structures such as Figure 5.35 in which the X' level has been eliminated, so that specifiers, heads, and complements are all attached at the XP level. Your instructor will decide whether this is appropriate in your class.
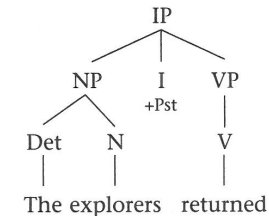
IP
/ | \
NP   I   VP
/ \   +Pst |
Det   N   V
| | |
The   explorers   returned

Figure 5.35   A simplified tree structure

A Sentential Example

Consider now how we proceed in the case of a complete sentence such as *The dog might bite that man*. Assignment of each word to the appropriate category gives the structure depicted in Figure 5.36.
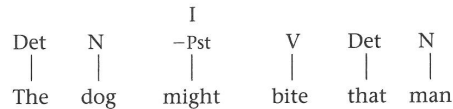

Figure 5.36   The categories for each word in the sentence

Working from right to left, it is easy to see that the noun *man* heads an NP that contains a specifier but no complement as depicted in Figure 5.37.
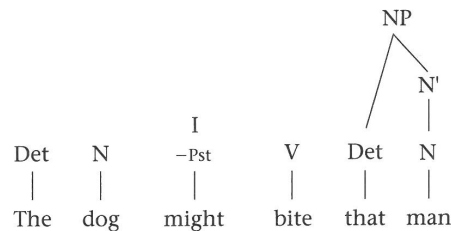

Figure 5.37   The structure of the rightmost NP

Next, we focus on the V *bite*, combining it with the complement NP *that man* and building the required V' and VP as depicted in Figure 5.38.
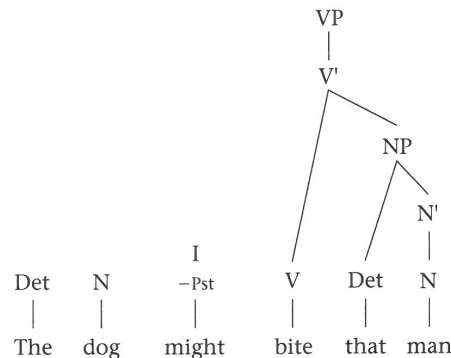

Figure 5.38   Adding the VP level above the V head

As an instance of the I category, the modal auxiliary *might* is the head of IP, with the VP to the right serving as its complement and the NP to the left functioning as its specifier. This yields the complete sentence illustrated in Figure 5.39, which includes the CP shell.
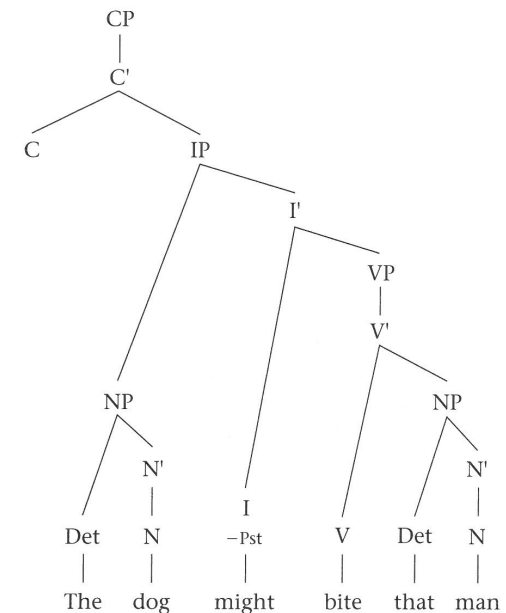
Figure 5.39   The sentence embedded in a CP shell

Some things to remember!

- Every sentence contains a verb, so every tree you draw must have a VP.
- Every VP must be a complement of I, so every tree must have an I.
- The I position will be filled by a modal auxiliary (if there is one) and/or ±Pst.
- Every I will have an NP (the subject) in its specifier position.
- Every IP occurs inside a CP shell.

Transformations

As explained in Section 3, the syntactic analysis of some sentences involves the Move operation in addition to Merge. Recognizing that one of the transformations used in this chapter has applied is relatively simple: if a sentence contains an auxiliary verb to the left of the subject, then Inversion has applied; if it begins with a *wh* word, then *Wh* Movement has applied. In the sentence *What should the farmers plant?*, then, both of these transformations have applied.

In order to determine the deep structure, we must "return" the auxiliary verb to its position under I and we must determine the position from which the *wh* word has been moved. Since the *wh* word in the sentence *What should the farmers plant?* asks about the complement of the verb (the thing that is planted), we place *what* in the
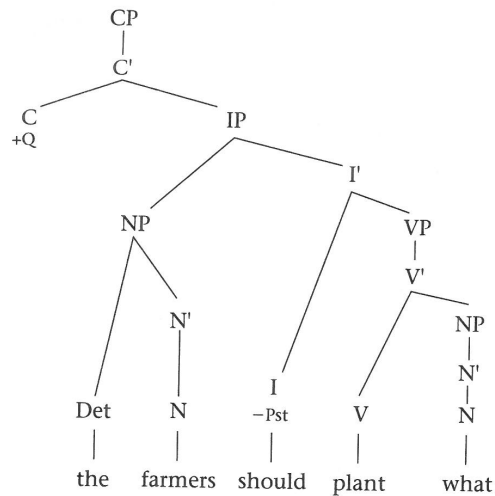
Figure 5.40 The deep structure for the sentence *What should the farmers plant?*

complement position within VP in deep structure. This gives the deep structure depicted in Figure 5.40.

Attracted by the +Q feature, the auxiliary *should* then moves to the C position (Inversion) and *what* moves to the specifier position under CP (*Wh* Movement), yielding the complete surface structure depicted in Figure 5.41.
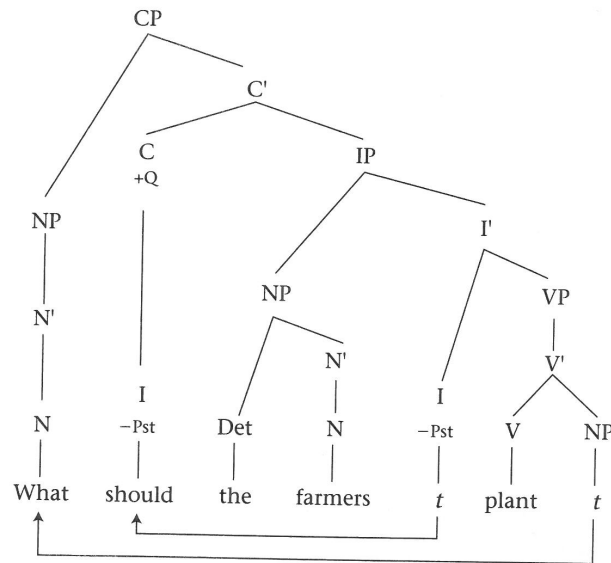

Figure 5.41 The surface structure for *What should the farmers plant?*

Exercises

1. Place an asterisk next to any of the sentences that are ungrammatical for you. Can you figure out what makes these sentences ungrammatical?
   a) The instructor told the students to study.
   b) The instructor suggested the students to study.
   c) The customer asked for a cold beer.
   d) The customer requested for a cold beer.
   e) He gave the Red Cross some money.
   f) He donated the Red Cross some money.
   g) The pilot landed the jet.
   h) The jet landed.
   i) A journalist wrote the article.
   j) The article wrote.
   k) Jerome is satisfied of his job.
   l) Jerome is tired of his job.

2. Indicate the category of each word in the following sentences. (It may help to refer back to Section 1.1.)
   a) That glass broke.
   b) A jogger ran toward the end of the lane.
   c) These tall trees are blocking the road.
   d) The detective looked through the records.
   e) The peaches never appear quite ripe.
   f) Jeremy will play the trumpet and the drums in the orchestra.

3. Each of the following phrases consists of a specifier and a head. Build a tree structure for each example that complies with the X' schema. (See Section 1.2.)
   a) the zoo   f) this house
   b) always try   g) very competent
   c) so witty   h) quite cheap
   d) perhaps pass   i) never surrender
   e) less bleak   j) those books

4. The following phrases include a head, a complement, and (in some cases) a specifier. Build a tree structure for each example that complies with the X' schema. For now, there is no need to depict the internal structure of complements. (See the tree diagrams in Figure 5.5 in the chapter.)
   a) into the house
   b) fixed the telephone
   c) full of mistakes
   d) more toward the window
   e) a film about pollution
   f) always study this material
   g) perhaps earn the money
   h) that argument with Owen
   i) the success of the program

5. Drawing on the X' schema, create trees for each of the following sentences. (Refer to Section 1.3.)
   a) Those guests should leave.
   b) Maria never ate a brownie.
   c) That shelf will fall.
   d) The glass broke.
   e) The student lost the debate.
   f) The manager may offer a raise.
   g) The judge rarely jails shoplifters.
   h) The teacher often organized a discussion.
   i) A psychic will speak to this group.
   j) Marianne could become quite fond of Larry.

6. Apply the substitution test to determine which of the bracketed sequences in the following sentences form constituents. (Refer to Section 1.4.)
   a) [The news] upset the entire family.
   b) They hid [in the cave].
   c) The [computer was very] expensive.
   d) [The houses] will be rebuilt.
   e) Jane will [leave town].

7. Apply the movement test to determine which of the bracketed sequences in the following sentences form constituents. (Refer to Section 1.4.)
   a) We ate our lunch [near the riverbank].
   b) Steve looked [up the number] in the book.
   c) The [island has been] flooded.
   d) I love [peanut butter and bacon sandwiches].
   e) The environmental [movement is gaining momentum].
   f) The goslings [swam across] the lake.

8. Lexical categories are divided into subcategories on the basis of their complements (see Sections 2.1 and 2.2). For each of the following words, two potential complement options are given. For each of the words:

   i) Determine which one of the two options better matches its subcategorization requirements.

   ii) Justify your choice by creating a sentence using that complement option.

Verb	Options		Verb	Options
a) expire	Ø or NP NP		e) clean	NP PP$_{for}$ or NP NP
b) destroy	NP or Ø		f) mumble	NP or NP NP
c) observe	NP or PP$_{to}$ PP$_{about}$		g) throw	Ø or NP PP$_{loc}$
d) discuss	NP or Ø		h) paint	NP PP$_{to}$ or NP PP$_{for}$

Noun	Options
a) debate	PP$_{of}$ PP$_{to}$ or PP$_{with}$ PP$_{about}$
b) hammer	Ø or PP$_{with}$ PP$_{about}$
c) success	PP$_{of}$ PP$_{to}$ or PP$_{of}$
d) transfer	PP$_{with}$ PP$_{about}$ or PP$_{of}$ PP$_{to}$
e) sickness	Ø or PP$_{with}$ PP$_{about}$

Adjective	Options
a) strong	Ø or PP$_{about}$
b) sick	NP or PP$_{of}$
c) bored	PP$_{with}$ or PP$_{from}$
d) knowledgeable	PP$_{to}$ or PP$_{about}$
e) small	PP$_{of}$ or Ø

9. The following sentences all contain embedded clauses that function as complements of a verb. Draw a tree structure for each sentence. (See the example in Figure 5.12.)
   a) The reporter said that an accident injured a woman.
   b) The fishermen think that the company polluted the bay.
   c) Bill reported that a student asked whether the eclipse would occur.

10. The derivations of the following sentences involve the Inversion transformation. Draw tree structures for the deep structure and the surface structure for each sentence. (See Sections 3.1 and 3.3.)
    a) Will the boss hire Hillary?
    b) Can the dog fetch the frisbee?
    c) Should the student report the incident?
    d) Must the musicians play that sonata?
    e) Might that player leave the team?
    f) Do pigs fly?
    g) Did the students understand the lecture?
    h) Does Romeo love Juliet?

11. The following sentences involve the rules of *Wh* Movement and Inversion. Draw the trees to show the deep structure and the surface structure for each of these sentences. (Refer to Section 3.)
    a) Who should the director call?
    b) Who should call the director?
    c) What can Joanne eat?
    d) Who will the visitors stay with?
    e) What might Terry sing?
    f) What could Anne bring to the gathering? (*Hint*: See Figure 5.10.)
    g) What did the lightning hit?
    h) Who did Stacy talk to?
    i) Which language does Michael teach?

12. The following data illustrates the formation of *yes-no* questions in German.
    a) Das Kind wird die Schwester lehren.
       the child will the sister teach
       'The child will teach the sister.'
    b) Wird das Kind die Schwester lehren?
       will the child the sister teach
       'Will the child teach the sister?'
    c) Der Mann liebt die Frau.
       the man loves the woman
       'The man loves the woman.'

   d) Liebt der Mann die Frau?
      loves the man the woman
      'Does the man love the woman?'

Assuming that German makes uses of the same Inversion transformation as English (i.e., "Move I to the C position"), does the above data tell us whether German employs the Verb Raising transformation? (See Section 4.1.) Explain your answer.

13. The following sentences all contain coordinate phrases (see Section 5.1). Draw a tree structure for each sentence.
   a) The cyclist drank a gallon of water and a liter of cola.
   b) The airplane will land at the airport and taxi to the terminal.
   c) The dog ran down the stairs and out the door.
   d) Jill should recycle that book and magazine.
   e) Hillary knows that spring will come and that the snow will melt.
   f) Mary is fond of dogs but tired of the fleas.

For the Student Linguist

For more food for thought on syntax, go to **bedfordstmartins.com/linguistics/ syntax** and click on **For the Student Linguist.**

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Semantics: The Analysis of Meaning

William O'Grady

. . . in every object there is inexhaustible meaning.

– THOMAS CARLYLE

OBJECTIVES

In this chapter, you will learn:
- how we derive meaning from words and sentences
- how different languages encode concepts in words and sentences
- how we use sentence structure to produce and understand meaning
- how speaker beliefs and attitudes, setting, and context contribute to meaning

Up to now, this book has focused on the *form* of utterances—their sound pattern, morphological structure, and syntactic organization. But there is more to language than just form. In order for language to fulfill its communicative function, utterances must also convey a message; they must have content. Speaking very generally, we can refer to an utterance's content as its **meaning**.

    This chapter is concerned with **semantics**, the study of meaning in human language. Because some work in this complicated area of linguistic analysis presupposes considerable knowledge of other disciplines (particularly logic, mathematics, and philosophy), not all aspects of contemporary semantics are suitable for presentation in an introductory linguistics textbook. We will restrict our attention here to four major topics in semantics: (1) the nature of meaning, (2) some of the properties of the conceptual system underlying meaning, (3) the contribution of syntactic structure to the interpretation of sentences, and (4) the role of nongrammatical factors in the understanding of utterances.