Phrase Structure Grammars and Ambiguity

Scott Martin

May 29, 2008

The sentence in example (1) is ambiguous:

(1)   I saw the man with the telescope.

In this case, ambiguity arises from the fact that there are (at least) two ways to interpret the sentence's meaning. The first is the reading in which the speaker has the telescope (call it **reading A**), while under the second reading the man the speaker sees has the telescope (**reading B**).

Phrase structure grammars can capture ambiguity by assigning more than one structure to a given string. Below are the phrase structure rules that would license the sentence in (1):

S → NP VP	
NP → Det N	Det → *the*
NP → NP PP	N → *man*
NP → Pro	N → *telescope*
VP → V NP PP	P → *with*
VP → V NP	Pro → *I*
PP → P NP	V → *saw*

Table 1: Phrase structure rules for the sentence in (1).

Note that the grammar in Table 1 contains **two** rules with the category VP on the left. This means that there are two structures that this grammar can categorize as being VP-type things. This is where the ambiguity will be captured.

To see this in action, consider the phrase structure trees in Figures 1 and 2. In Figure 1, the phrase structure rule V → V NP PP is used. In this case, the PP constituent is a top-level sub-constituent of the VP because it is describing how the V constituent *saw* happened (using a telescope).
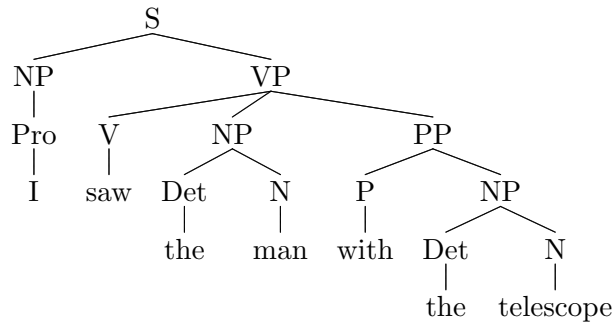
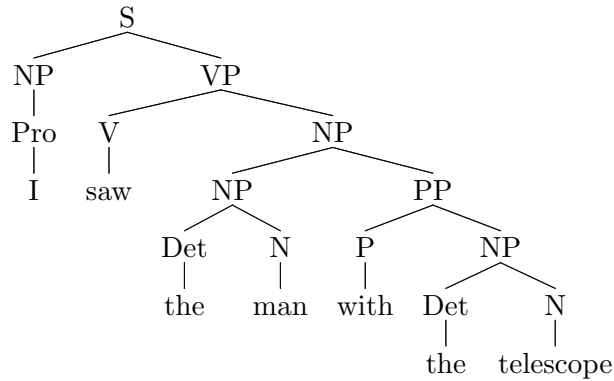Figure 1: Phrase structure tree for reading A of (1).

Figure 2: Phrase structure tree for reading B of (1).

However, the tree in Figure 2 uses the V → V NP rule, where the NP is the direct object to the verb. Here, the NP contains the PP, whose role is to describe something about the NP (that he has a telescope).

So the phrase structure rules here correctly describe the two ambiguous readings by assigning different structures for the VP. This ambiguity is an instance of a phenomenon known as "PP attachment ambiguity."