

Example of how to draw a parse tree

Grammar:

$S \rightarrow NP VP$

$VP \rightarrow V NP \mid V NP PP \mid V PP$

$NP \rightarrow Prop \mid Det N \mid Det N PP$

$PP \rightarrow P NP$

$V \rightarrow \text{"saw"} \mid \text{"ate"} \mid \text{"walked"}$

$Prop \rightarrow \text{"John"} \mid \text{"Mary"} \mid \text{"Bob"}$

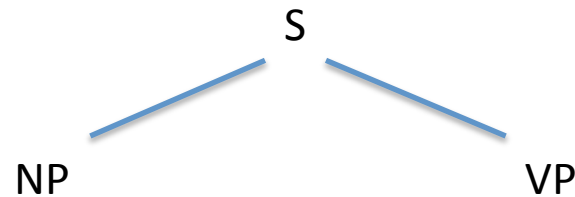
$Det \rightarrow \text{"a"} \mid \text{"an"} \mid \text{"the"} \mid \text{"my"}$

$N \rightarrow \text{"man"} \mid \text{"dog"} \mid \text{"cat"} \mid \dots$

$P \rightarrow \text{"in"} \mid \text{"on"} \mid \text{"by"} \mid \text{"with"}$

Sentence: Bob walked my dog

In the grammar, the only rule for a sentence S , is $S \rightarrow NP VP$, so I start drawing the parse tree with that rule.



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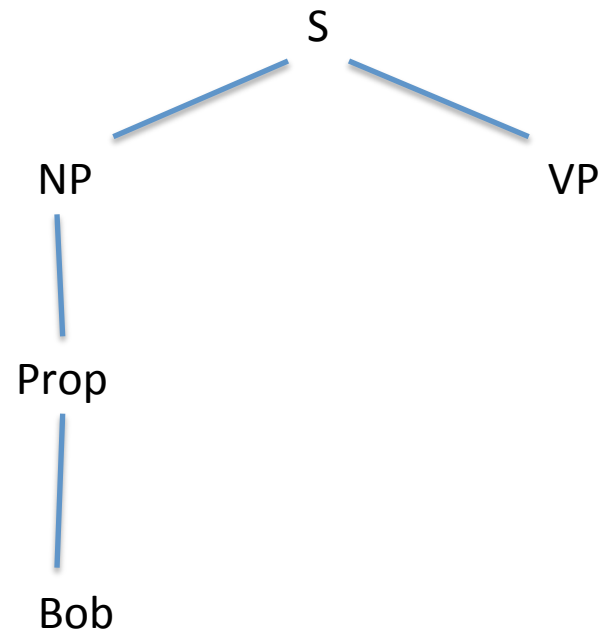
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Next I find the main verb of the sentence, and it is the verb "walked". In this grammar, all verb phrases VP start with a verb, so I know that the VP will start with "walked" and derive the following words, and the NP must derive all the words before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



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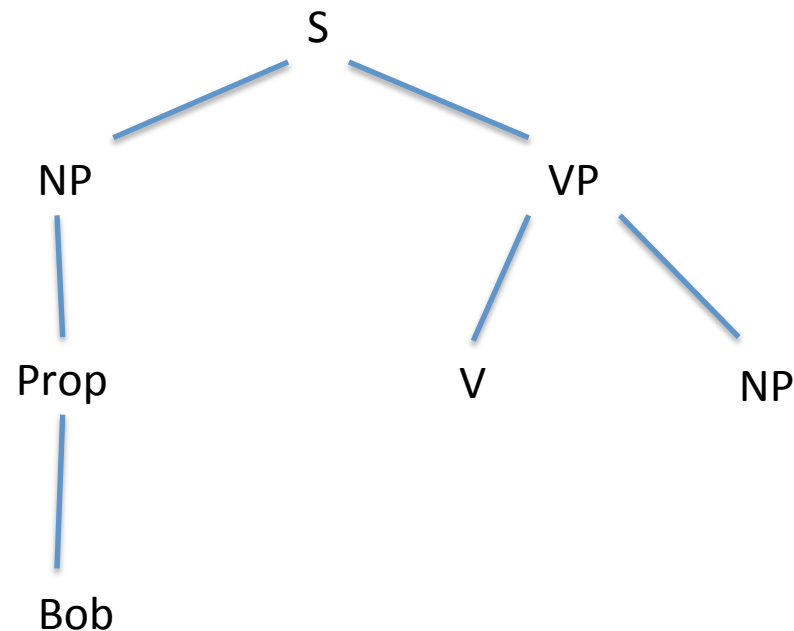
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Next I need to choose a verb phrase rule to derive "walked my dog". In this case, I choose $VP \rightarrow V NP$ because I have a verb V , "walked", followed by a noun phrase NP , "my dog". I reject the VP rules $VP \rightarrow V NP PP$ because my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



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Now I choose a NP rule to derive the words "my dog" and I choose the rule $NP \rightarrow Det N$ because I have a determiner Det of "my" and a noun N of "dog". Finally, I draw in the rules for the words $V \rightarrow \text{"walked"}$, $Det \rightarrow \text{"my"}$ and $N \rightarrow \text{"dog"}$.

