

1

Let's get Parsing!



expected outcomes for this chapter

- You'll acquire a basic sense of what linguists mean by "sentence structure."
- Regardless of your belief that you know very little about sentence structure, you'll see that you actually know quite a bit — and this will help you gain some confidence, for the chapters to come.
- You'll become familiar with the following terms (see words in bold and term boxes): *cognition, structure, parsing, ambiguity, constituent, modification, syntax, grammar, phrase structure rules, phrase structure trees, subject, noun phrase, verb phrase, hierarchical organization.*

1.1 some introductory words

The purpose of this chapter is to get us started immediately. I want you to see right away what sentence structure is, and how you already have the power to analyze — or **parse** — sentences. I want you to see that this power derives from your natural human disposition to automatically analyze strings of words as structured. Consider the immediately preceding sentence, for example. In fact, please read that whole sentence over again, starting with the words "*I want you to see that this power ...*" Let's write the sentence down; you can do this on a separate sheet of paper, so that you have it in front of you, all by itself. We're going to analyze this sentence, and it'll be easier to do that if we can look at it in isolation. Let's give the sentence an example number, like "Example



(1).” It’ll be useful to treat it like a specimen — like something we can dissect and examine. We’ll be doing a lot of this kind of thing in this book: analyzing individual sentences in isolation as a way to learn about sentence structure.

Term Box 1

When we **parse** a string of words, we are mentally assigning structure to the string. We are thus analyzing the string as if it were a sentence in a language, with syntax. As humans, we naturally parse certain strings of symbols as linguistic structures without realizing we’re doing this — that is, we do it unconsciously. As syntacticians, we parse such strings consciously, with an eye towards understanding how humans structure such strings. Related words: *parsing*; *parser*

Side Note 1: (Be proactive!)

You can learn a lot from this book, if you do what is suggested each step of the way. The more you do the mini-exercises as you read, the more surely you’ll integrate everything into your knowledge and skill base.

Have you written the sentence down and considered it? If you did, I bet you understood *as structured* as having something to do with *strings of words*. I’ll illustrate this in Example (1a), where I’ve indicated your mental grouping of these particular words with underlining):

What you did, mentally:

- (1a) I want you to see that this power you have derives from your natural human disposition to automatically analyze strings of words as structured.

So, I’m pretty sure you understood me to be saying that “strings of words” are “structured.” On the other side of the same coin, I bet you didn’t understand the words *as structured* to be associated with, say, the words *your natural human disposition*, as follows:

What you did NOT do, mentally:

- (1b) I want you to see that this power you have derives from your natural human disposition to automatically analyze strings of words as structured.

If I’m right, then it’s pretty amazing that you mentally put together the underlined words in (1a) automatically, without consciously thinking about it; it’s equally amazing that you didn’t put together in your mind the underlined words in (1b); so it’s not as though you thought that “structured” should have anything to do with “your natural predisposition.” Furthermore,

it's certain that you unconsciously put the words together in the way I think you did without anyone ever explicitly teaching you how to do it. In fact, it came so naturally to you that you might be thinking it's strange for me to point out that (1b) was NOT something you did.

Side Note 2: (Just in case you're doubtful)

You might be thinking here, "Well of course I put *as structured* together with *strings of words*, as in (1a); they're right next to each other! The words *your natural human disposition* are too far away from the words *as structured* for me to have thought that these two sets of words could belong together, as in (1b)!"

In case you are thinking this: Yes, there are in fact a lot of other words in between *your natural human disposition* and *as structured*, making these two sets of words distant from one another. However, as we'll see below, **distance** (i.e. how far away words are from each other) doesn't always dictate how you mentally structure words into sentences. Sometimes, you automatically mentally put together groups of words that look far away from one another. The examples in (2b)/(2c) below will illustrate this.

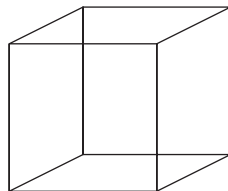
1.1.1 before we talk about sentence structure: the Necker Cube

As human beings, there are lots of things that we do mentally which come naturally to all of us, which are below the level of consciousness; that is, we don't consciously think about them. And although you may not realize this, structuring sentences is one of them. But before we look more carefully at what "structuring sentences" means and how it works, let's look at an example of another thing you do automatically — or, instinctively — without realizing you do it, without you even trying, and without anyone having taught you how to do it. I like this particular example because it helps understand what is meant by your **cognitive instincts** (or, your automatic mental processes).

Perhaps you've actually already seen an example of a **Necker Cube**, and maybe you've even doodled a million of them. In case you haven't, though, let's look at a Necker Cube in Exercise [1]:

EXERCISE [1]

Consider the Necker Cube here. What do you see?





If you spend some time looking at this picture, you'll notice something amazing: in particular, you'll realize that this two-dimensional line-drawing actually gives rise to your perception of two possible cubes — or, put differently — two possible **structures**. In one structure, you're interpreting the lower left corner of the drawing (from your perspective) as the lower left front of the cube, so that the front of the cube is pointing downwards towards the left. In the other structure, you're interpreting this same lower left corner as the lower left rear of the cube, so that the front of the cube is pointing upwards towards the right.

Term Box 2

When something can be mentally assigned more than one possible structure, like this Necker Cube, we say that it's **structurally ambiguous**. Related words: *structural ambiguity, structurally unambiguous*

Side Note 3: (Don't try this at home)

There are two other things you could try to see when staring at a Necker Cube, but I warn you, these exercises become irritating very quickly:

First, you could try to see both cubes at the same time, but I'm sure you'll find this to be impossible. No matter how you try, you either see one cube or the other, but not both simultaneously.

Second, you could try to see the picture in Exercise [1] as a two-dimensional line-drawing. As you'll see, though, it's actually extremely difficult to see this object as anything other than a pair of three-dimensional cubes.

These exercises can be frustrating, because they make you try (and fail) to go against your cognitive instincts.

It's important to note that there aren't really two cubes here on the page. The only thing that's on the page is a two-dimensional line-drawing. So there's nothing outside of your mind which forces you to see the two cubes. Your perception that there are two possible cubes in the drawing simply has to do with how your brain is "hardwired" to structure the image as two distinct cubes. And just as importantly, these are the **ONLY** two structures that you can see; your mind doesn't create any other logical possibilities. So if I tried to teach you through explicit instruction to see the drawing in Exercise [1] in other ways (as in Side Note 3), I would do so in vain.

The structures you see in the Necker Cube are thus a product of your mental processes. Our little study of the object in Exercise [1], then, is not about the object itself; rather, it's about your mind.

1.1.2 how is sentence structure like the Necker Cube?

When we study **sentence structure**, we're studying the same kind of thing. Like the Necker Cube, sentence structure is not something that's actually out there in the world. Rather, sentences are structured by your mind. Let me make this analogy more concrete by asking you to consider the string of words in Example (2) (just like I asked you to consider the Necker Cube in Exercise [1]):

(2) Sue poked the dog with the stick.

I'm absolutely certain that you understand this string of words. I'm also reasonably certain that, if you think about the string in (2) for long enough, you'll "see" two possible meanings (just as you saw two possible structures with the Necker Cube). Let me give you a moment to think about (2), and what you think it means.

Side Note 4: (a hint)

If you think you already see two meanings, you don't have to consider my hint here.

However, if you're having a little trouble getting at the two possible meanings, I'll help you along a little bit: *who do you think has the stick in sentence (2)?*

Ok, so now that you've thought about (2), I'm going to assume that you see the two different meanings that I do, which are as follows: In one meaning, *Sue poked the dog, which happened to have the stick*. In this meaning, I don't know what Sue used to poke the dog with (her finger maybe?), but it doesn't matter; the important thing is, I'm certain that the dog has the stick. In the second meaning, *Sue used the stick to poke the dog*.

You should take a moment to make sure you agree with my characterization of the possible meanings of the sentence in (2).

There are a few questions which arise now, but let's shoot to the most important one: how are you getting these two different meanings? That is, why do you interpret the sentence in these two different ways? It has to do with how you're grouping the string of words *with the stick* with the rest of the words in (2) (*Sue poked the dog*). It turns out that there are two strategies at your disposal, and you use these strategies instinctively, probably without you realizing it. In one strategy, you structure the words *with a stick* together with the words *the dog*. Let's use [square brackets] to represent this grouping, in (2a):

(2a) Sue poked [**the dog with the stick**].



When you mentally group *with a stick* and *the dog*, as in (2a), you're essentially thinking that the words [the dog with the stick] form a kind of meaningful unit, to be analyzed all together. That is, [the dog with the stick] refers to a particular dog, as opposed to some other dog (maybe one without a stick or one with a bone).

Term Box 3

In this case, we would say that the string *with the stick* **modifies** *the dog*. That is, *with the stick* is a **modifier**. Related words: *modification*.

Term Box 4

A string of words that you put together to form a meaningful unit is what we call a **constituent**. So, [the dog with the stick] in (2a) is a constituent. There are other constituents in this sentence (in fact, the whole sentence itself is also a constituent, making [the dog with the stick] a smaller constituent within a bigger constituent). We'll talk more about constituents throughout the rest of the book. Related words: *subconstituent*.

So this is one strategy you use for structuring the words in the sentence in (2). There is, however, another strategy at your disposal. In this second strategy, you do NOT group the string of words *with the stick* with the words *the dog*. This second structural strategy is represented in (2b), where [the dog] is grouped separately from the three words *with the stick*:

(2b) Sue poked [**the dog**] with the stick.

When you mentally group *the dog* without the words *with a stick*, you're thinking that the words [the dog] form a kind of meaningful unit all by itself, at the exclusion of *with the stick*. In this case, then, *the dog with the stick* doesn't form a **constituent** (see Term Box 4). In terms of meaning, *the dog* doesn't have the stick, and in fact, we don't know what he has, if anything. So *with the stick* doesn't **modify** the constituent [*the dog*] (see Term Box 3).

In this particular strategy, you are instead mentally grouping the words *with the stick* with something else. If you think about it, you're actually grouping these words with the word *poked*; it's as if the constituent [the dog] were invisible, or somehow out of the way, as schematized in (2c). Here, the string *with the stick* modifies *poked* directly, so that we interpret "the poking" as having been done with the stick:



(2c) Sue [**poked with the stick**].

Of course, [the dog] isn't literally invisible, and it isn't literally floating there in a cloud, on top of the sentence. In the single sentence in (2), these two words come right after the word *poked*, and right before the word *with*, both when these words are on the page, and when these words are coming out of your mouth. The schematization in (2c) is just meant to give you a rough picture of how you interpret the words *with the stick* as somehow being grouped with the word *poked*, despite the fact that they're separated from each other by other words (see Side Note 2)!

So to sum up, when you hear or read the string of words in (2), you interpret these words in one of two ways. This is a direct result of the fact that you can mentally assign the string in (2) one of two different possible structures, just as you assigned two possible structures to the Necker Cube in Exercise [1]. The sentence is thus structurally ambiguous (see Term Box 2). I'll repeat the two structures that you assign to (2) here:

(3) Sue poked the dog with the stick.

Structure 1: Sue poked [**the dog with the stick**].

Meaning: *Sue poked the dog which had the stick.*

Structure 2: Sue poked [**the dog**] with the stick.

Meaning: *Sue used the stick to poke the dog.*

In Chapter 3, I'll prove that this description of your instincts is correct, and that you indeed automatically assign two different structures to the string of words in (2).

Side Note 5:

Like sentences, a single word can have more than one meaning. Consider, for example, the word *bat*. This word can mean either "the stick used for baseball," or "the flying mammal." We can therefore say that the word *bat* is also ambiguous. Crucially, however, it isn't *structurally* ambiguous, like the sentence in (2)/(3): the two meanings of *bat* don't derive from two different structures.



EXERCISE [2]

The following sentences are like (2) in that they are structurally ambiguous. Just as I did in (3), provide the two different structures for each sentence, and for each distinct structure you provide, state which meaning it corresponds to. Note that the meaning you give must be an unambiguous paraphrase of the structure you provided (much as the meanings I gave in (3) were).

- {1} Mary saw the man with the telescope.
- {2} Steve shot the man with the gun.
- {3} Sue attacked the piñata with the ax.
- {4} Bill opened the door with the key.
- {5} Lisa fixed the refrigerator in the kitchen.
- {6} Bob ate the ice cream from the freezer.
- {7} Jane painted the tile on the roof.

1.1.3 in sum: what does *sentence structure* mean?

This brings us to the main point, which is to clarify what linguists mean by sentence structure. If we just look at the words in example (1a), or in example (2), or if we look at any of the strings of words on these pages, we see that in the world, these are just strings of ink marks. But when you — as an English-speaking human — read these ink marks (or likewise, when you hear them spoken as words), you assign structure to them. Furthermore, that unconscious mechanism you have which adds structure to strings of words is one and the same mechanism which allows you to take words you know and create your own sentences — structures which can be written, or spoken, or just thought. Thus, like the structures in the Necker Cube in Exercise [1], sentence structure is a product of the human mind.

Let's think of this “mental mechanism” as a set of **rules**. And just as no one ever explicitly taught you how to see the two cubes in Exercise [1], no one ever explicitly taught you these sentence-structuring rules; you just naturally developed them as a child, in the process of language acquisition (as it's called in linguistics). These rules are what is often meant by **syntax**, or **grammar**. For our purposes, then, let's think of “syntax” as those rules that the human mind uses to create sentences out of words. As a human, you can use these rules both to create sentences on your own and also to assign structure to strings of words that you read, or that you hear someone else say. This book is thus about how we, as human beings, structure sentences.

So, as we analyze sentences in this book, we're really studying how you, as a human being, instinctively structure sentences. Of course, this book is in English, we'll be discussing how English speakers structure sentences using English words, and I'll be tapping into your knowledge as an English speaker to bring these tacit rules to your consciousness. But keep in mind that this

structure is a product of the human mind, so what we're doing in this book could be done with any language.

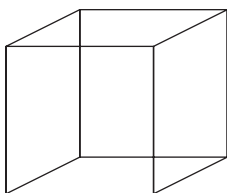
Side Note 6:

In the remainder of the book, I may say things like "... the structure of this sentence is ..." or "... in that sentence, the noun is modified by an adjective ..." and so forth. In other words, I might talk about words and sentences as if they have a life of their own, independent of our minds. But please don't be fooled by this; we'll always be working with the underlying assumption that the structure we're talking about is mentally created. Sometimes it's just easier to talk about words and sentences as if they were objects out there in the world (even though we know they're not). In a similar way, it's easier to talk as if the drawings in Example (4) are cubes, even though we know they're not cubes; in the world, they're just line-drawings. It's just that sometimes for the purposes of discussion it's more efficient to pretend that the object under investigation is outside of the human mind.

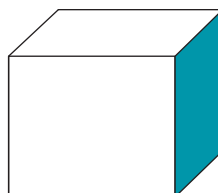
1.1.4 an important clarification: not all objects give rise to ambiguity

Before we continue, I need to clarify something right now. Both the Necker Cube in Exercise [1] and the subsequent linguistic analogy drawn with Example (2)/(3) were meant to illustrate the fact that you, as a human being, mentally assign structure to objects in the world. In both cases, I used objects which happened to be structurally ambiguous to make my point. (More accurately: I used objects which have properties that allow us humans to assign more than one structure to them.) I did this because it's simply easier for students who are new to this kind of discussion to see how the mind assigns structure to an object if that object can give rise to two possible structures. However, it's very important to note that not every object (spatial or linguistic) is structurally ambiguous. For example, compare the structurally ambiguous line-drawing in (4a) (our Necker Cube) with the **unambiguous** line-drawing in (4b):

(4a) The Necker Cube:



(4b) An unambiguous cube:



As we already saw, if you stare at (4a), you'll see two structures. In contrast, no matter how long you stare at the cube in (4b), you'll only ever see one structure, namely, a cube which points downward towards the left. The structure in (4b) is thus unambiguous. That doesn't mean, however, that you're not mentally assigning a structure to the line-drawing in (4b). Just as with the Necker Cube, the picture in (4b) is nothing more than a two-dimensional line-drawing on the page (with some shading on the rightmost piece of the drawing). Nevertheless, your mind does assign a structure to it — namely, that of a single, three-dimensional cube.

The point of this example is to clarify that not all objects give rise to our mental construction of multiple structures. That is, not all objects are structurally ambiguous; some objects cause us to assign only a single structure to them. And if we once again draw an analogy with sentences, we can see that in contrast with (3), not all sentences are structurally ambiguous. Some sentences, like the one in (5), only have one possible structure — and therefore, only one possible meaning. I've repeated our example (3) here, so that you can easily compare (5) with it:

- (3) Sue poked the dog with the stick.

Structure 1: Sue poked [**the dog with the stick**].

Meaning: *Sue poked the dog which had the stick.*

Structure 2: Sue poked [**the dog** with the stick].

Meaning: *Sue used the stick to poke the dog.*

- (5) Sue knows the dog with the stick.

Structure 1: Sue knows [**the dog with the stick**].

Meaning: *Sue knows the dog which had the stick.*

In contrast with the string of words in (3), the string of words in (5) doesn't have more than one meaning. This is because your mind will only assign one structure to this string of words.

Side Note 7:

A structure like *Structure 2* in (3) is simply not possible with the string of words in (5):

*Sue knows [the dog] with the stick.

Meaning: *Sue uses the stick to know the dog.*

(We'll use the asterisk * to mark structures which are not possible)

Your mental mechanism for structuring sentences automatically doesn't allow you to use *with the stick* to modify *know*.

So, not all sentences are structurally ambiguous. For some strings of words, you can mentally assign only one structure (like (5), which is like the unambiguous cube in (4b)); in contrast, others can be assigned more than one possible structure. The common denominator is that SENTENCES HAVE STRUCTURE. And as I stated in Side Note 6, this statement must be taken as shorthand for “the human mind unconsciously uses rules to assign structure to words, to create sentences.”

1.2 let's start understanding what those unconscious rules that create structure are

Now that we've established the fact that sentence structure comes from your mind, let's spend the remainder of this book using the best methods we know of to discover how you structure sentences. We've already done a bit of this in the first half of this chapter, but it'll be useful to get more "graphic" — literally! So let's talk about **phrase structure rules**. Phrase structure rules are the rules you unconsciously use to form (or, "structure") **phrases** out of words, and to structure sentences out of phrases. Remember that phrases are strings of words which form a coherent meaningful unit; in other words, a phrase is a kind of constituent (Term Box 4). As we'll see later, the structures created from phrase structure rules can be represented in a kind of graph form, which we call **phrase structure trees** (or, **syntactic trees**). Drawing trees of sentences is a handy way to graphically see the ways in which humans assign structure to strings of words.

I'd like us to start by learning about the most basic phrase structure rule, namely, the one which forms a whole sentence. To do this, let's first consider the examples in (6) through (12). Please read each and every one of these examples carefully.

- (6) The professor ate the sandwich.
- (7) The professor of linguistics ate the sandwich.
- (8) The professor of linguistics with brown hair ate the sandwich.
- (9) The professor of linguistics with brown hair that Sue had an appointment with yesterday ate the sandwich.
- (10) My professor with the big window in her office ate the sandwich.
- (11) Maria ate the sandwich.
- (12) She ate the sandwich.

Let's assume that in the sentence in (12), *she* refers to the same consistent sandwich-eater who's mentioned in sentences (6) through (11). Now let's do Exercise [3].

EXERCISE [3]

For each sentence in (6) through (11), write down the entire string of words that represents the person which *she* in (12) refers to.

Example:

In sentence (6), she refers to the professor.

In sentence (10), she refers to my professor with the big window in her office.

Please do this exercise before you read on.

If you did this exercise, then you likely came up with the following answers:

In sentence X, she refers to...

- (7') The professor of linguistics
- (8') The professor of linguistics with brown hair
- (9') The professor of linguistics with brown hair that Sue had an appointment with yesterday
- (11') Maria.

In contrast, here are some strings of words which I'm reasonably sure you did not come up with, as representing the person which *she* refers to:

- (6") professor ate
- (7") professor of
- (8") brown hair
- (9") Sue
- (9'") Sue had an appointment with
etc.

So let's summarize the main accomplishment of Exercise [3]: in each sentence in (6) through (11), you used your instincts to identify a coherent string of words — a phrase — which the word *she* in (12) “stands in for.” And you identified this phrase at the exclusion of the words *ate the sandwich*. This is important, as you've noticed a crucial aspect of sentence structure: that a sentence has a “first part” which excludes a “second part.” As we'll see in the chapters that follow, identifying these two major parts is a handy first step that we can always rely on as a kind of methodology to help us get at the ever more finely detailed aspects of sentence structure.

Side Note 8: (Another major accomplishment)

Exercise [3] illustrated something else important, namely, that a phrase can consist of one word (like *Maria* in (11)), or fourteen words (like *The professor of linguistics with brown hair that Sue had an appointment with yesterday* in (9)), or anything in between.

Side Note 9: Understanding what humans do vs. learning the tools of analysis

This book has a dual purpose. First, it's meant to show how the human mind structures sentences. At the same time, though, you'll be learning how to use particular tools of analysis, which will help you graphically represent this aspect of human cognition. Sometimes these might seem like two independent things; so, at times it might seem like I'm just instructing you on a method of analysis — a “how-to” on tree-drawing. Whenever we're focused on the “how-to,” however, we should not forget that the ultimate point is to capture what it is that humans do unconsciously. You can therefore think of the “how-to” as a way of bringing this unconscious knowledge into your consciousness.

Before I say more about the “second part” of the sentences in (6) through (12) (*ate the sandwich*), let's take stock of the facts we just noted. Basically, our observations lead us to conclude that the most basic phrase structure rule — the one which forms the sentence — states that:

(13) “A sentence is formed out of two major parts.”

Now let's give names to our “two major parts” of the sentence. In traditional grammar books, the “first part” we identified in Exercise [3] has been referred to as the **subject** of the sentence. In the field of linguistics, however, where we study sentence structure from a slightly different perspective, this “first part” is often referred to as the **subject noun phrase**. I'll say more about the term **noun phrase** (or **NP**) in a moment, but let's just quickly say something about the “second part” too. As we saw in (6) through (12), the “second part” of the sentence — *ate her sandwich* — is not part of the subject noun phrase. It's a separate phrase, which in traditional grammar has been referred to as the **predicate** of the sentence. In linguistics, however, it's often referred to as the **verb phrase** (or, **VP**). Thus, the phrase structure rule which forms the sentence can be restated as follows:

(14) “A sentence is formed out of a subject noun phrase and a verb phrase.”

Term Box 5

We'll talk more about the terms **noun phrase** and **verb phrase** (and **noun** and **verb**) in Chapters 2 and 3. Please be assured that I don't expect you, at this moment, to necessarily know what nouns and verbs are.

To make sure you understand where the major divide is between the subject NP (= the first part of the sentence) and the VP (= the second part of the sentence), please do Exercise [4].

EXERCISE [4]

For each sentence in this exercise, write down on a separate piece of paper what the subject NP is and what the VP is.

Example: *In sentence {4}, her big sister is the subject NP, and sang the song at three o'clock is the VP.*

- {1} Maria sang.
- {2} The woman sang.
- {3} Her sister sang a song.
- {4} Her big sister sang the song at three o'clock.
- {5} The older sister who lives in New York City sang the song at three o'clock in the cafeteria.

Now that you've done Exercise [4], let's start drawing phrase structure trees out of our phrase structure rule in (14).

First, though, let's further shorten the statement in (14) by using symbols instead of words. Let's use the symbol "S" to mean "sentence," the symbol NP to mean "noun phrase," and the symbol "VP" to mean "verb phrase," as in (15):

- (15) S = "sentence"
 NP = "noun phrase"
 VP = "verb phrase"

Let's also adopt an "arrow" symbol (\rightarrow), to mean something like "is made up of," or, "is broken down into." In this way, we can transform the statement in (14) into the one in (16):

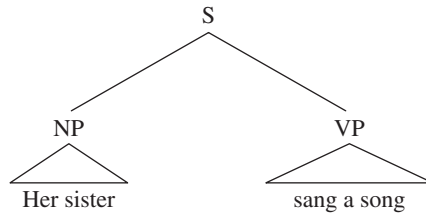
- (16) S \rightarrow NP VP

I'd like you to get used to reading statements like that in (16). The phrase structure rule in (16) is simple: it means what (14) says.

To draw our phrase structure tree, we also need to understand how the phrase structure rule in (16) acts as an instruction for drawing a tree. As I said earlier, a phrase structure tree is a kind of graph, a line-drawing that we can use to graphically represent sentence structure. The rule in (16) translates

into the phrase structure tree in (17); to make this more concrete, I'll fill in the words from sentence {3} in Exercise [4]:

(17)



Side Note 10: (A temporary practice)

Notice that in (17), I put triangles above the NP *her sister*, and the VP *sang a song*. I did this as a temporary stop-gap measure, since we haven't yet talked about the internal structure of the NP and of the VP — or as a related matter, *why* these constituents are even called noun phrase and verb phrase in the first place. We'll address these issues in Chapters 2 and 3, where the triangles will be replaced by more articulated tree structures themselves, which will be given to us by the NP and VP phrase structure rules.

The rule in (16) tells us that “S” is made up of two parts, “NP” and “VP,” and furthermore, that these two subparts are **subconstituents** of S (see Term Box 4). The tree in (17) captures this in graphic form.

To make sure you understand how to draw this basic phrase structure tree for a sentence, please do Exercise [5].

EXERCISE [5]

For each of the sentences in Exercise [4] (where you've already established the NP and VP of each sentence), draw a phrase structure tree like the one you see in (17).

In this same vein, draw phrase structure trees for the sentences in (6) through (12).

EXERCISE [6]

Just as you did in Exercise [5], draw phrase structure trees (like the one in (17)) for the sentences from Exercise [2]. You'll notice in doing this exercise that you'll come up with only one tree for each sentence. This will be despite the fact that each of these sentences is structurally

ambiguous — and therefore, should have more than one structure, as we saw. In Chapter 3, where we'll learn how to break down the internal structure of the verb phrase (VP), we'll learn how to draw the two different structures for each of these structurally ambiguous sentences.

1.3 some conclusions, and what to look forward to in the coming chapters

If you worked your way through each exercise in this chapter as you read along, you should now understand two basic ideas. First, it should be clear that when we say “sentences have structure,” we mean that you — as a member of our species — have an instinct to structure strings of words into sentences, regardless of the language (or languages) you know. This instinct is there from birth, and it's what's responsible for you learning a language in the first place. Our test investigation of structurally ambiguous sentences showed that you already know how sentences are structured; so now it's just a question of bringing this knowledge you have into your consciousness. That's what this book is for.

Second, you should have gained a very basic understanding of the tools we'll be using in order to bring that knowledge into your consciousness: phrase structure rules and trees. We started using the most basic of phrase structure rules — the one which captures the fact that a sentence consists of two major constituents (the “S” phrase structure rule). In every chapter, we'll be building on this knowledge, developing more and more sophisticated phrase structure rules, which will allow us to see sentence structure in a more and more articulated way. The simple tree in (17) showed us that the words in sentences don't form a flat, linear string; rather, they're **hierarchically organized**, and grouped into meaningful units (constituents or phrases). In fact, even without drawing the internal structure of the verb phrase (VP) in Exercise [6], in Exercise [2] you were already tapping into the different ways that the words in the VP can be hierarchically organized, and how hierarchical organization is more important than linear order. As you saw with the sentence in (3), the single string of words in a structurally ambiguous sentence in fact has only one linear order. But the two different meanings of this single linear order tell us that there's something else hidden behind it. And that hidden thing is hierarchical structure. In sentence (3) (as with all the sentences in Exercise [2]), we saw that *with the stick* can either be associated with *the dog*, or with *poked*. This is regardless of the fact that in linear terms, *with the stick* always follows the word *dog* in (3). This showed us that groups of words which are far apart from one another in linear terms might actually be close together structurally. This will become much clearer in Chapters 2 and 3, when we look more carefully at the internal structure of the noun phrase (NP) and the verb phrase (VP).

We have yet to see the great potential for complexity in the hierarchical organization of sentences that our phrase structure rules give rise to; the plan

in this book is to build towards this complexity one step at a time. It won't serve us to try and learn everything at once, but I guarantee you that you'll become a junior **syntactician** by the end of this book, as long as you take each chapter methodically in turn. If you're interested in learning about the origins of the concept of phrase structure rules, you can take a look at Chomsky (1957), though you might want to wait until you're about half-way through this book before you do so.

In meeting the objectives of Chapter 1, you've also learned quite a few new terms. Many of these terms represent sophisticated concepts, so don't be frustrated if at this point in the game you don't feel as if you've fully absorbed the meanings of all of them — though I do encourage you to go back and reconsider the term boxes and the other terms in bold scattered throughout the chapter, as a way to put yourself on firmer ground with these new concepts. The most important thing for now is that you've been familiarized with terms and concepts that are going to reappear again and again in the chapters to come. By the time you get to the end of the book, it'll be like second nature to you!

list of terms/concepts

ambiguous (ambiguity, unambiguous)	phrase structure (phrase structure rules, phrase structure trees)
cognitive instincts	predicate
constituent (subconstituent)	rules
grammar	sentence (S)
hierarchy (hierarchical structure, hierarchical organization)	sentence structure
linear distance	structural ambiguity
modify (modifier; modification)	structure
Necker Cube	subconstituents
noun	subject
noun phrase (NP)	subject noun phrase
parse	syntax (syntactic trees, syntactician)
phrases	verb
	verb phrase (VP)

reference

Chomsky, Noam (1957). *Syntactic Structures*. Walter de Gruyter.