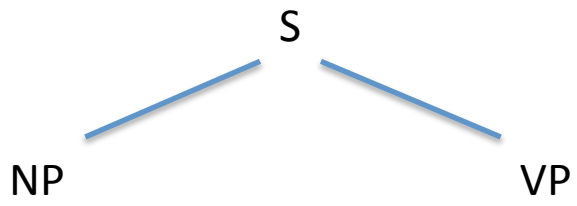
Example of how to draw a parse tree

Grammar:

S -> NP VP
VP -> V NP | V NP PP | V PP
NP -> Prop | Det N | Det N PP
PP -> P NP
V -> "saw" | "ate" | "walked"
Prop -> "John" | "Mary" | "Bob"
Det -> "a" | "an" | "the" | "my"
N -> "man" | "dog" | "cat" | . . .
P -> "in" | "on" | "by" | "with"

Sentence: Bob walked my dog

In the grammar, the only rule for a sentence S, Is S -> NP VP, so I start drawing the parse tree with that rule.

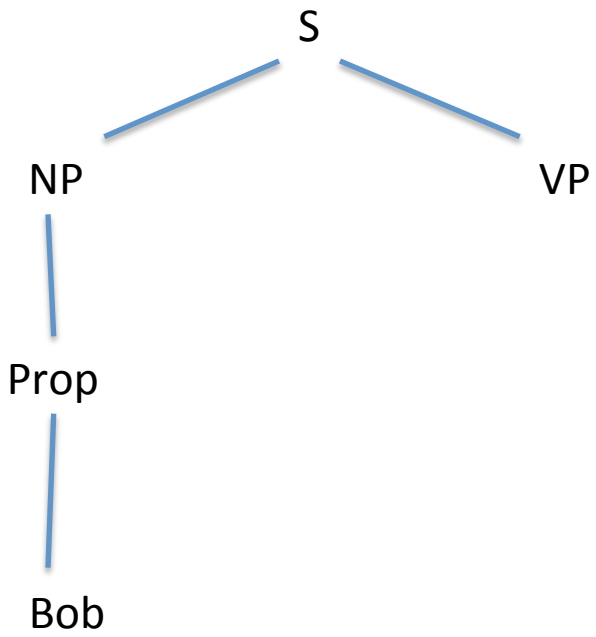


Grammar:

S -> NP VP
VP -> V NP | V NP PP | V PP
NP -> Prop | Det N | Det N PP
PP -> P NP
V -> "saw" | "ate" | "walked"
Prop -> "John" | "Mary" | "Bob"
Det -> "a" | "an" | "the" | "my"
N -> "man" | "dog" | "cat" | . . .
P -> "in" | "on" | "by" | "with"

Sentence: Bob walked my dog

Next I find the main verb of the sentence, and it is the verb “walked”. In this grammar, all verb phrases VP start with a verb, so I know that the VP will start with “walked” and derive the following words, and the NP must derive all the words before “walked”. I see that Bob can be derived by using the rules NP -> Prop (Proper noun) and Prop -> “Bob”.

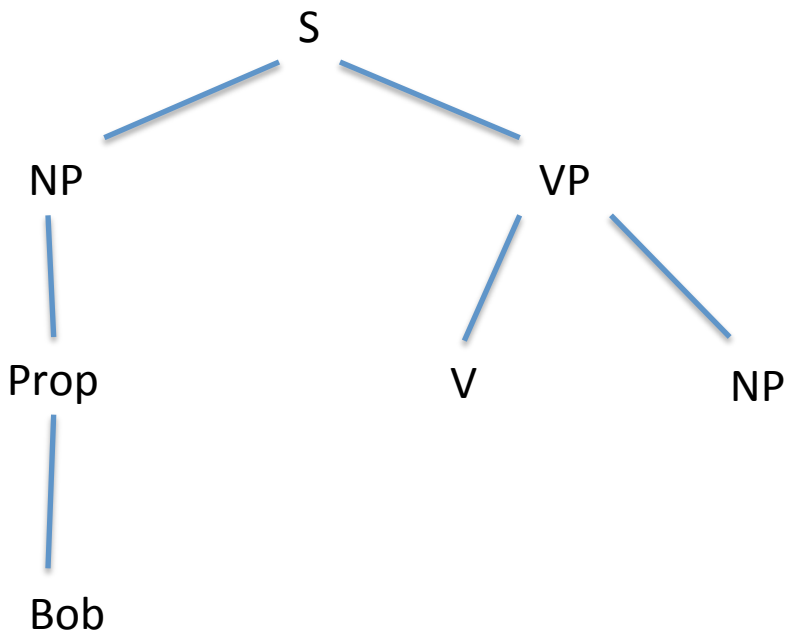


Grammar:

S -> NP VP
VP -> V NP | V NP PP | V PP
NP -> Prop | Det N | Det N PP
PP -> P NP
V -> "saw" | "ate" | "walked"
Prop -> "John" | "Mary" | "Bob"
Det -> "a" | "an" | "the" | "my"
N -> "man" | "dog" | "cat" | . . .
P -> "in" | "on" | "by" | "with"

Sentence: Bob walked my dog

Next I need to choose a verb phrase rule to derive "walked my dog". In this case, I choose VP ->V NP because I have a verb V, "walked", followed by a noun phrase NP, "my dog". I reject the VP rules VP -> V NP PP because my noun phrase is not followed by a prepositional phrase and VP -> V PP because the verb "walked" is not followed directly by a prepositional phrase.



Grammar:

S -> NP VP
VP -> V NP | V NP PP | V PP
NP -> Prop | Det N | Det N PP
PP -> P NP
V -> "saw" | "ate" | "walked"
Prop -> "John" | "Mary" | "Bob"
Det -> "a" | "an" | "the" | "my"
N -> "man" | "dog" | "cat" | . . .
P -> "in" | "on" | "by" | "with"

Sentence: Bob walked my dog

Now I choose a NP rule to derive the words “my dog” and I choose the rule NP -> Det N because I have a determiner Det of “my” and a noun N of “dog”. Finally, I draw in the rules for the words V -> “walked”, Det -> “my” and N -> “dog”.