FILE 5.4

Syntactic Categories

5.4.1 What Are Syntactic Categories?

Thus far, we have used terms like *sentence, noun, noun phrase, attributive adjective,* etc., either relying on your intuitive understanding of them or pointing out particular examples. In this file, we discuss terms like these—names of **syntactic categories**—more explicitly and technically. The notion of syntactic category is similar to but distinct from the traditional notions of parts of speech or lexical categories (see File 4.1).

A syntactic category consists of a set of expressions that have very similar syntactic properties; that is, they have approximately the same word order and co-occurrence requirements. When two expressions have similar syntactic properties, they are usually interchangeable in a sentence; you can substitute them for one another and still have a grammatical sentence. Since such expressions can occur in almost all the same syntactic environments, we say that they have the same **syntactic distribution.**

For example, take any sentence that contains the constituent *the cat.* You can substitute *Fluffy* for *the cat* in all those sentences, and the result will be a grammatical sentence. This indicates that *Fluffy* and *the cat* have the same distribution and, therefore, the same syntactic properties. We can thus conclude that they belong to the same syntactic category. The following examples show that *the cat* and *Fluffy* have the same distribution:

(1) a.	Sally likes the cat.	Sally likes Fluffy.
b.	The cat is sleeping.	Fluffy is sleeping.
c.	Sally gave the cat some food.	Sally gave Fluffy some food.
d.	It was the cat that Sally hated.	It was Fluffy that Sally hated.
e.	Sally bought it for the cat.	Sally bought it for Fluffy.
f.	The cat's bowl was empty.	Fluffy's bowl was empty.

On the other hand, *Fluffy* and *cat* are not interchangeable, as shown in (2). This indicates that they do not have the same distribution and, therefore, do not belong to the same syntactic category.

(2) a.	The cat was sleeping.	*The Fluffy was sleeping.
b.	*Sally gave cat some food.	Sally gave Fluffy some food.
	etc.	

But why are syntactic categories important? Suppose one night you're taking a stroll in your neighborhood and you run into a friendly Martian scientist who's working on a descriptive grammar of English. The Martian already knows a lot about English, including many of its syntactic categories. However, she has encountered some new English expressions whose syntactic properties she doesn't know, and she'd like your help. All you would have to do is tell her which syntactic categories the expressions belong to. She would then immediately know the distribution of all of the new expressions: how they can combine

with other expressions, how they have to be ordered with respect to other expressions, what their arguments are, etc. If you prefer, substitute "foreign language learner" or "computer" for "Martian scientist" above, and you'll come to appreciate why syntactic categories are important.

In order for syntactic categories to successfully convey detailed syntactic information, they have to be distinguished based on the syntactic properties of the expressions that comprise them. It is important to appreciate the fact that expressions do not belong to a given syntactic category by virtue of their morphological or semantic properties. Rather, it is because of their syntactic properties.

You might have been told at some point in your education that nouns refer to people, places, or things, that verbs are action words, and that adjectives are descriptive words. This is a semantically based classification system; that is, to say that nouns are words that stand for people, places, or things is to make a claim about what nouns are supposed to mean, not about how they behave syntactically. We observed early on in this chapter that semantic properties of expressions do not determine their syntactic properties. Therefore, we cannot successfully assign expressions to syntactic categories by examining their meaning.

For example, *exploded* and *destroyed* are both "action words," but they have different syntactic distributions: *Sally exploded, *Sally destroyed.* On the other hand, it is not clear that *slept* and *vegetated* could be called "action words," even though they have the same distribution as *exploded: Sally exploded, Sally vegetated,* and *Sally slept* are all sentences. The expressions *mountains* and *the hill* both refer to "places," but they have different distributions: first, they have different agreement features (plural vs. singular); and second, *mountains* can combine with determiners, but *the hill* can't (*Sally likes the mountains, *Sally likes the the hill*). Further, we pointed out at the beginning of this chapter that even expressions that mean essentially the same thing can be syntactically different (*my* vs. *mine, ate* vs. *devoured*). The point is that knowing the semantic class that some expression ostensibly belongs to does not help you figure out its syntactic properties.

Additionally, we cannot distinguish syntactic categories based on their morphological properties. For example, verbs comprise a relevant lexical category in English (see File 4.1), so we can say that morphologically, *sleep, tell, destroy,* and *devour* are all in the same category. However, because these expressions do not all have the same syntactic properties, they do not comprise a useful syntactic category. That is, if the Martian scientist knew that *sleep* and *tell* are verbs, and then you told her that *devour* is also a verb, she would know what kinds of morphemes can combine with *devour.* For example, she would know that *devouring* is a word. Nonetheless, she would not be able to predict the syntactic distribution of *devour* at all, and, as a result, she might go around producing non-sentences like **I'd like to devour now* (cf. *I'd like to sleep now*) or **I'll devour you what I found* (cf. *I'll tell you what I found*).

If you wanted to categorize countries of the world by the size of their population, you would need to take into account how many people live in each country, rather than a country's surface area, its proximity to an ocean, or the level of education of its population. Similarly, if we want to categorize expressions of a language syntactically, we have to take into account their syntactic properties, not their meaning, their morphological properties, or what they sound like. In the following section, we discuss some major syntactic categories in English and the syntactic properties that distinguish them.

5.4.2 Syntactic Categories in English

Although you probably have an intuitive understanding of what a sentence is, let's begin with a syntactic test for distinguishing the category **sentence.** This category (abbreviated as S) consists of expressions that can occur in the following syntactic environment:

(3) Sally thinks that _____.

Given this test, *the cat* is not a sentence (**Sally thinks that the cat*). On the other hand, *the cat is cute* is a sentence since we can say *Sally thinks that the cat is cute.*

The syntactic category of **noun phrases,** abbreviated NP, consists of personal pronouns (*he, she, you, it, we,* etc.), proper names, and any other expressions that have the same distribution. The most reliable test that you can use to check whether or not some constituent is a noun phrase is to try to replace it with a pronoun. If the result is a grammatical sentence, then that constituent is an NP, and if the result is ungrammatical, then it is not. In each of the examples in (4) through (6), the test indicates that the underlined expressions are NPs.

(4) Is *Fluffy* in *Fluffy was sleeping on the desk* an NP? Yes.
   a. Fluffy was sleeping on the desk.
   b. She was sleeping on the desk.

(5) Is *the cat* in *The cat was sleeping on the desk* an NP? Yes.
   a. The cat was sleeping on the desk.
   b. She was sleeping on the desk.

(6) Is *the desk* in *The cat was sleeping on the desk* an NP? Yes.
   a. The cat was sleeping on the desk.
   b. The cat was sleeping on it.

Note, however, that while *the cat* and *the desk* belong to the category NP, *cat* and *desk* do not. The pronoun replacement test indicates that they do not have the same distribution as NPs, as shown in (7) and (8).

(7) Is *cat* in *The cat was sleeping on the desk* an NP? No.
   a. The cat was sleeping on the desk.
   b. *The she was sleeping on the desk.

(8) Is *desk* in *The cat was sleeping on the desk* an NP? No.
   a. The cat was sleeping on the desk.
   b. *The cat was sleeping on the it.

Expressions such as *desk* and *cat* belong to the syntactic category of **nouns,** abbreviated N. As shown in (7) and (8), one way in which Ns and NPs are syntactically different is that Ns can co-occur with **determiners** (abbreviated Det) like *the,* while NPs cannot. The category of nouns consists of those expressions that can combine with a determiner to their left to yield an expression of category NP. For example, we can combine *the* with *cat* and get *the cat,* which, as we have already observed, is an NP.

English does not have many determiners. In fact, there are so few of them that we could in principle list them all. However, since understanding the syntactic properties of determiners will enable you to figure out which expressions are determiners, we will provide just a partial list in (9).

(9) a. *this, that, these, those* [demonstrative determiners]
   b. *my, your, his, her, our,* etc. [possessive determiners]
   c. *a, some, the, every, all, few, most,* etc. [quantificational determiners]

A determiner is any expression that can be combined with a noun to its right to form an expression of category NP. Thus, for example, *some* is a determiner because *some cat* is an NP.

In addition to NPs that consist of a determiner and a noun, and single-word NPs (pronouns and proper names), there are also NPs that contain attributive **adjectives** (abbrevi-

ated as Adj). For example, the expression *the cute gray cat* has the same distribution as *Fluffy* or *she,* as shown in (10), and consequently we know that it is an NP.

(10) The cute gray cat is sleeping. Fluffy is sleeping.
Sally likes the cute gray cat. Sally likes Fluffy.

Expressions like *cute* and *gray* belong to the category adjective, which consists of expressions that can occur between a determiner and a noun in an NP. Note that a noun and the adjective-noun sequence have the same syntactic distribution—wherever *cat* can occur, so can *cute cat* or *gray cat,* as shown in the following example:

(11) a. The cat is sleeping. The gray cat was sleeping.
b. Sally likes her cat. Sally likes her gray cat.
c. The fluffy cat is sleeping. The fluffy gray cat is sleeping.

We can thus define adjectives as those expressions that can occur immediately to the left of a noun, with the resulting expression having the same distribution as a plain noun.

Now that we know what noun phrases are, we can describe another major syntactic category, namely, the **verb phrase,** abbreviated as VP. The category VP consists of those expressions that, when combined with an NP on their left, will result in a sentence, that is an expression of category S. The NP that occurs to the left of the VP is referred to as the subject of the sentence. For example:

(12) a. Sally slept.
b. Sally likes Bob.
c. Sally gave Bob some money.
d. Sally traveled to France.
e. Sally put the book on the desk.
f. Sally persuaded Bob to study French.

All of the underlined expressions in the sentences in (12) are of category VP, and in each of these sentences, the NP *Sally* is the subject. If some expression is a VP, it will have the same distribution as a verb form like *slept.* It will also have the same distribution as *did so.* Therefore, if it is possible to replace some expression with *slept* or *did so,* and the result is a grammatical sentence, then the expression in question is of category VP. Take a minute to verify that each underlined expression in (12) can be replaced with *did so* without loss of grammaticality. This should remind you of our earlier observation regarding expressions of category NP: all noun phrases can be replaced in a sentence with a pronoun or a proper name.

Another way to describe a verb phrase syntactically is to say that it consists of a verb (as a morphological category) and any complements it may have. Optionally, a verb phrase can include one or more adjuncts as well. A verb like *slept* requires only a subject argument so it is a VP all by itself. Traditionally, verbs such as *slept* which require no complements are called **intransitive verbs.** Other verbs, such as *liked* or *devoured,* require both an NP complement (an object) and a subject NP argument. Providing these verbs with an NP complement results in a VP. Consider the following example:

(13) Sally liked her cute gray cat.

In (13), *her cute gray cat* is the complement of *liked,* whereas *Sally* is its subject argument. We can confirm that *liked,* together with its complement, is a VP because we can replace *liked*

her cute gray cat with *slept* or *did so* and still have a sentence. However, we cannot replace *liked* with *did so* or *slept*, which tells us that *liked* itself is not a VP, as shown in (14).

(14) a. Sally liked her cute gray cat.
b. Sally did so.
c. Sally slept.
d. *Sally did so her cute gray cat.
e. *Sally slept her cute gray cat.

Verbs such as *liked*, which require an NP complement to form a VP, are called **transitive verbs** (abbreviated TV) and form their own syntactic category. Other verbs, such as *gave*, require two NP complements and a subject NP argument, for example, *Sally gave Bob a book*. Combining them with two NP objects results in a VP, which we can verify with *do so* replacement, as shown in (15b). However, neither *gave* by itself (15e), nor *gave* combined with just one of its objects (15c) and (15d), forms a VP.

(15) a. Sally gave Bob a book.
b. Sally did so.
c. *Sally did so a book.
d. *Sally did so Bob.
e. *Sally did so Bob a book.

Verbs such as *gave* belong to the syntactic category of **ditransitive verbs**, abbreviated as DTV. There are also verbs that require a complement of category S to form a VP, for example, *thought*. We call such verbs **sentential complement verbs**, abbreviated as SV. Example (16) shows that only the combination of a sentential complement verb with its complement sentence is a VP since it is replaceable by *did so* (16b). A sentential complement verb without its complement is not a VP (16c).

(16) a. Sally thought Bob liked her.
b. Sally did so.
c. *Sally did so Bob liked her.

Apart from verbs and their complements, recall from our earlier discussion that VPs can optionally contain adjuncts as well. Many expressions that can occur in a verb phrase as adjuncts are of the category **adverb** (abbreviated Adv). For example, the underlined expressions in (17) are all adverbs.

(17) a. Sally wrote the letter carefully.
b. Sally walked fast.
c. Sally put the book on the desk yesterday.
d. Sally ate her dinner quickly.

Any expression that consists of a VP followed by an adverb has the same distribution as a VP. For example, you can replace a verb and its complements with *did so*, leaving the adverb behind, as in (18b), or you can replace the verb, its complements, and an adverb with *did so*, as in (18c).

(18) a. Sally wrote the letter carefully.
b. Sally did so carefully.
c. Sally did so.

Examples like (18) show that VPs with or without adjuncts have the same distribution. From this we can conclude that adverbs combine with a VP to form an expression of category VP, and for this reason they're called **VP adjuncts.** This may remind you of adjectives, which can combine with nouns. Since the resulting expression is also of category N, we call them **N adjuncts.** Thus, both adverbs and attributive adjectives combine with expressions of certain categories (VP and N, respectively), and the resulting expression belongs to that same category. This is true of all adjuncts. However, in contrast to adjuncts, combining an expression with its arguments changes the syntactic category of the resulting expression. For example, *liked* does not have the same distribution as *liked Bob; slept* does not have the same distribution as *Sally slept;* etc.

Another kind of VP adjunct is a **prepositional phrase** (PP), which consists of a **preposition** (P) and a noun phrase.

(19) a. Sally wrote the letter with a pen.
b. Sally walked down the street.
c. Fluffy slept on the desk.
d. Sally ate her dinner at the table.

All of the underlined expressions in (19) are called prepositional phrases. Words like *with, down, on, in, over, under, for, from, of,* and *at* are called prepositions. Just like determiners, there are relatively few prepositions in English, and we could in principle list them all. Yet, instead of doing so, we will describe their syntactic properties so that it is always possible to figure out whether a given expression is a preposition based on its syntactic behavior.

Prepositions need an argument of category NP in order to form PPs. Example (19) shows prepositional phrases in the same distribution as adverbs—as VP adjuncts. However, prepositional phrases can also occur as adjuncts inside NPs, whereas adverbs cannot.

(20) a. That bar down the street is my favorite.
b. Sally likes all cats with long hair.
c. That cat under the bed is Fluffy.

Inside NPs, PPs occur immediately to the right of the noun, and the resulting expression has the same distribution as a noun. For example, verify for yourself that *bar down the street* has the same distribution as *bar.*

Table (21) summarizes the main syntactic categories in English and their syntactic properties.

(21) Major syntactic categories in English and their properties

Syntactic Category	Relevant Properties	Example
S (sentence)	can occur in *Sally thinks that* _____	Fluffy is cute
NP (noun phrase)	has the same distribution as a personal pronoun or a proper name	she Sally the cat this cute dog that cat under the bed
N (noun)	needs a determiner to its left to form an NP	cat cute dog cat under the bed
Det (determiner)	occurs to the left of the noun to form an NP	the every this
Adj (adjective)	occurs in between a determiner and a noun; can be a noun adjunct, that is, combines with a noun to its right which results in an expression that is also of category N	cute fluffy gray
VP (verb phrase)	consists minimally of a verb and all its complements; combines with an NP to its left which results in a sentence; has the same distribution as *slept* or *did so*	slept wrote the letter quickly liked Bob walked believed she liked that man
TV (transitive verb)	needs an NP complement to form a VP	liked devoured
DTV (ditransitive verb)	needs two NP complements to form a VP	gave sent
SV (sentential complement verb)	needs a sentential complement to form a VP	believed said
Adv (adverb)	can be a VP adjunct, that is, combines with a VP to its left which results in an expression that is also of category VP	fast quickly tomorrow
P (preposition)	combines with an NP to form a PP	at for with
PP (prepositional phrase)	can be a VP or an N adjunct; consists of a preposition and its NP complement	at the table for Sally under the bed

FILE 5.5

Constructing a Grammar

5.5.1 Why Construct Grammars

Syntacticians often try to construct descriptive grammars of natural languages. You can think of such grammars as a linguist's theory of a native speaker's mental grammar. If we focus on syntax alone, such grammars are like a recipe for constructing, in a completely mechanical fashion, all and only the sentences of the natural language that we are trying to describe. This is a complicated task; in fact, there isn't a single complete grammar for any natural language that correctly predicts all and only the sentences of that language.

You can imagine how useful such a grammar would be not only to our Martian scientist friend, but also to foreign language learners. There are also many computational applications for such grammars (see Chapter 16). In this file, we will construct a simple grammar for English. For such a grammar to be useful, it has to assign lexical expressions to syntactic categories, and it has to provide us with recipes for syntactically combining expressions into larger expressions depending on their syntactic categories.

5.5.2 Parts of the Grammar: The Lexicon and the Rules

In constructing a grammar, we start with a **lexicon,** in which we assign lexical expressions to syntactic categories. This lexicon is, of course, not an actual language user's mental lexicon, but just a representation of lexical expressions and their syntactic properties. To represent in our grammar the fact that *she, Fluffy,* and *Sally* are all of category NP, we write the following **lexical entries:**

(1) NP → she
NP → Fluffy
NP → Sally

A lexical entry consists of a syntactic category name followed by an arrow followed by a word. We can abbreviate multiple lexical entries that contain the same category name as follows:

(2) NP → {she, Fluffy, Sally}

Note that there is no real substantive difference between (1) and (2); the latter is just shorthand for (1). Here is a sample lexicon:

(3) NP → {she, Fluffy, Bob, Sally, . . .}
N → {dog, cat, man, . . .}
Adj → {fluffy, cute, gray, . . .}
Det → {the, this, some, . . .}
VP → {slept, barked, . . .}

TV → {liked, devoured, . . .}
DTV → {gave, sent, . . .}
SV → {thought, said, . . .}
P → {to, for, with, on, under, . . .}
Adv → {carefully, quickly, yesterday, . . .}

The lexicon simply tells us which syntactic category a given lexical expression belongs to. However, it doesn't tell us how the expressions can combine with one another to form larger expressions. For example, we want our grammar to represent not only the fact that *Sally* is an NP and *slept* a VP, but also the fact that combining an NP and a VP results in a sentence. Similarly, in addition to representing the fact that *dog* is a noun and *this* a determiner, the grammar needs to state that combining a noun with a determiner results in an NP.

Phrase structure rules are used to capture patterns of syntactic combination. They are similar in form to lexical entries, except that they contain only names of syntactic categories; they do not contain any actual linguistic forms. We know that if we combine a VP with an NP to its left, we can create a sentence. A phrase structure rule that represents this fact about English appears in (4).

(4) S → NP VP

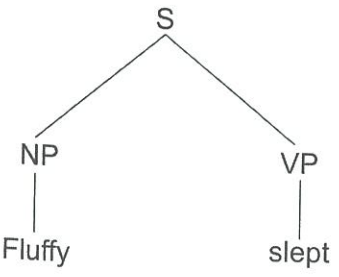
This phrase structure rule consists of a category name (S), followed by an arrow, followed by a sequence of category names (NP VP). The order in which the categories to the right of the arrow appear represents the relative order in which the expressions of those categories must occur in a sentence. The fact that we find the sequence NP VP to the right of the arrow in (4), as opposed to VP NP, captures the fact that in English, subject NPs occur to the left of verb phrases. For example, since we know that *Fluffy* is an NP, and *slept* is a VP, the phrase structure rule in (4) tells us that *Fluffy slept* is an expression of category S.

All phrase structure rules allow us to combine expressions to form a larger expression. The expressions that combine via a rule are called the immediate constituents of the resulting expression. For example, the rule in (4) tells us that the immediate constituents of a sentence are an NP and a VP. Immediate constituents are just a special case of the syntactic constituents introduced in File 5.3.

Once we have a grammar for a language—and we already have a tiny grammar for English since we have some lexical entries and a rule—we can define a syntactic constituent of some expression X to be either an immediate constituent of X or else an immediate constituent of a constituent of X. This definition may seem circular, but it's a perfectly legitimate case of a recursive definition.[1]

We can conveniently display the way that a sentence is built up from lexical expressions using the phrase structure rules by means of a **phrase structure tree.** For example, the construction of *Fluffy slept* can be represented with the following phrase structure tree:

(5)



[1]Here's another example of a recursive definition: we can define Sally's descendants to be either her children or the children of her descendants.

A phrase structure tree is drawn upside down. The leaves of the tree in (5) are *Fluffy* and *slept*, the forms of the lexical expressions that this sentence contains. The lowermost syntactic category names in the tree (NP and VP) represent the syntactic categories of the lexical expressions that occur in the sentence (*Fluffy* is of category NP, and *slept* is of category VP). The root of this tree is labeled with the category name S. The category names that occur immediately below S are NP and VP, in that order. This corresponds to the phrase structure rule in (4) and tells us that the immediate constituents of S are an NP and a VP. When we read the leaves of the tree from left to right, we get *Fluffy slept*, the form of the sentence whose structure is represented in (5).

Not all NPs and VPs consist of single words. We need to add other phrase structure rules to our grammar that will let us construct more complex NPs and VPs, and in turn more complex sentences. We will start with NPs. An NP can consist of a determiner followed by a noun, which is represented in the following phrase structure rule:

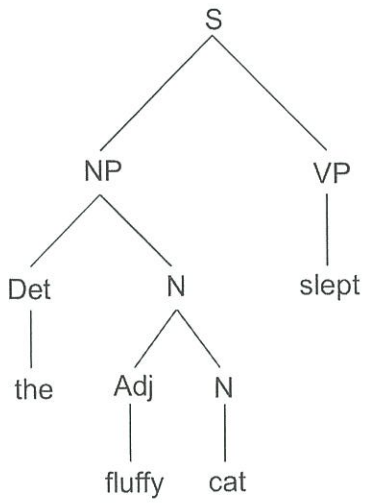
(6) NP → Det N

Nouns can be preceded by adjectives, and, as we observed earlier, the combination of an adjective and a noun is an expression with the same distribution as a noun. The following phrase structure rule captures these facts:

(7) N → Adj N

Now our grammar predicts that *The fluffy cat slept* is a sentence, since we can construct the phrase structure tree in (8).

(8)



In this tree, as always, the forms of the lexical expressions are the leaves. The syntactic category names that occur right above the leaves represent the syntactic categories of lexical expressions, in accordance with the lexical entries. The tree also shows that the immediate constituents of this sentence are NP and VP (rule 4), that the immediate constituents of NP are Det and N (rule 6), and that the immediate constituents of the higher occurrence of N in the tree are Adj and N (rule 7). Reading the leaves of this entire tree from left to right gives us the string *The fluffy cat slept*, the form of the whole sentence whose structure this tree represents.

Turning our attention now to VPs, we need to add phrase structure rules to our grammar that will allow for the construction of more complex VPs that contain verbs and their complements.

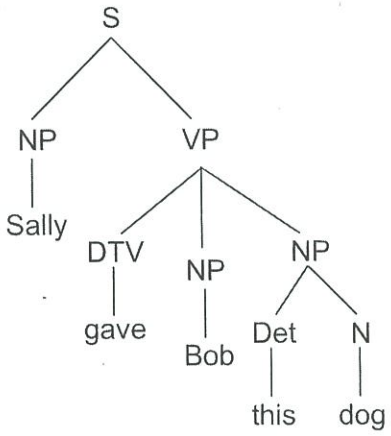
(9) a. VP → TV NP
[a VP can consist of a transitive verb followed by an NP]

b. VP → DTV NP NP
[a VP can consist of a ditransitive verb followed by a sequence of two NPs]

c. VP → SV S
[a VP can consist of a sentential complement verb followed by a sentence]

Our grammar now predicts that *Sally gave Bob this dog* is a sentence, which we can represent by means of the phrase structure tree in (10).

(10)



The rules in (9) allow us to construct VPs that consist of verbs and their complements. However, VPs can also contain adverbs, which the following phrase structure rule captures:

(11) VP → VP Adv

To construct prepositional phrases, we add the following phrase structure rule that allows prepositions to combine with their complement NPs to form PPs:

(12) PP → P NP

Since PPs can be either VP or N adjuncts, we need two more phrase structure rules.

(13) a. N → N PP
[PPs can be noun adjuncts]

b. VP → VP PP
[PPs can be VP adjuncts]

Table (14) lists all the phrase structure rules that we've introduced and describes their purpose.

(14) Phrase structure rules

Phrase Structure Rule	Function
S → NP VP	allows VPs to combine with their subject NP to form a sentence
NP → Det N	allows determiners to combine with a noun to form an NP
N → Adj N	allows attributive adjectives to be noun adjuncts
VP → VP Adv	allows adverbs to be VP adjuncts
VP → TV NP	allows transitive verbs to combine with their object NP to form a VP
VP → DTV NP NP	allows ditransitive verbs to combine with their object NPs to form a VP
VP → SV S	allows sentential complement verbs to combine with their complement S to form a VP
PP → P NP	allows prepositions to combine with their complement NP to form a PP
N → N PP	allows PPs to be noun adjuncts
VP → VP PP	allows PPs to be VP adjuncts

With these phrase structure rules, we can account for a variety of English sentences. We can also show that the same expressions can combine in different ways, resulting in distinct phrases that nevertheless have exactly the same form. This phenomenon, called **ambiguity**, is the focus of the next section.

5.5.3 Ambiguity

We defined a linguistic expression as a piece of language that has a certain form, a certain meaning, and certain syntactic properties. The form is just the sequence of sounds associated with a word or a sequence of words. Linguistic forms can be **ambiguous**, which means that they can correspond to more than one distinct expression. Consider the following example:

(15) a. Sally works at a $\underline{\text{bank}_1}$ downtown.
b. There is a bike path along the east $\underline{\text{bank}_2}$ of the Olentangy River.

Both underlined expressions in (15) have the same form: [bæŋk]. Yet, we know that they are distinct expressions nonetheless because they mean very different things: $bank_1$ refers to a financial institution, and $bank_2$ to the strip of land next to a river. This means that the word *bank* is ambiguous. Here is another example:

(16) a. They went for a $\underline{\text{walk}_1}$.
b. They $\underline{\text{walk}_2}$ quickly.

Both underlined expressions in (16) have the same form, but they have different syntactic properties. The noun $walk_1$ is preceded by a determiner *a* with which it forms an NP that is

the argument of *for*. On the other hand, $walk_2$ belongs to the syntactic category VP; its subject argument is *they*, and it is combined with a VP adjunct, the adverb *quickly*.

Distinct expressions can thus share the same form, but nonetheless have different meanings or different syntactic properties. The shared form is said to be ambiguous. In the following sections, we will discuss different types of ambiguity and then show how to use the grammar that we have constructed to analyze a certain kind of ambiguity.

a. Types of Ambiguity. The kind of ambiguity exemplified in (15) and (16), where a single (phonological) word corresponds to distinct expressions that differ in meaning, syntactic properties, or both, is called **lexical ambiguity** or **homophony.** The expressions that correspond to the same single-word form are said to be homophonous. Here are some more examples of homophonous expressions that differ in meaning:

(17) a. Sally is going to have the mole on her back surgically removed.
b. Sally hates that pesky mole that keeps digging holes in her backyard.

(18) a. We should find some essential readings in syntax and collect them into a reader.
b. Sally is an avid reader of science fiction.

The following are more examples of homophonous expressions that differ in terms of syntactic properties:

(19) a. We love Fluffy. — *love* is of category transitive verb (TV)
b. Our love for Fluffy will never die. — *love* is of category noun (N)

(20) a. Sally likes that. — *that* is of category noun phrase (NP)
b. Sally likes that dog. — *that* is of category determiner (Det)

(21) a. Sally has a fast car. — *fast* is of category adjective (Adj)
b. Sally walks fast. — *fast* is of category adverb (Adv)

Homophonous expressions can differ in terms of both meaning and syntactic properties, as shown in examples (22) and (23). Try to figure out which syntactic category each of the expressions underlined in the examples below belongs to.

(22) a. I know most people have cats and dogs as pets, but I always wanted to have a duck.
b. Sandy and Polly are scared of Frisbees—they both just duck if somebody throws one in their general direction.

(23) a. Teachers take attendance in class to figure out which students are present.
b. Sally got a really cool present from Polly for her birthday.

Strings of words can also be ambiguous. This occurs when two distinct phrasal expressions contain all the same lexical expressions, in exactly the same order, but the way these expressions are combined is different. Consider the string of words in (24).

(24) The cop saw the man with the binoculars.

Remember that sentences are just expressions with a certain form and a certain meaning, whose syntactic category is S. Consequently, the form in (24) actually corresponds to two distinct sentences. The first sentence means that the man whom the cop saw had the binoculars. The second sentence means that the cop used the binoculars to see the man; in other words, the cop was the one with the binoculars.

In this example, the ambiguity arises because the prepositional phase *with the binoculars* can be either a VP adjunct or a noun adjunct. The sentence in which the prepositional

phrase is a VP adjunct means that the cop was the one with binoculars. The sentence in which the PP is a noun adjunct and modifies *man* means that the man whom the cop saw had the binoculars. This kind of ambiguity is called **structural ambiguity.** Here is another example of a structurally ambiguous string of words:

(25) Sandy said Tom would be here yesterday.

In (25), *yesterday* could be the adjunct to the VP *would be here yesterday,* or it could be the adjunct to the VP *said Tom would be here yesterday.* In the first case, the resulting sentence means that Sally said that yesterday was the particular day of Tom's arrival. The other sentence means that it was yesterday when Sally said that Tom would be arriving at some point in the future. Note that strings of words can be both lexically and structurally ambiguous. Consider the following example:

(26) I know you like the back of my hand.

On the one hand, the string in (26) could correspond to the sentence in which *like* occurs as a transitive verb, and the sentence *you like the back of my hand* is the complement of *know.* This sentence means something like 'I am aware of the fact that you're a big fan of the back of my hand.' On the other hand, the string in (26) could correspond to a completely different sentence, in which *you* is the object of *know* and *like the back of my hand* is a VP adjunct. In this case, the sentence means something like 'I know you extremely well.' In the second sentence, *like* is not a transitive verb at all, and thus the ambiguity of (26) is partly lexical in character.

Ambiguity is pervasive in language, and it is important to be aware of it as you attempt to determine the syntactic categories of expressions. Now we will show you how the grammar that we have constructed can be used to analyze structurally ambiguous strings of words.

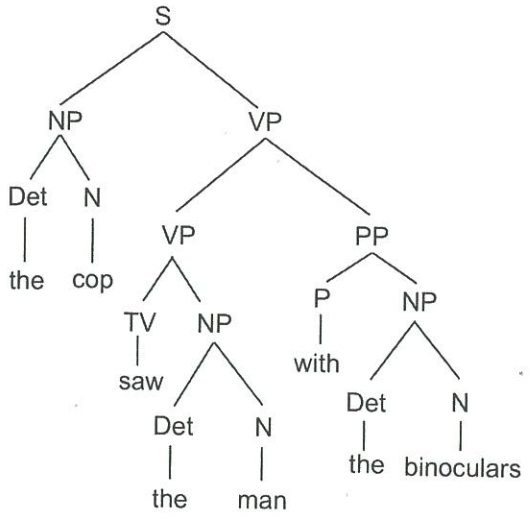
b. Analyzing Structural Ambiguity. We already have the tools to show exactly why some strings of words are structurally ambiguous. Recall the structurally ambiguous string *The cop saw the man with the binoculars.* With our grammar in place, and assuming a straightforward extension of our lexicon, we can show that this string corresponds to two different sentences, depending on whether *with the binoculars* is a VP adjunct or an N adjunct. To show this, the phrase structure rules from (13) are relevant. They are repeated below as (27) for your convenience.

(27) a. N $\rightarrow$ N PP
[PPs can be noun adjuncts]

b. VP $\rightarrow$ VP PP
[PPs can be VP adjuncts]

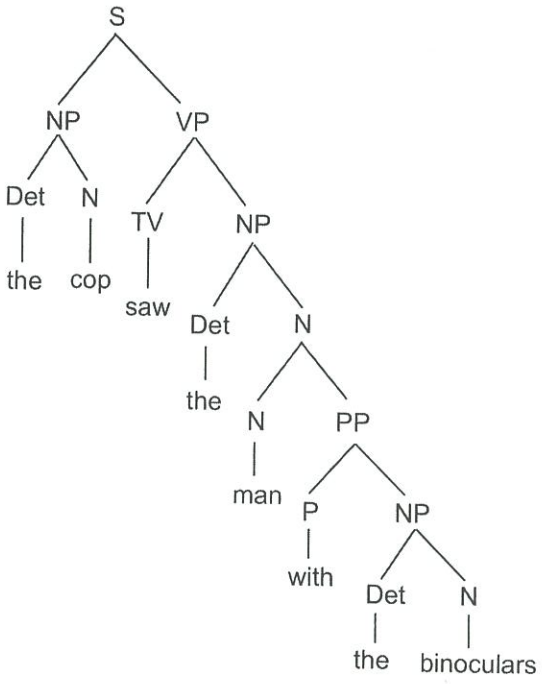
If we make use of the phrase structure rule (27b), which allows PPs to be VP adjuncts, we can construct the phrase structure tree for the sentence that means that the cop had the binoculars and was using them to see the other man, as shown in (28).

(28)



On the other hand, if we use the rule in (27a), which allows PPs to combine with nouns, we get the sentence that means that the man who the cop saw was the one who had the binoculars, as shown in (29).

(29)



While the grammar we constructed in this file allows us to explain why some strings of words are structurally ambiguous, it is still quite modest in scope. On one hand, it fails to predict that certain sentences of English genuinely are sentences, e.g. *The man who I saw yesterday knows Sally* or *Who do you think won?* On the other hand, it incorrectly predicts that certain non-sentences are sentences, e.g. **Bob likes she*. In the practice section for this chapter, File 5.6, we will ask you to evaluate our grammar and the inventory of the syntactic categories that we have assumed, as well as to extend it to include a larger chunk of English. You will also have an opportunity to try out these tools on other languages.