Some notes on Constituency Tests
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Here are some notes on tests for constituency. Remember that the best test that something is a constituent is substitution. Here are some common substitutions that work to test for DPs, NPs, VPs and PPs:

1 Tests for DPs and NPs

1.1 Tests for DP

If a phrase is a DP, it should be able to be substituted for a personal pronoun like he, she, him, her, it, they, etc. Here are some examples of places where the substitution works and where it doesn’t work. Consider sentence (1.1).

(1) The tall man with the hat was reading the book.

In this example, there are a number of strings that could possibly be DPs. Here are some possibilities:

(2) a. Is the book a DP
    b. Is the tall man with the hat a DP?
    c. Is the tall man a DP?

We can substitute the book with it, so this shows that the book is a DP. We can also substitute the tall man with the hat with he, so the tall man with the hat is a DP. The actual substitutions are shown in (3a/b). However, if we try to substitute the tall man with he, the test fails, as in (3c). This shows that the tall man IS NOT DP, in this sentence.

(3) a. The tall man with the hat read it.
    b. He read the book.
    c. *He with the hat read the book.

What do these tests tell us about drawing a tree for this phrase. Here is how we draw the tree, step by step.

The first thing we do is label all of the parts of speech of the words in the sentence:

\[
\begin{array}{cccccccc}
D & A & N & P & D & N & I & V & D & N \\
\text{the tall man with the hat is reading the book}
\end{array}
\]

Constituency Tests
the tall man with the hat is reading

We know that we can combine reading with the book to form a VP:

We also know that the Auxiliary verb (which we have categorized as Inflection (I)) combines with the VP to form an intermediate category I.

Now the question is what to do with the remaining words. We know that the whole phrase is a DP, because it can be replaced by he. However, to see the rest of the structure we need to be more careful. We know that the hat is a constituent, because it can be substituted with it. We also know that with goes with the hat, so we can build another phrase:
1.2 Tests for NP

Now the next part is not obvious, so we need to be very careful. It looks like we should be able to turn the tall man into a DP, since it forms a coherent semantic unit. However, remember example (3c) above. If the tall man is a DP in THIS PARTICULAR SENTENCE, then it should be able to be substituted for he in IN THIS PARTICULAR SENTENCE. But it can’t:

(4) *He with the hat is reading a book

However, we can do another substitution that shows that tall man is a constituent. Look at (5):

(5) The tall man with the hat is reading a book, but the one with the umbrella isn’t.

In this example, we have used the noun one to substitute for the phrase tall man. Since this substitution is possible, it shows us that tall man is a constituent EVEN THOUGH the tall man IS NOT. This allows us to add in the following to our partially completed tree:
We now are in a position to combine the last four pieces together. We know that *the tall man* is NOT a phrase, and that adjectives modify Nouns (or more properly Noun Phrases). So this means that *tall man* must combine with *with the hat* to form another NP, and then we add the determiner to create the DP. We know that this is a constituent, because it can be substituted by *he*, as in (3b).

Finally, we can combine the last two pieces together to form the completed IP:

2 Tests for VP

The substitution test for VPs involve the use of *do so* or just leaving out a VP in discourse. If we go back to example (1.1) above, we can easily show that *reading a book* is a VP. In (6b) I have marked the missing part with the symbol $\Delta$ in (6b). We interpret the missing part in (6) as meaning “reading a book”. The fact that we interpret it this way is evidence that *reading a book*...
is a constituent because it can be substituted by $\Delta$.

(6)  
   a. The man with the hat is reading a book and the woman is too.  
   b. The man with the hat is reading a book and the woman is $\Delta$ too.

Sometimes it is more usual to substitute VPs with *do so*, as in the following examples:

(7)  
   a. The man will play the guitar in the park, and the woman will do so on the sidewalk.  
   b. The man will drive to the store quickly and the woman will do so slowly.  
   c. The man will play the guitar in the park, and the woman will too.  
   d. The man will drive to the story quickly, and the woman will too.

In (7a) *do so* substitutes for *play the guitar*. In (7b) *do so* substitutes for *drive to the store*. These tests show that those groups of words form VP constituents. In (7c) the missing portion substitutes for *play the guitar in the park*, while in (7d) the missing portion substitutes for *drive to the store quickly*. These test show that the larger phrases are also VPs. This means that in a sentence like (8), there are two VP phrases. This is reflected in the tree in (9).

(8) The man will play the guitar in the park.

(9)  
   \[
   \text{IP} \quad \quad \text{IP} \\
   \quad \quad \text{DP} \quad \quad \text{IP} \\
   \quad \quad \quad \quad \text{DP} \quad \quad \text{I} \\
   \quad \quad \quad \quad \quad \text{D} \quad \text{NP} \quad \quad \quad \text{I} \\
   \quad \quad \quad \quad \quad \quad \text{the} \quad \text{N} \quad \quad \quad \quad \text{will} \\
   \quad \quad \quad \quad \quad \quad \quad \text{man} \quad \text{VP} \\
   \quad \quad \quad \quad \quad \quad \quad \quad \text{VP} \quad \quad \text{PP} \\
   \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{V} \quad \text{DP} \\
   \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{D} \quad \text{NP} \quad \quad \quad \quad \quad \text{P} \\
   \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{the} \quad \text{N} \quad \quad \quad \quad \quad \text{in} \\
   \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{guitar} \quad \text{DP} \\
   \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{the} \quad \text{NP} \\
   \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{N} \\
   \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{park}
   \]

Notice that this tree matches exactly the tests in (7). In (7a), the test showed that *play the guitar* is a VP, and in our tree, there is a VP that contains *play the guitar*. In (7c), the test shows that *play the guitar in the park* is a VP, and in our tree there is a VP that contains *play the guitar in the park*.
3 Tests for PP

Prepositional phrases can also be tested by substitution. Consider the following examples. In (10a/b) the PP *in the park* can be substituted for by *there*. In (10c/d) the PP *on Sunday* can be substituted for with *then*.

(10)  a. The man will play the guitar in the park.
     b. The man will play the guitar there
     .
     c. The man will play the guitar on Sunday.
     d. The man will play the guitar then