PCFGs

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### Probabilistic Context-Free Grammars applied to syntax disambiguation

Consider the sentence "Time flies fast." This might mean that the clock seems to move quickly, or it might mean that some kind of insects are not eating.

With the given probabilistic context-free grammar, find two legal parses, and compute a score for each one. Then identify the most probable parse using the scores. The grammar is given below. Consider the number at the right of a production to be the conditional probability of applying that production given that the symbol to be expanded is the symbol on the left-hand side of the production. Convert each probability into a score by taking score = $-\log_2(p)$

Score

Production	Probability	Score
S ::= NP VP	1.00	0
NP ::= JJ NN	0.25	2
NP ::= NN	0.25	2
VP ::= VBZ	0.50	1
VP ::= VBZ ADVP	0.25	2
NN ::= Time	0.50	1
JJ ::= Time	0.125	3
NNS ::= flies	0.25	2
NN ::= flies	0.25	2
VBZ ::= flies	0.50	
VBZ ::= fast	0.125	3
ADVP ::= fast	0.25	2

Write the scores next to the corresponding probability above.

Show parse number 1:
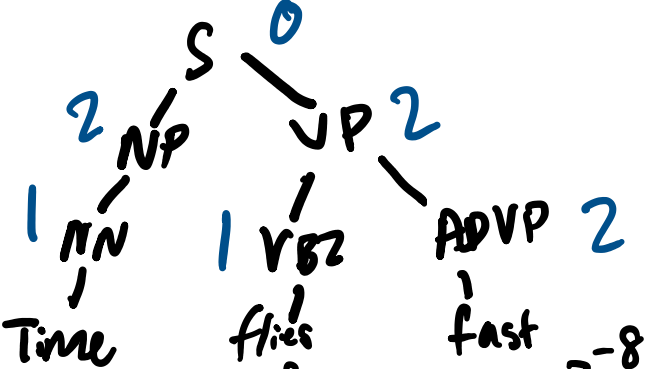
Show Parse number 2:

Parse 1 total score: __8__. Overall probability __2^{-8}__.

Parse 2 total score: __11__. Overall probability __2^{-4}__.

Which parse is more probable? **Parse 1**