

# Ling 201 – Syntax 2

Jirka Hana – April 21, 2003

## Overview

- Phrase Structure & Phrase Structure Rules
- Phrase structure diagrams
- Ambiguity
- Characteristics of Phrase Structure Rules

## 1 Phrases & Phrase Structure Rules

### 1.1 Describing Noun Phrases

In English, a noun phrase a determiner followed by a noun, or determiner followed by an adjective followed by a noun, or a single noun, or ...

To save words, we can use the so called Phrase Structure Rules capture this:

- (1)
- a.  $NP \rightarrow Det\ N$      *the cat*
  - b.  $NP \rightarrow Det\ A\ N$    *those noisy cats*
  - c.  $NP \rightarrow N$             *cats*
  - d.  $NP \rightarrow A\ N$          *noisy cats*

We can mark optional subphrases with parentheses and save even more words:

- (2)  $NP \rightarrow (Det)\ (A)\ N$    *cats, noisy cats, the cat, those noisy cats*

A phrase structure rule tell us two things:

- Which smaller phrases (Det, A, N) use to build a bigger phrase (NP).
- How to order the smaller phrases – the rule (2) allows *noisy cats*, but not *cats noisy*

- (3)
- $$\begin{array}{c} \overbrace{\hspace{10em}}^{NP} \\ \underbrace{those}_{Det} \quad \underbrace{noisy}_{A} \quad \underbrace{cats}_{N} \end{array}$$

In addition, a pronoun can be a noun phrase:

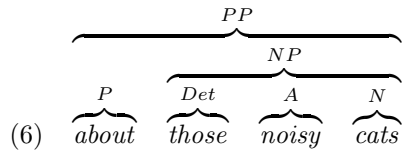
- (4)  $NP \rightarrow Pron$      *she, you, ...*

### 1.2 Describing Prepositional phrases

In English, preposition is usually followed by a noun phrase (let's ignore the prepositions at the end of the sentence).

- (5)  $PP \rightarrow P NP$  *about those noisy cats*

Now we can put that together and say things like:



### 1.3 Describing Sentences

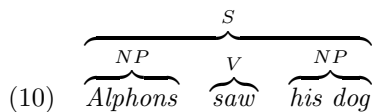
In English, a sentence consists of a subject (usually a noun phrase) followed by a verb which is sometimes followed by an object (another noun phrase), prepositional phrases etc.

- (7) a. *Alphons slept.* – Subject + V  
 b. *Alphons saw his dog.* – Subject + V + Object  
 c. *Alphons asked for a beer.*  
 d. *Alphons begged beer from his dog.*
- (8) a.  $S \rightarrow NP V$  – *Alphons slept*  
 b.  $S \rightarrow NP V NP$  – *Alphons saw his dog*  
 c.  $S \rightarrow NP V PP$  – *Alphons asked for a beer*  
 d.  $S \rightarrow NP V NP PP$  – *Alphons asked his dog for a beer*

We can abbreviate these rules as:<sup>1</sup>

- (9)  $S \rightarrow NP V (NP) (PP)$

This rule says: Sentence is a noun phrase followed by a verb and possibly some other noun phrase and/or prepositional phrase. For example:



<sup>1</sup>Of course, we ignored many other sentences like:

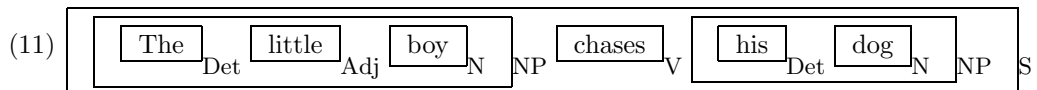
- (i) a.  $S \rightarrow NP V NP NP$  – *Alphons offered his dog some beer*  
 b.  $S \rightarrow NP V PP PP$  – *Alphons argued with his dog about beer*  
 c.  $S \rightarrow NP V NP InfP$  – *Alphons persuaded his dog to buy some beer*  
 d.  $S \rightarrow NP V NP that S$  – *Alphons persuaded his dog that it would be wise to bring beer*

Linguists often distinguish between sentences and verb phrases (VP). A verb phrase is a sentence without a subject (e.g. *saw his dog*). Then you have to describe sentence in two steps: First,  $S \rightarrow NP VP$  and then  $VP \rightarrow V (NP) (PP)$ .

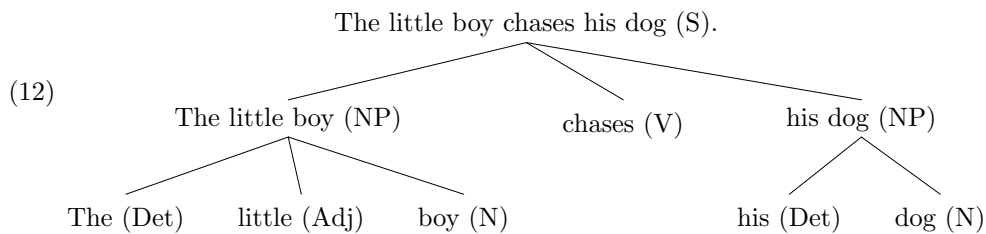
## 2 Phrase structure diagrams

- Phrases are created from other phrases or words.
- Sentence is the biggest phrase.

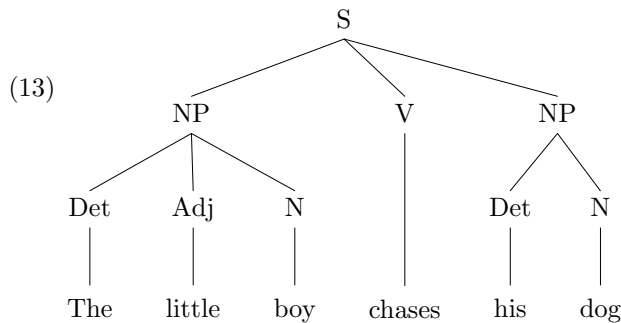
We can depict the fact that a sentence is built from smaller parts by a diagram:



Or:



Let's try something less wordy:



A tree diagram represents several aspects of “how words are put together” in a sentence:

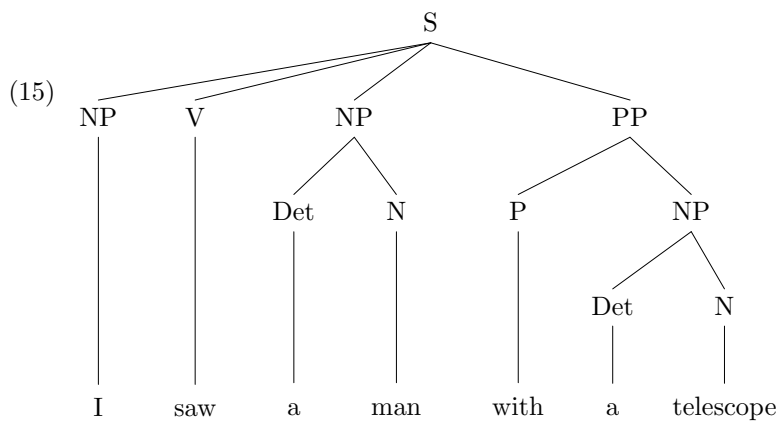
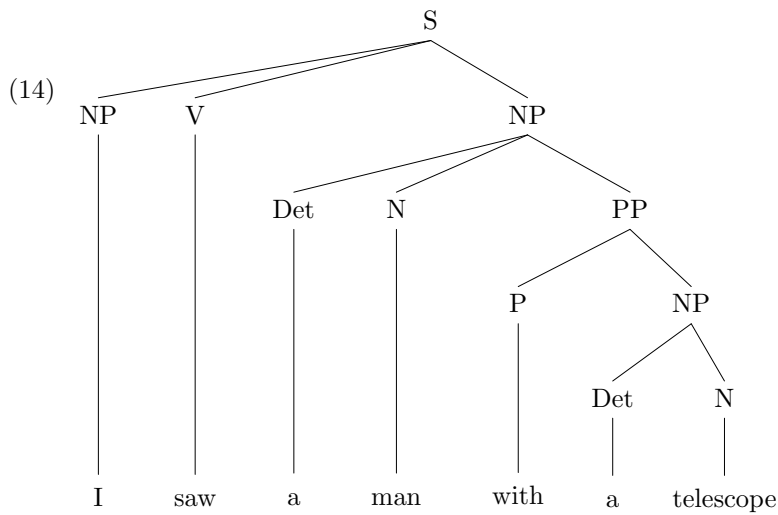
- the order of the words in a sentence.
- the word class (Part of Speech) of each word.
- the hierarchical structure of a sentence – the grouping of words into phrases, and the grouping of phrases into larger phrases.
- the centers of phrases that other words group around (e.g. N in NP, V in S)

### 3 Ambiguity

Ambiguity:

- syntactical – more than one possible structure for the same string of words.  
*I saw a man with a telescope.* (Who has the telescope, me or the man?)  
*We need more intelligent leaders.* (*need more* or *more intelligent*?)
- lexical (homonymy) – a word form has more than one meaning.  
*Did you see the bat?*  
*Where is the bank?*

All languages have expressions which have more than one possible interpretation.



Other example:

(16) Old men and women are exempt from the new tax.

Sometimes, world knowledge can help you to select the right interpretation:

- (17) a. I saw a policeman with a gun.  
b. I saw a dog with a telescope.

Syntactically, these examples are ambiguous, however your knowledge of the world helps you to choose the most probable interpretation.

## 4 Characteristics of Phrase Structure Rules

A simple grammar:

- (18) a.  $S \rightarrow NP V (NP) (PP)$   
b.  $NP \rightarrow (Det) (A) N (PP)$   
c.  $PP \rightarrow P NP$

This grammar describes a simple language (similar to English). It has several characteristics, which it shares with grammars of real languages:

- **Generativity:**

It does not *list* the sentences of the language, it describes the way how to *build* them. This is important, since languages contain infinite number of sentences.

- **Ambiguity:**

Some sentences can be build in more than one way (starting with the S rule and ending with the words in the sentence) These sentences have more than one syntactic structure – they are syntactically ambiguous (for example the *telescope* sentence). This also shows that sentences are more than just simple strings of words.

- **Infinite Recursion:**

It allows to produce an infinite number of sentences using a finite (very small) number of rules.

It is allowed by the so called **recursion**. Recursion can be thought of as a process of “looping back” or “feeding oneself”:

One example of recursion in English involves the pair of rules (18b) and (18c):

1. The rule (18b) allows a PP.
2. This PP is described by the rule (18c), which requires an NP.
3. This NP is again described by rule (18b), which again allows a PP.
4. This PP is described by the rule (18c), which requires an NP.
5. ...

It allows to generate many phrases including *The book on the shelf in the corner in the bedroom of my house in LA.*

