61A Lecture 35

Wednesday, December 4

Announcements

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  - See http://inst.eecs.berkeley.edu/~cs61a/fa13/exams/final.html for the schedule.

Natural Language Processing

Ambiguity in Natural Language

Unlike programming languages, natural languages are ambiguous.

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Semantic ambiguity:

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Syntactic ambiguity:	TEACHER STRIKES IDLE KIDS	HOSPITALS ARE SUED BY 7 FOOT DOCTORS
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Tasks in Natural Language Processing

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Word Sense Disambiguation: Does the "bank of the Seine" have an ATM?

Named-Entity Recognition: What names are in "Did van Gogh paint the Bank of the Seine?"

Machine Translation

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Target language corpus gives examples of well-formed sentences

I will get to it later	See you later	He will do it

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Parallel corpus gives translation examples

I will do it gladly Yo lo haré de muy buen grado	You will see later Después lo veras

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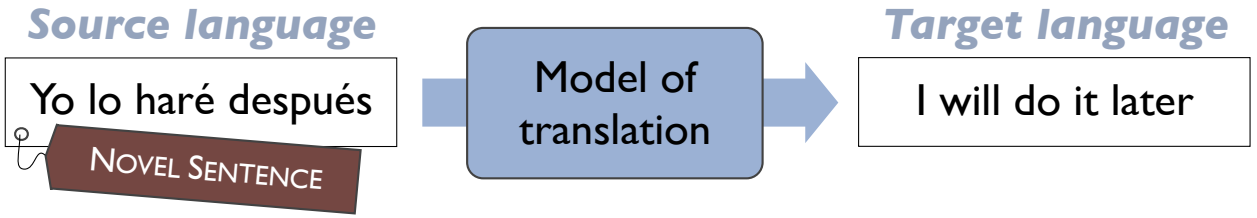
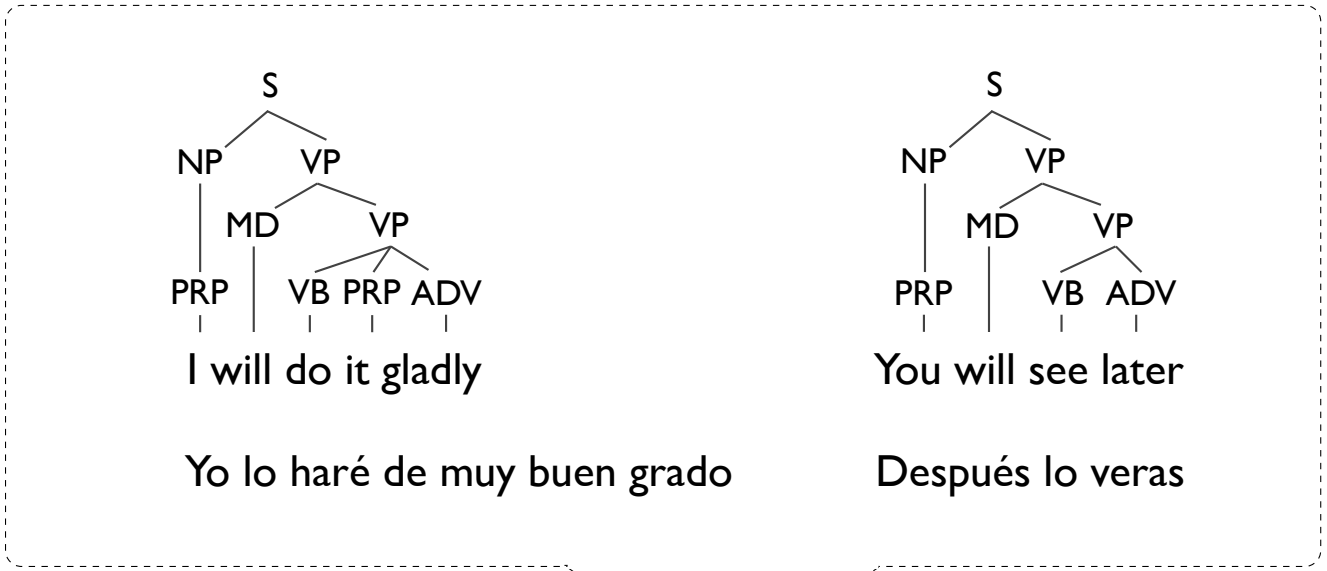
Machine translation system:



Syntactic Agreement in Translation



Machine translation system:

Yo lo haré después → Model of translation → I will do it later

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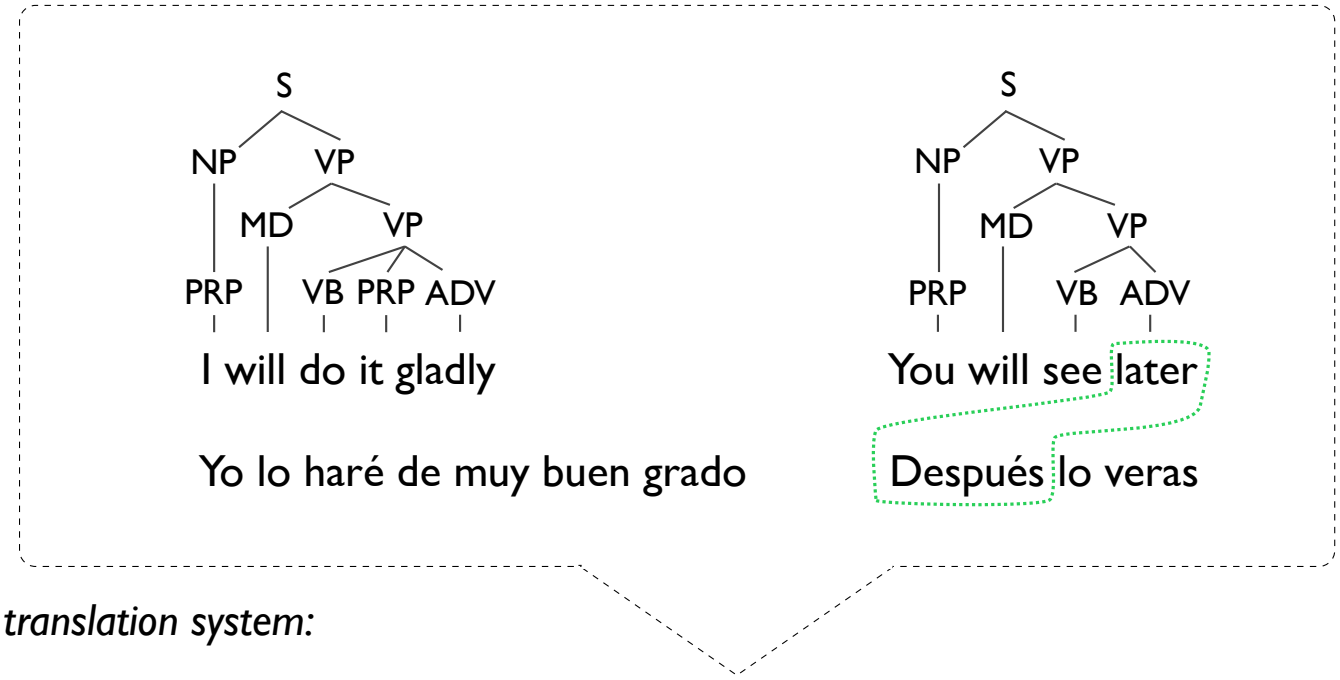

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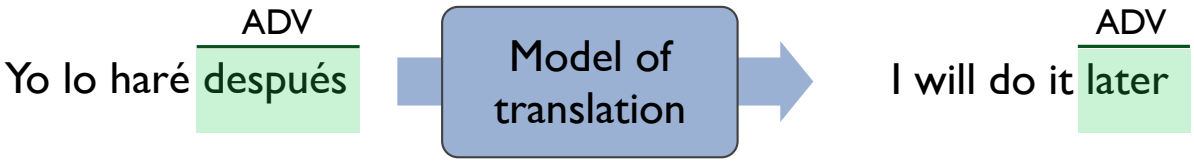

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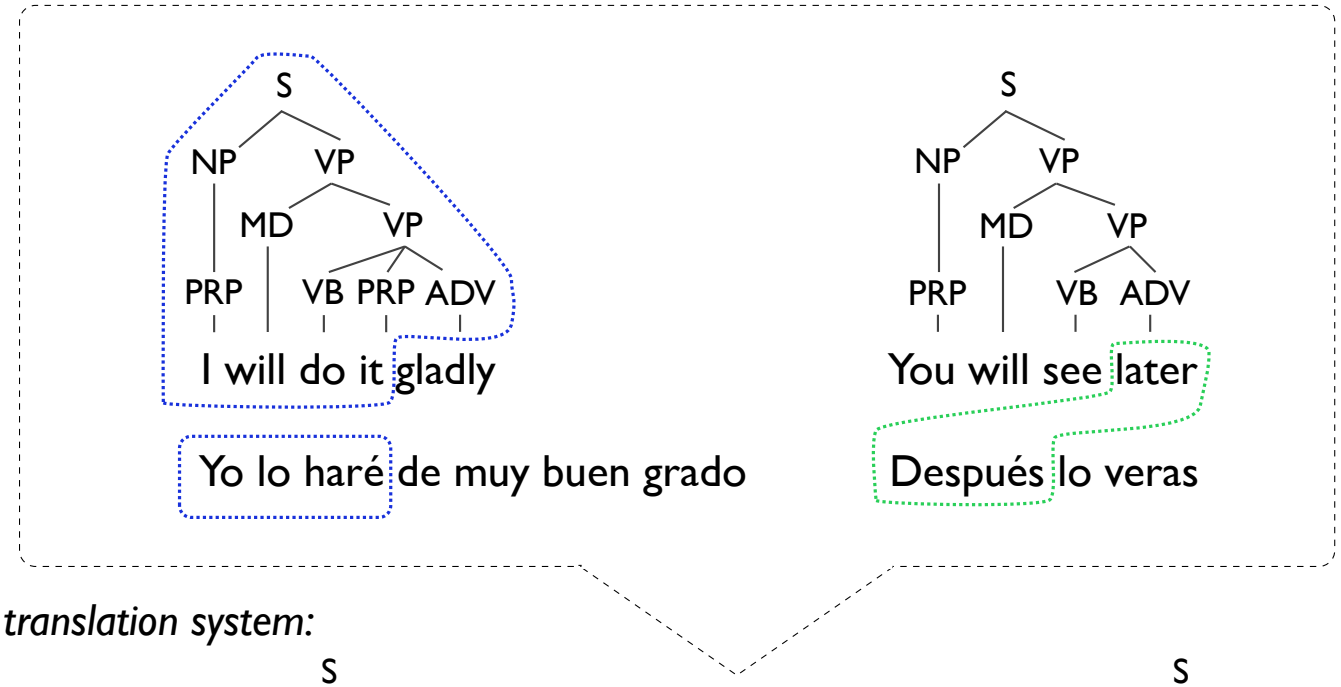

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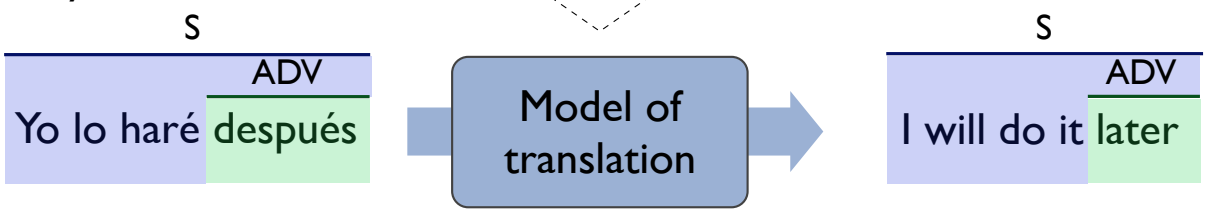

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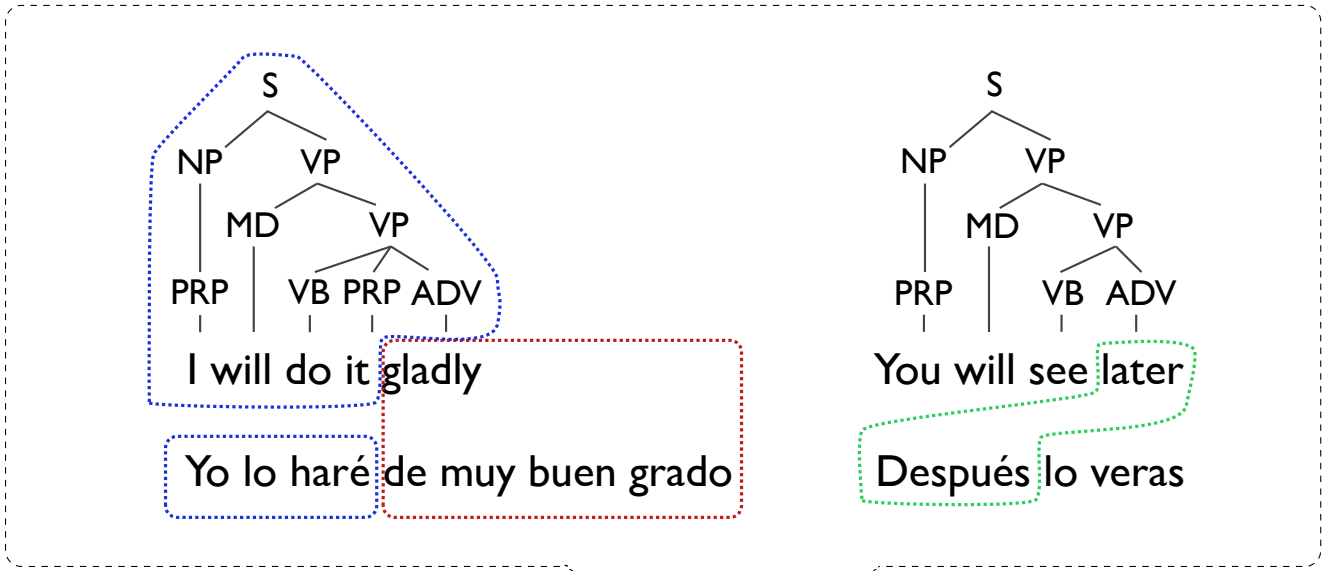

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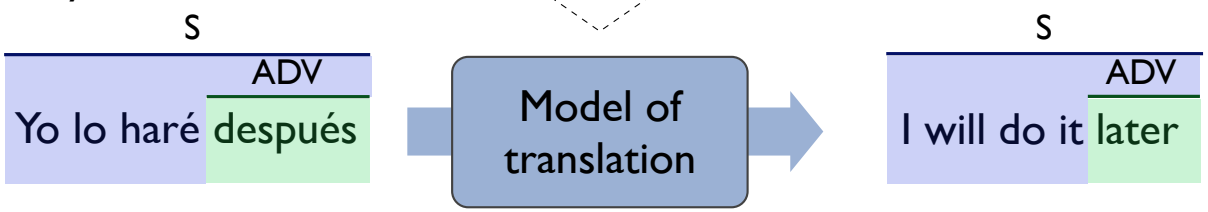

Syntactic Reordering in Translation

pair added to the lexicon

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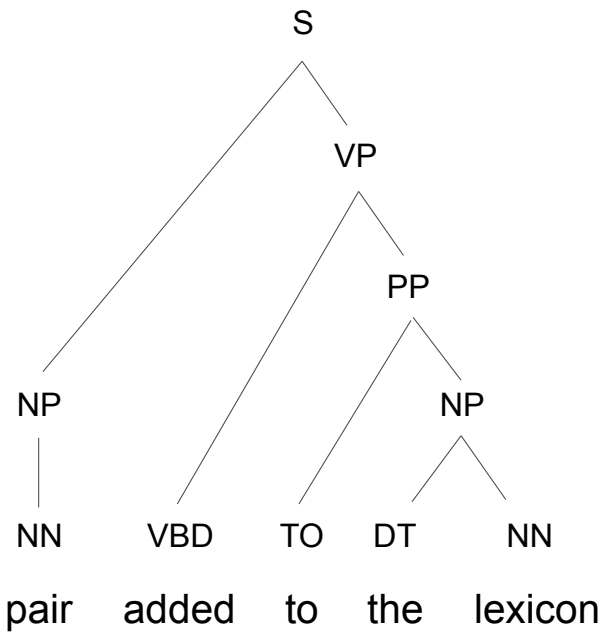

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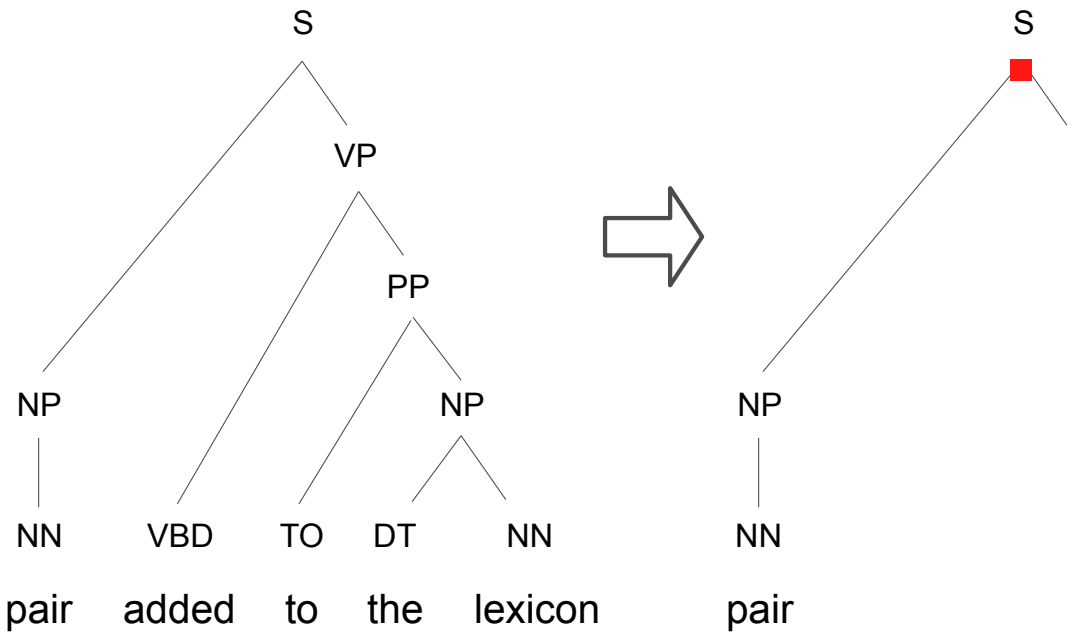

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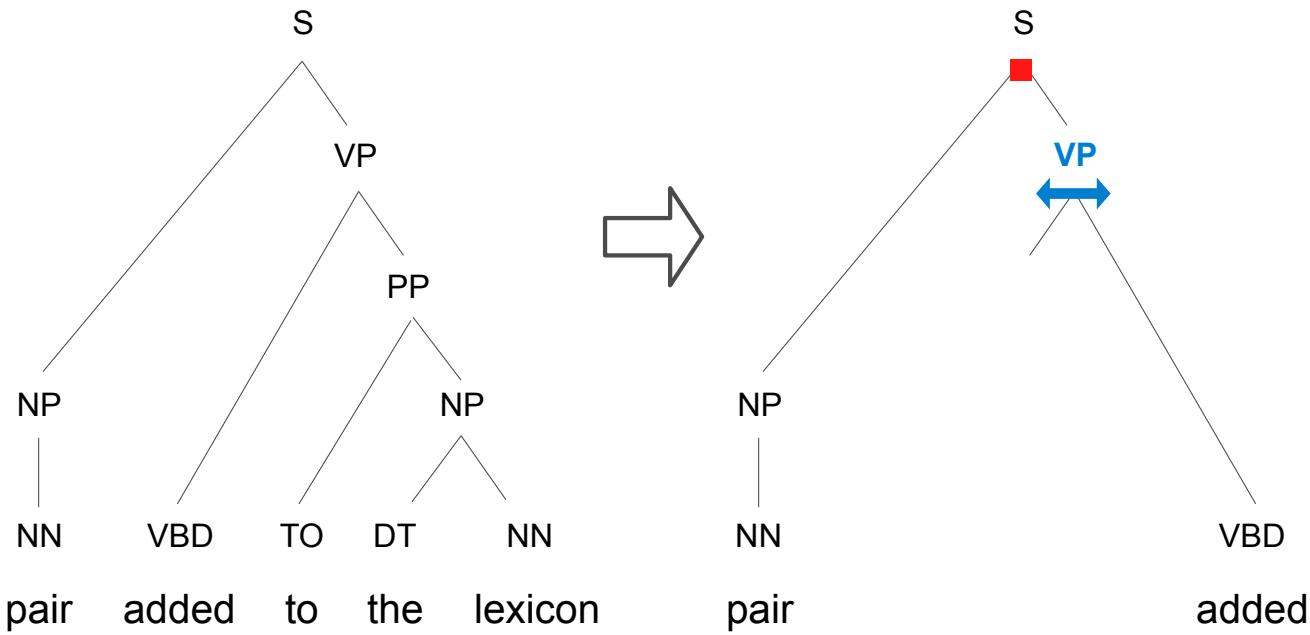

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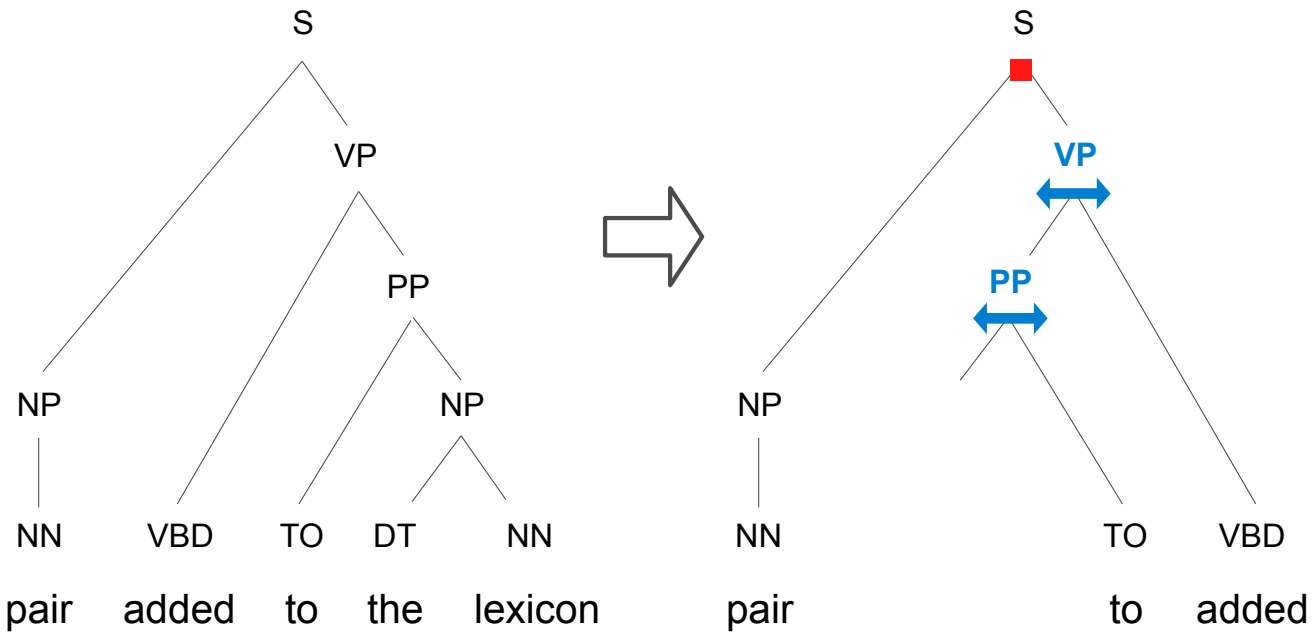

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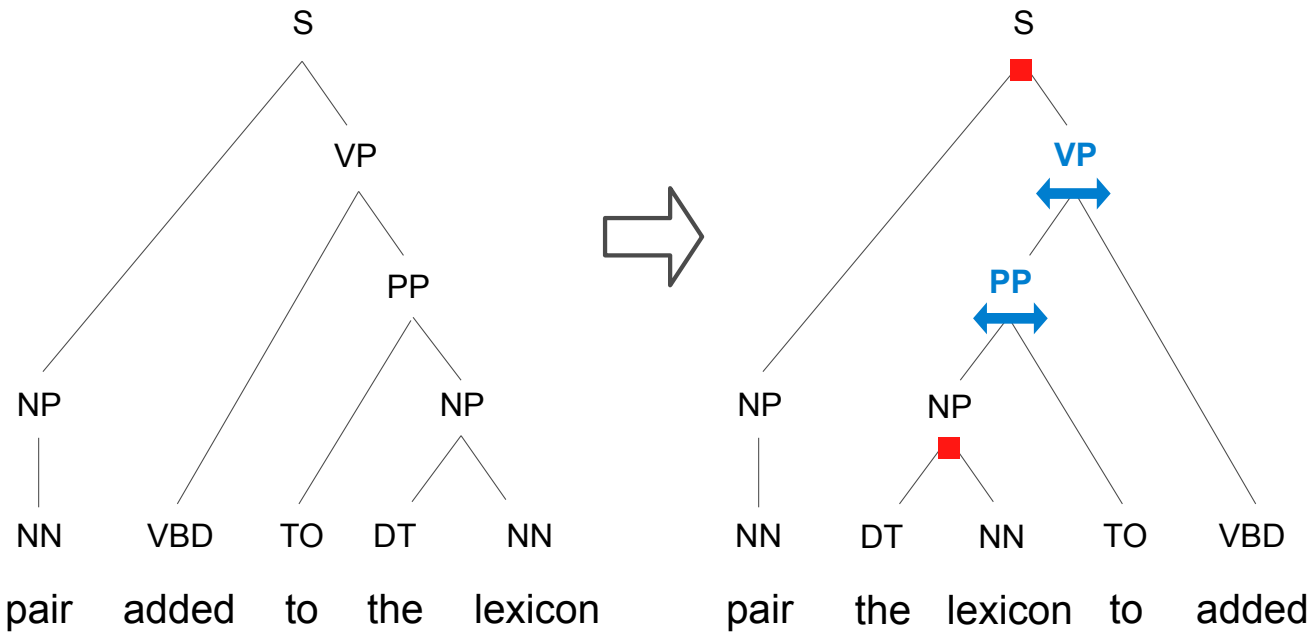

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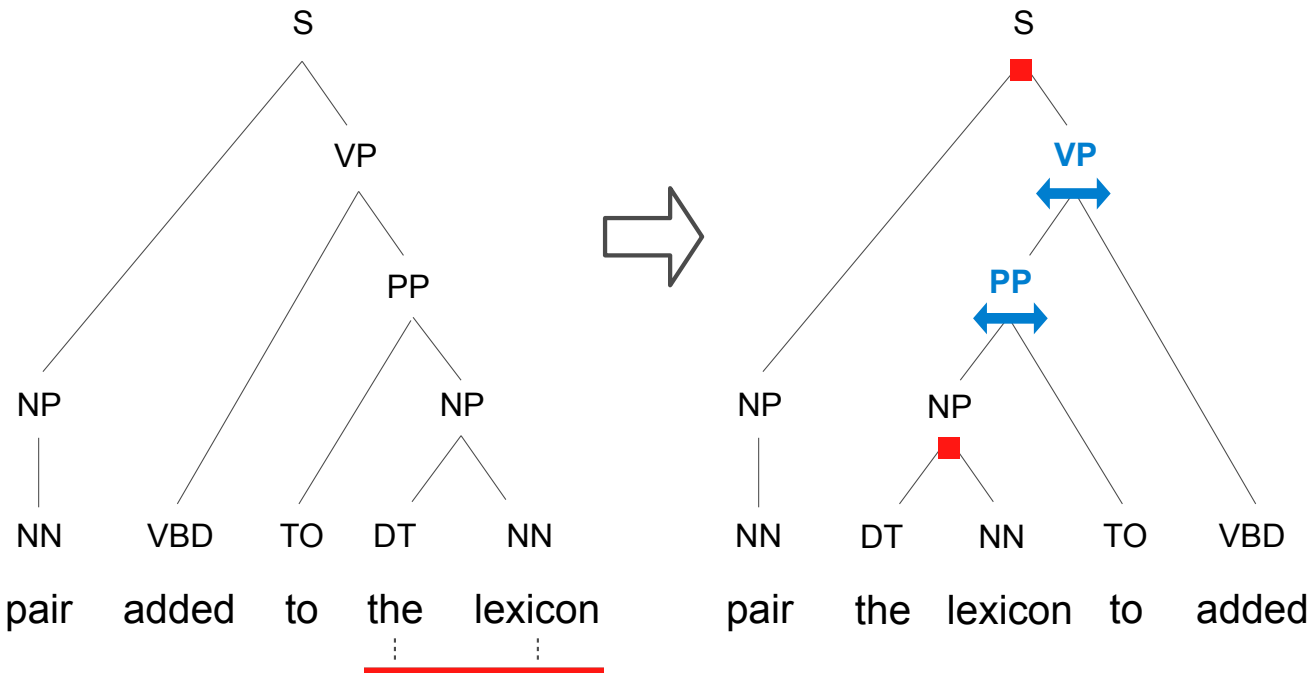

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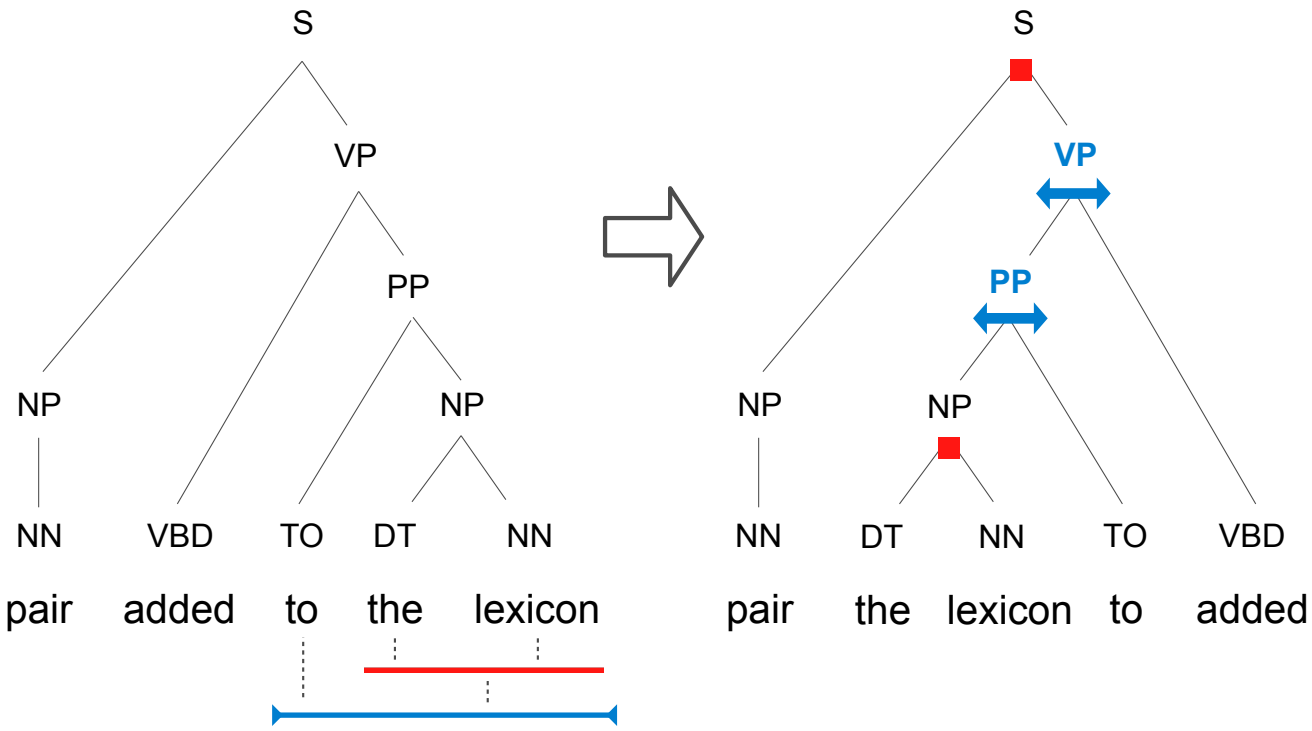

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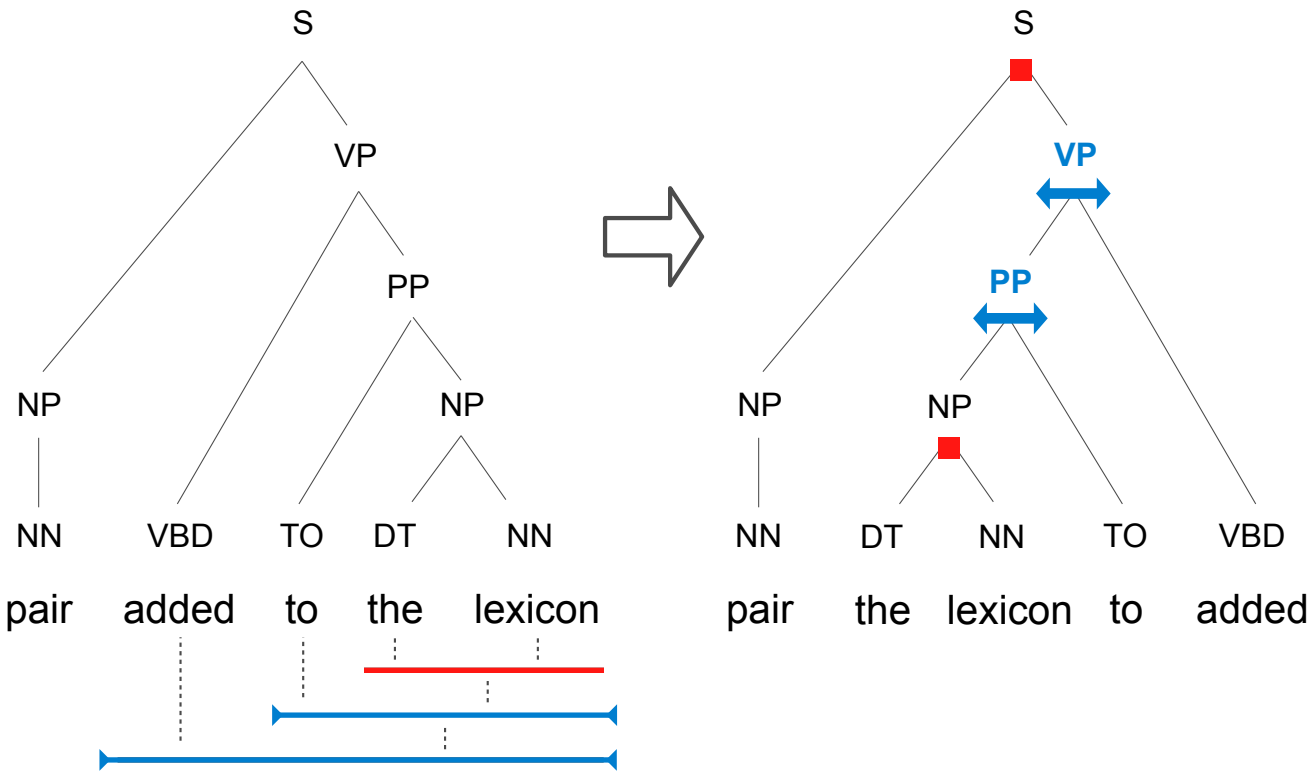

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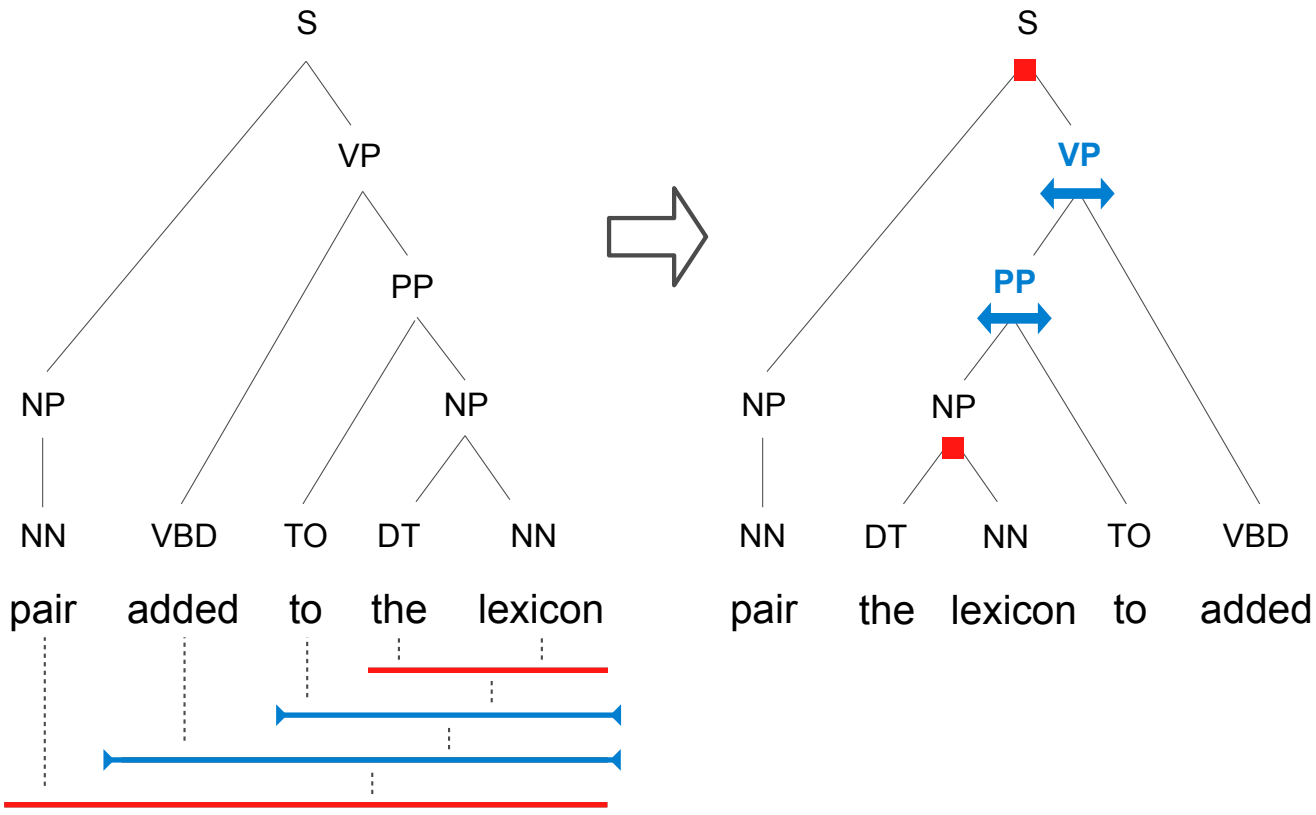

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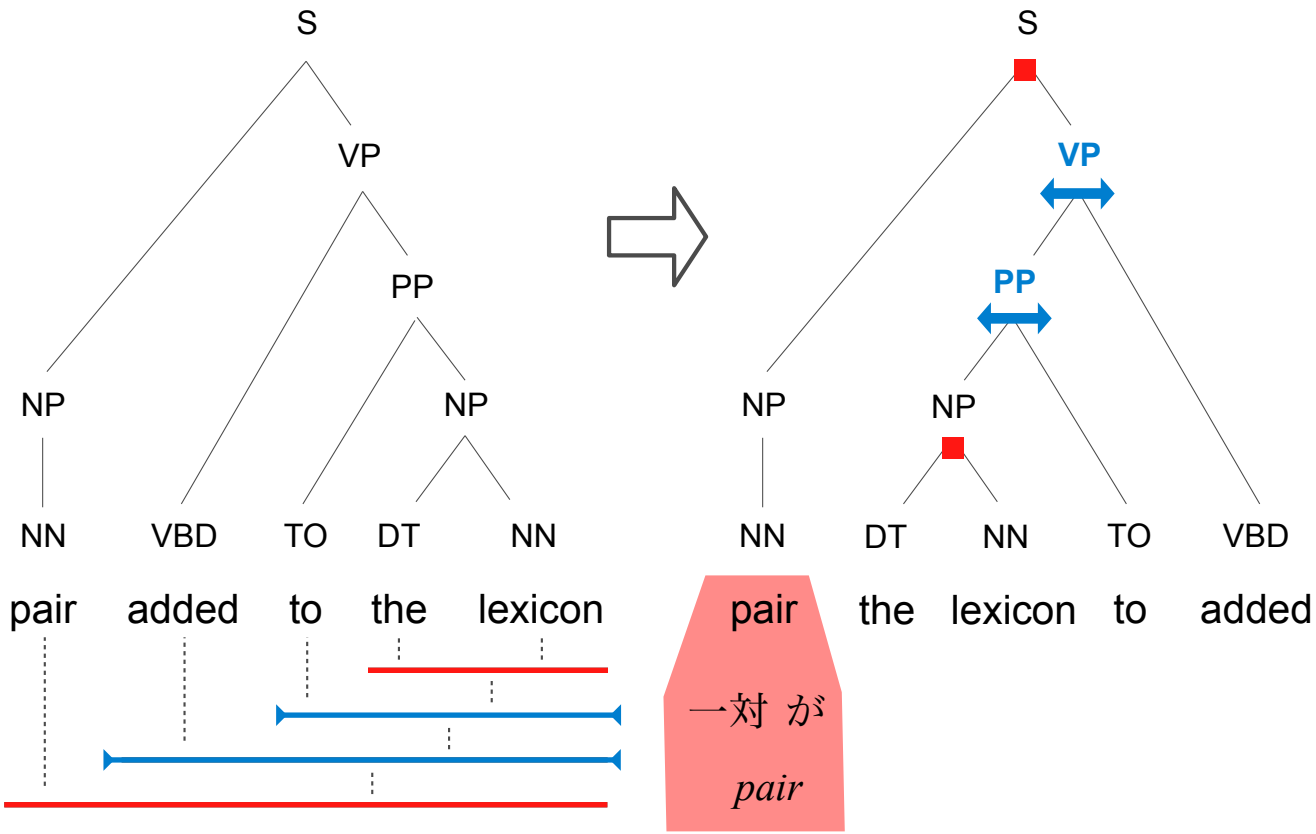

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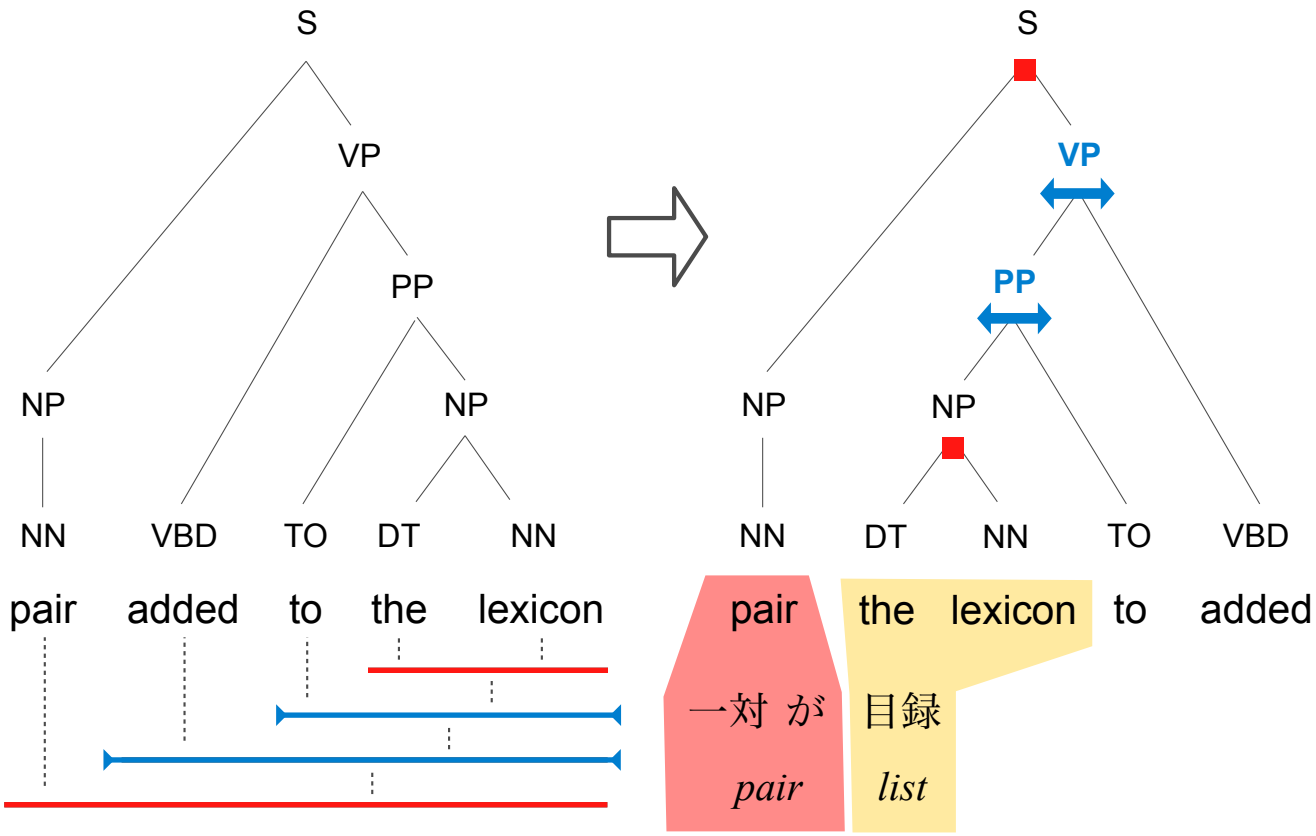

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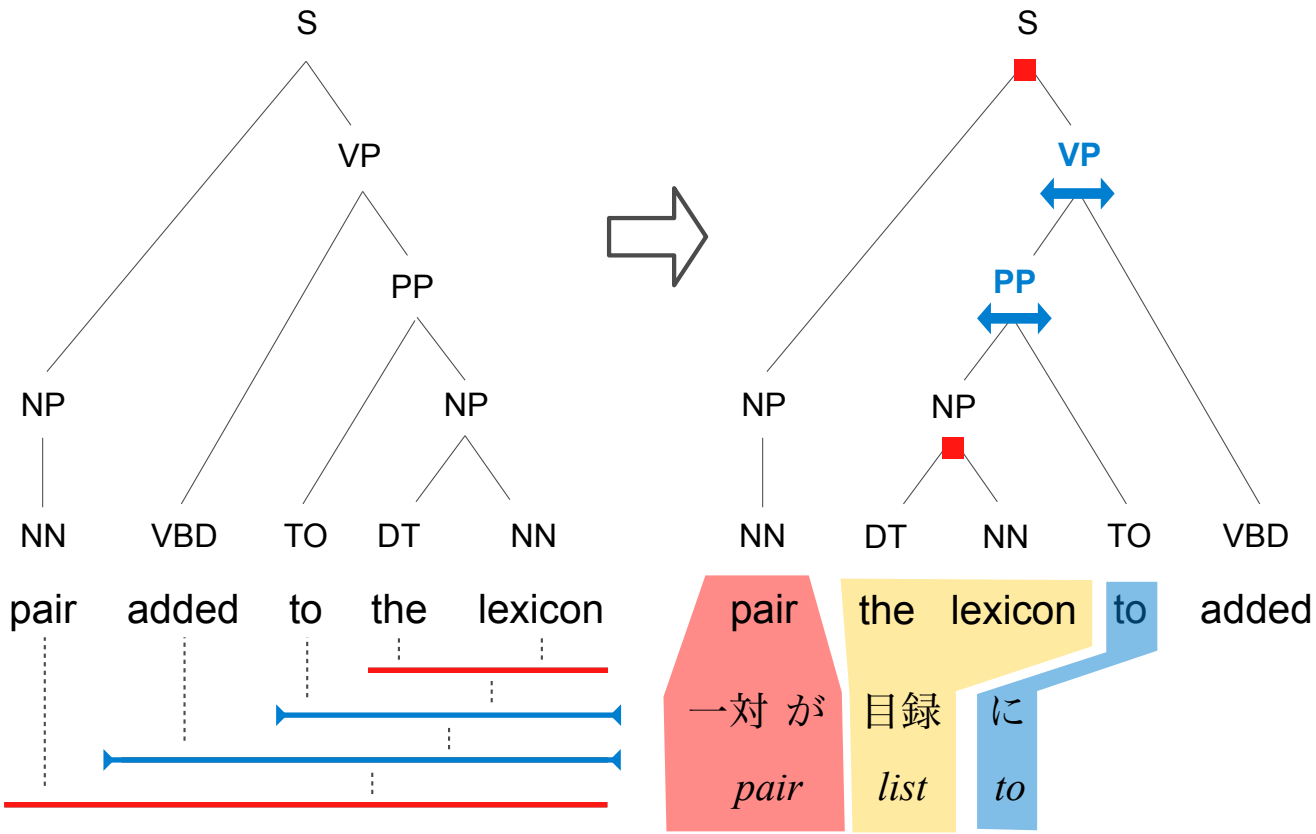

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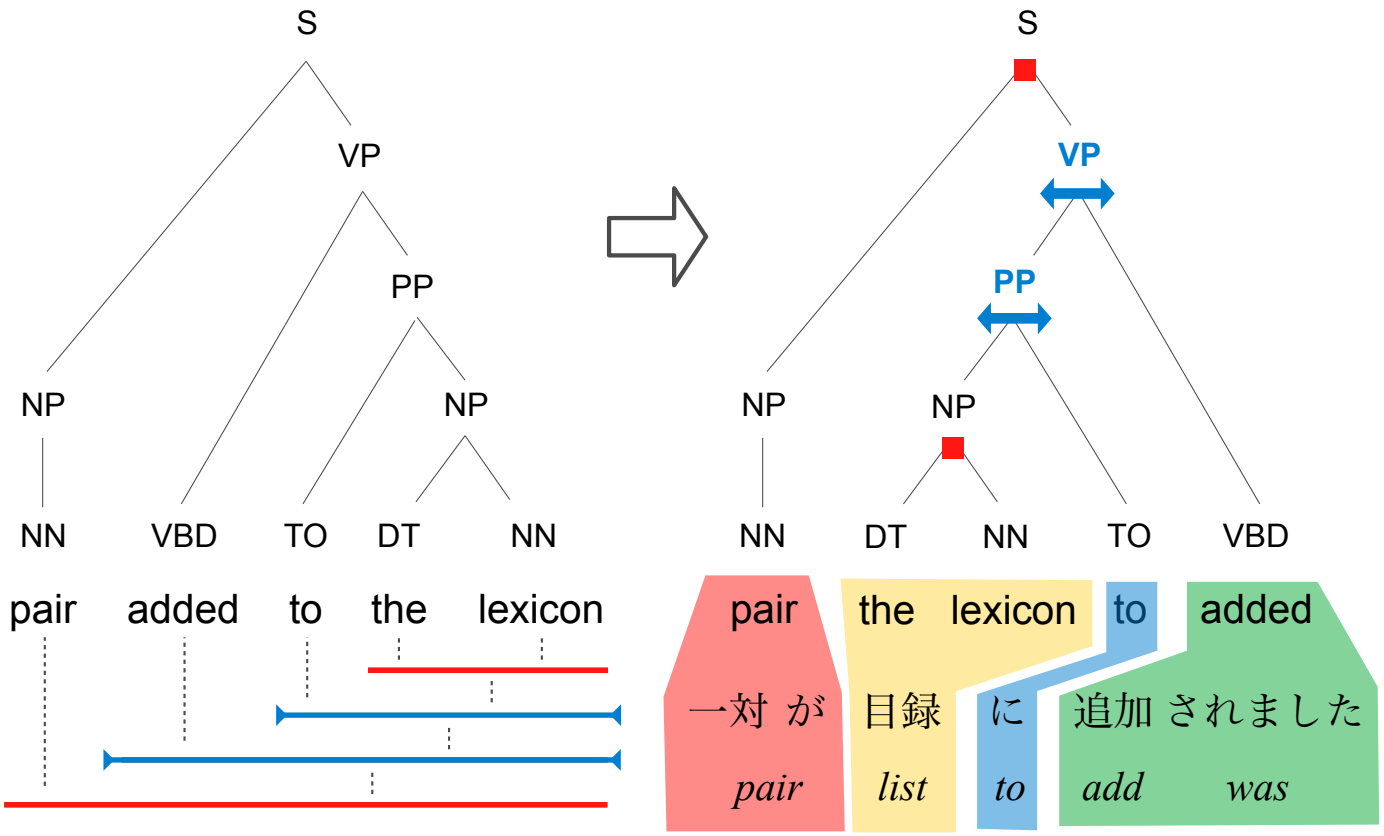

Context-Free Grammars

A Context-Free Grammar Models Language Generation

A grammar contains rules that hierarchically generate word sequences using syntactic tags.

Grammar Rules

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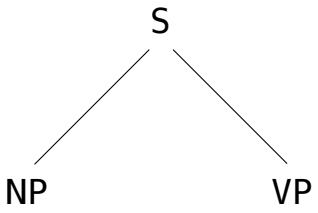

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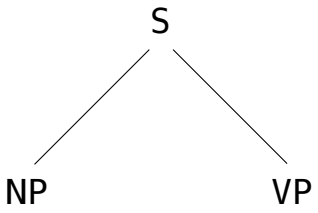

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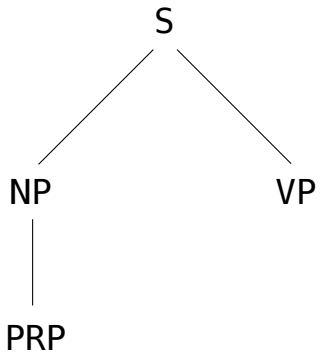

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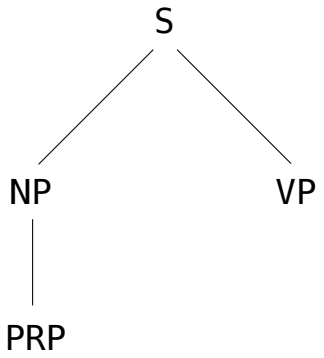

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Lexicon

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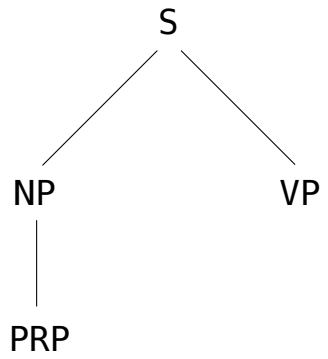

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Lexicon

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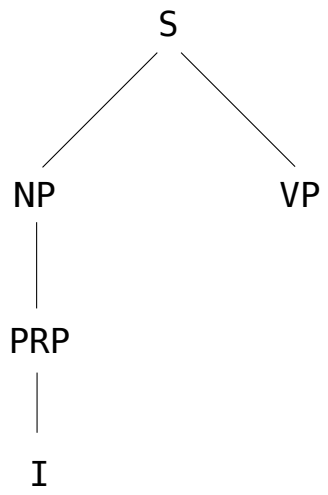

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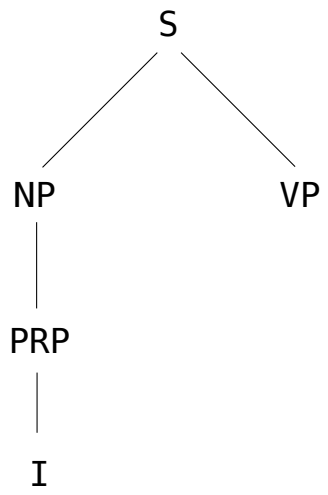

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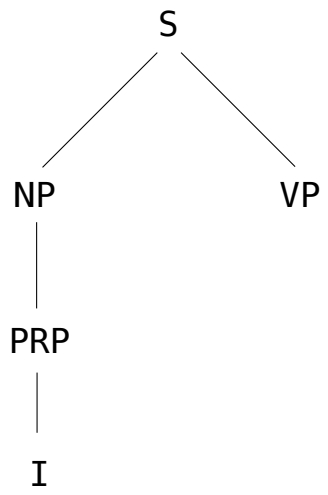

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VP -> VB

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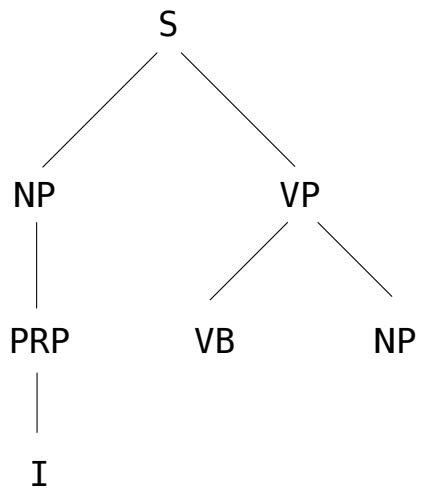

Grammar Rules

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VP -> VB NP
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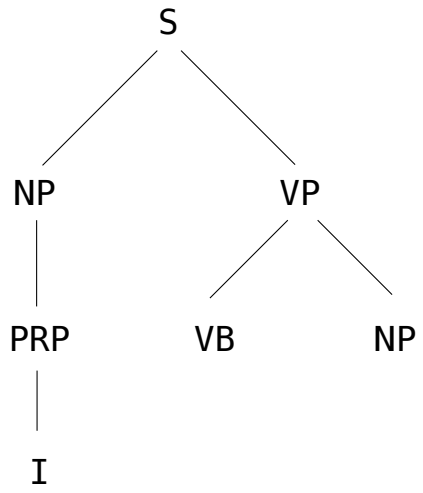

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VP -> VB

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PRP -> I

VB -> know

VB -> help

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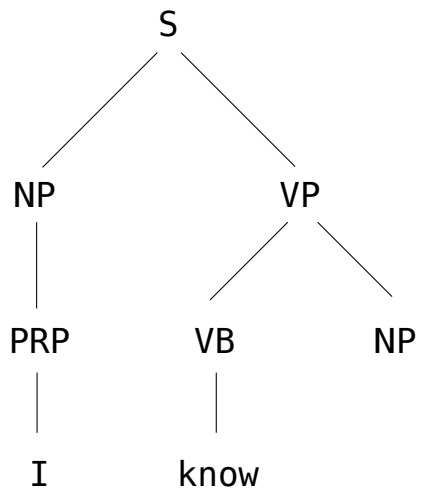

Grammar Rules

S -> NP VP

NP -> PRP

VP -> VB

VP -> VB NP

Lexicon

PRP -> I

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VB -> help

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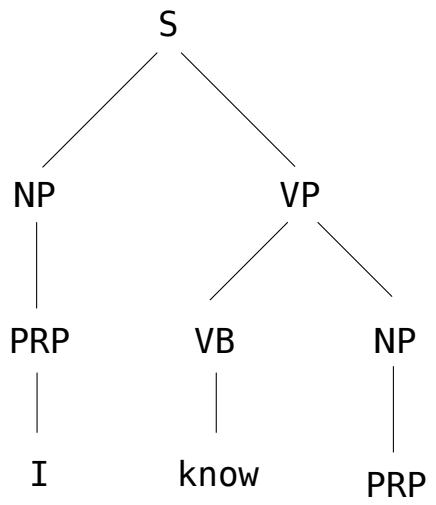

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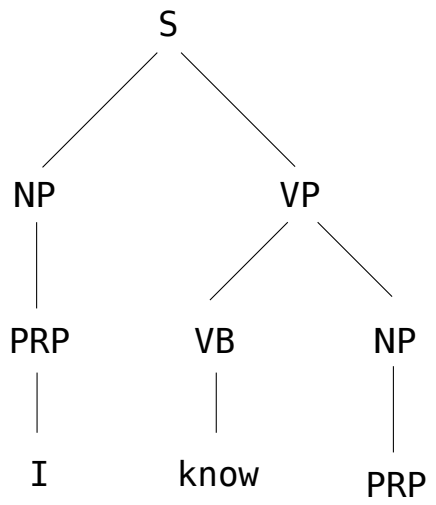

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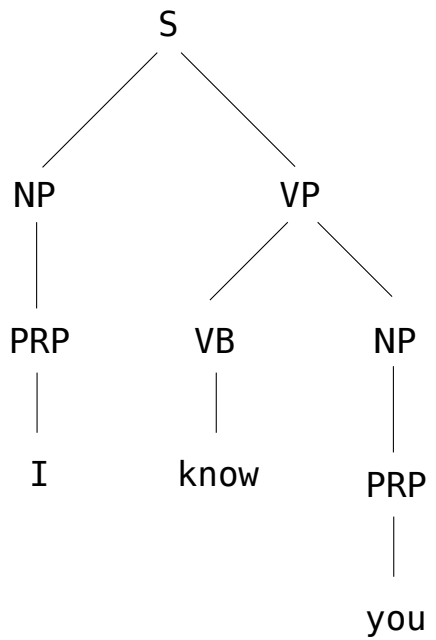

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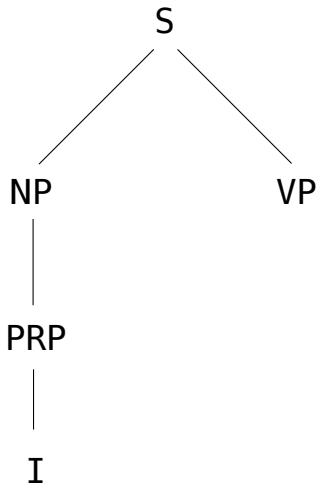
Probabilistic Context-Free Grammars



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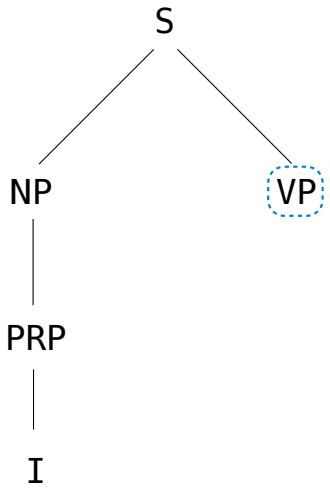

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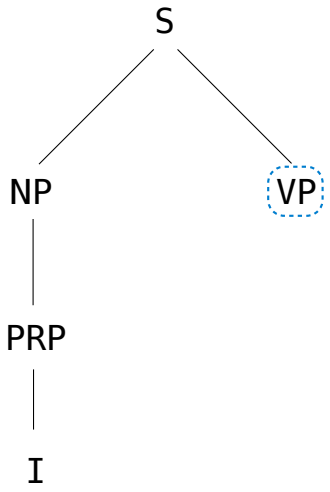

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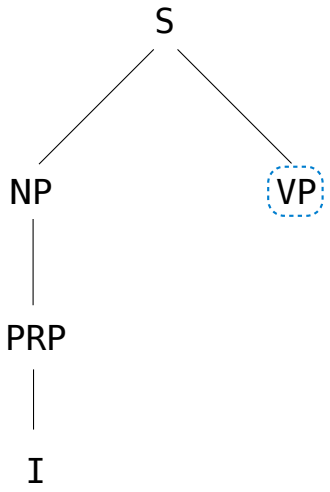

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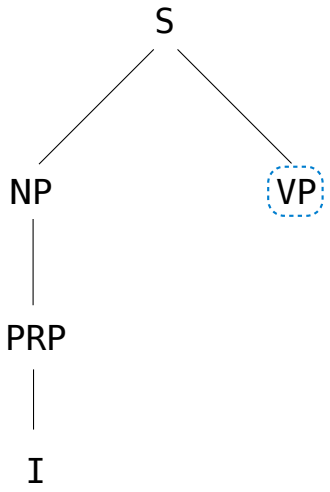

Grammar Rules

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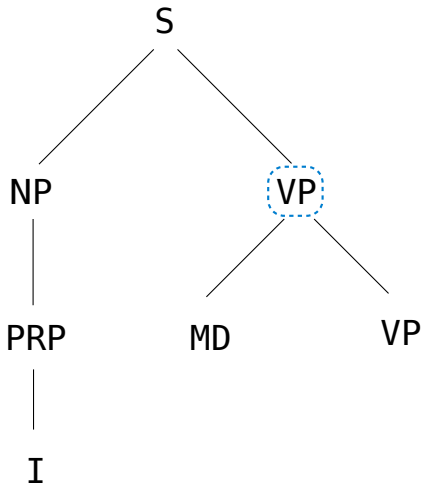

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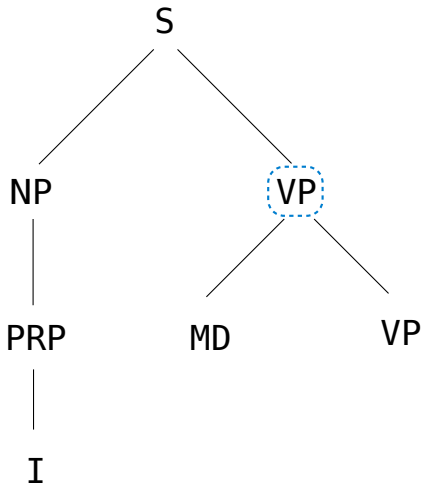

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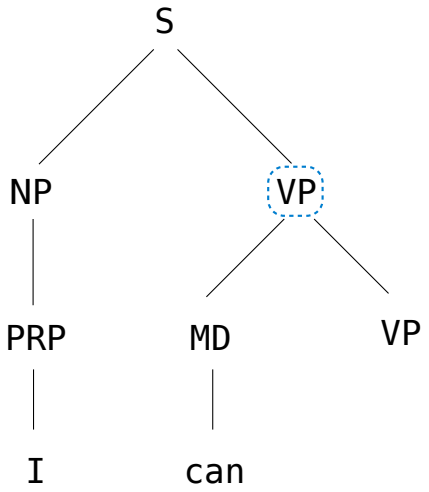

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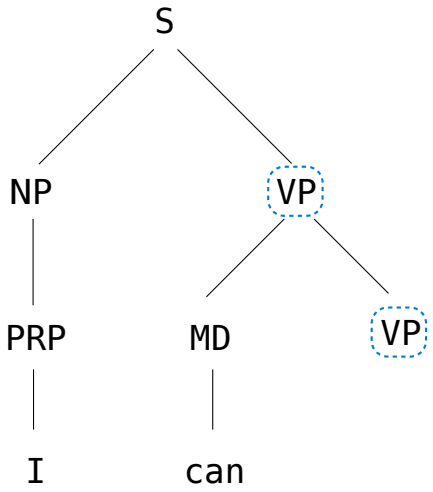

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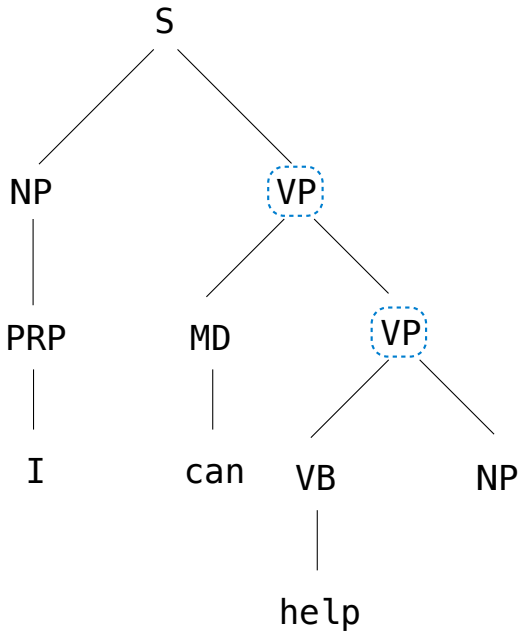

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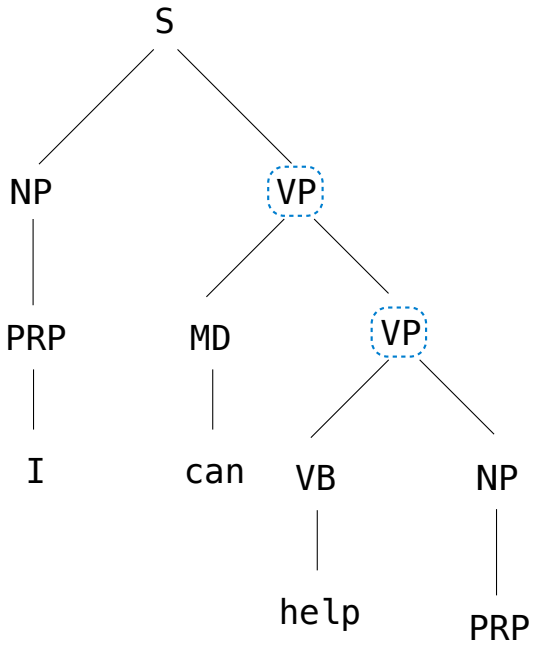

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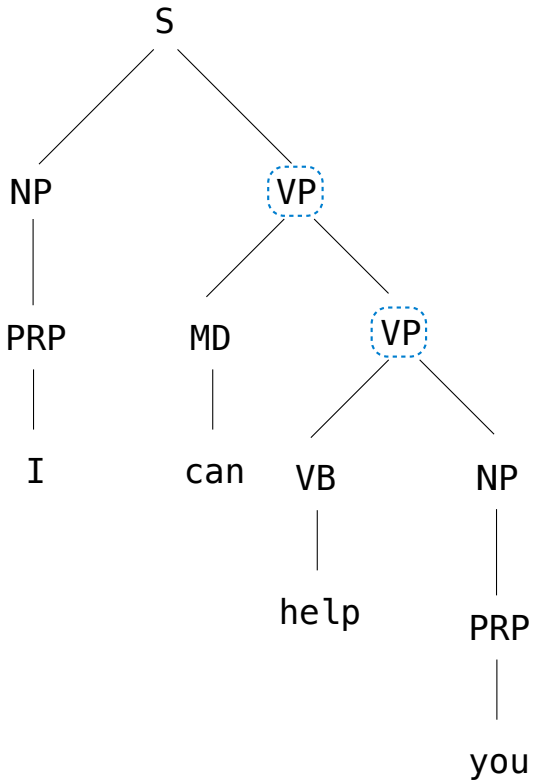

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Learning Probabilistic Context-Free Grammars

(Demo)

Parsing with Probabilistic Context-Free Grammars

Parsing is Maximizing Likelihood

A probabilistic context-free grammar can be used to select a parse for a sentence.

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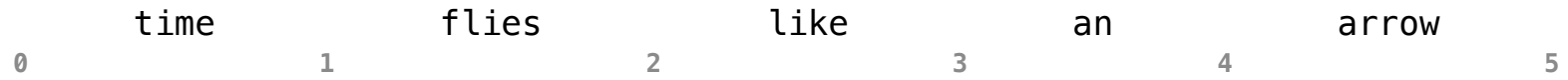

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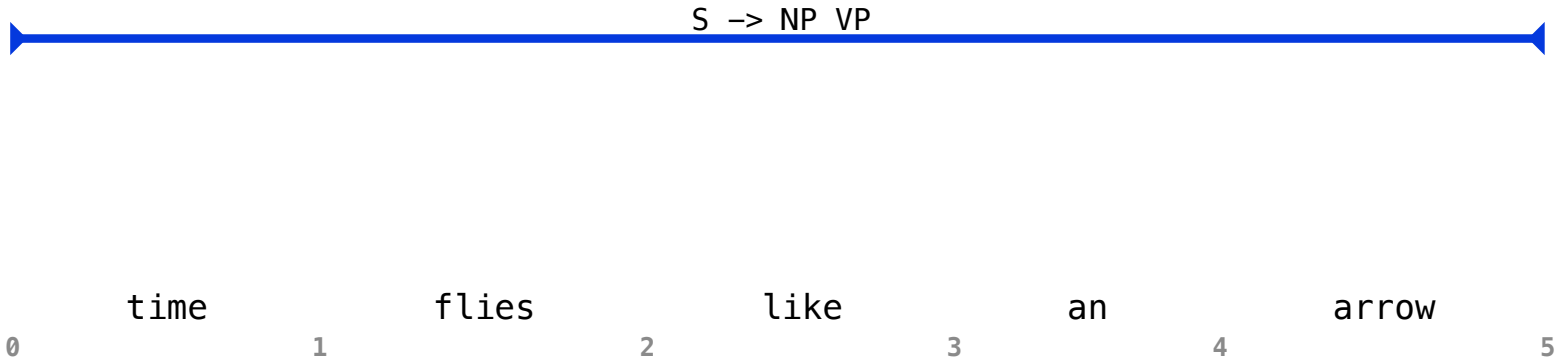

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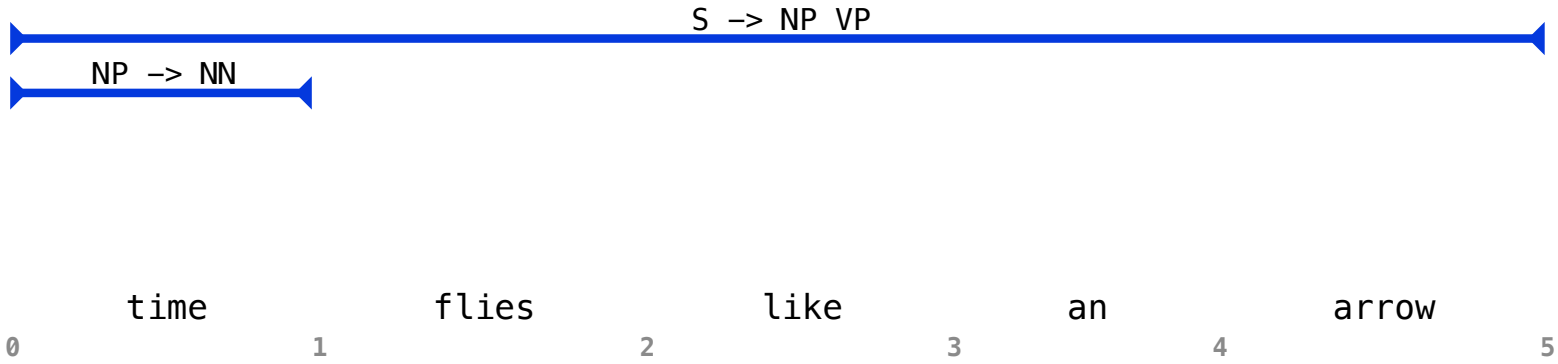

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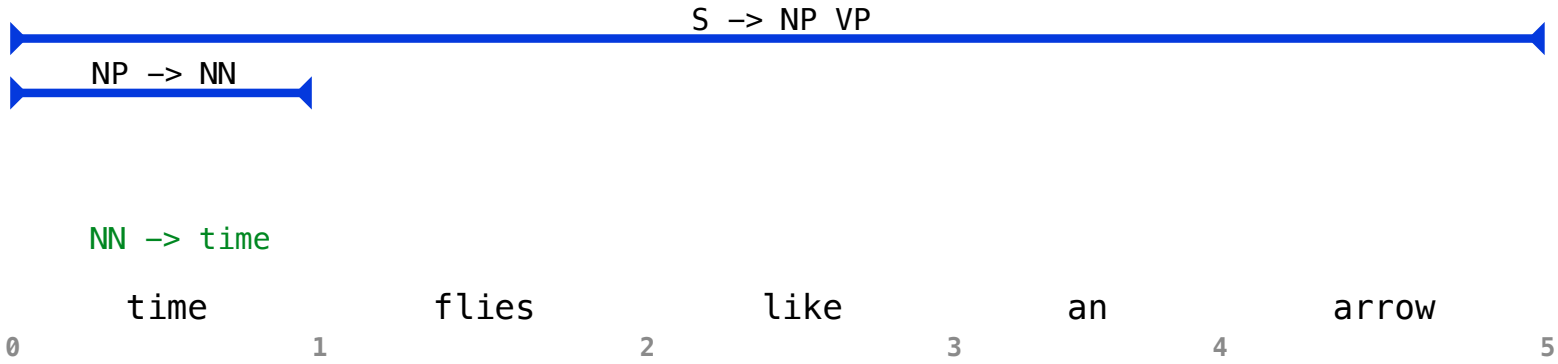

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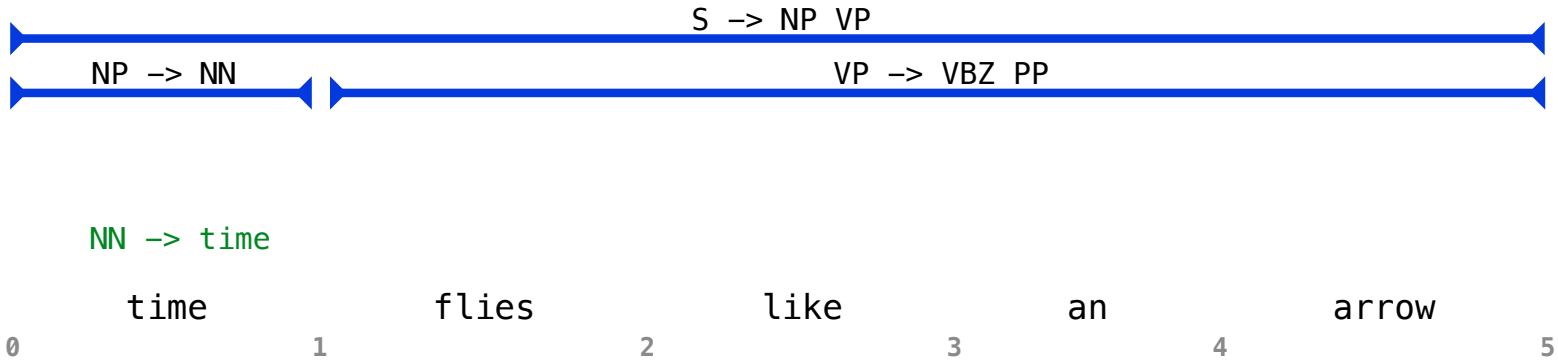

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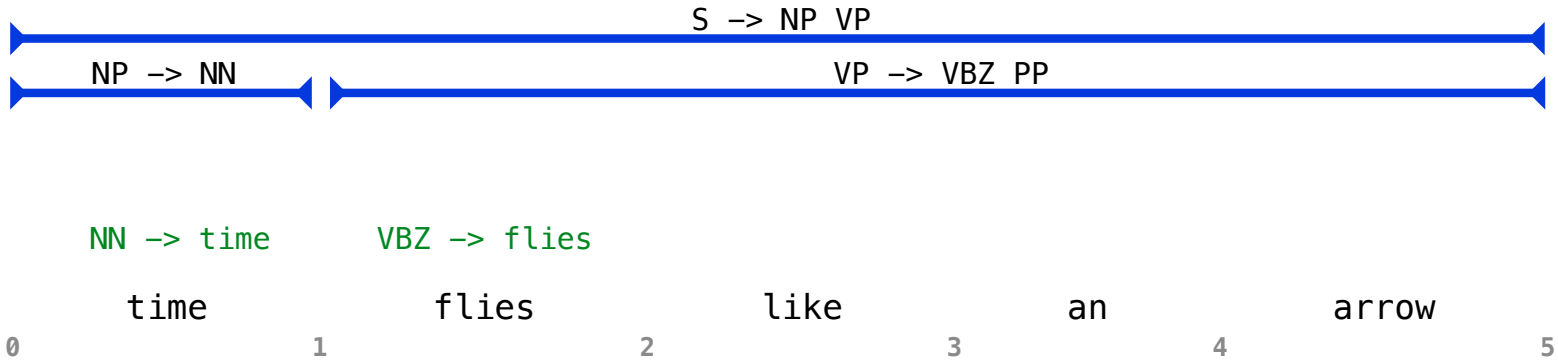

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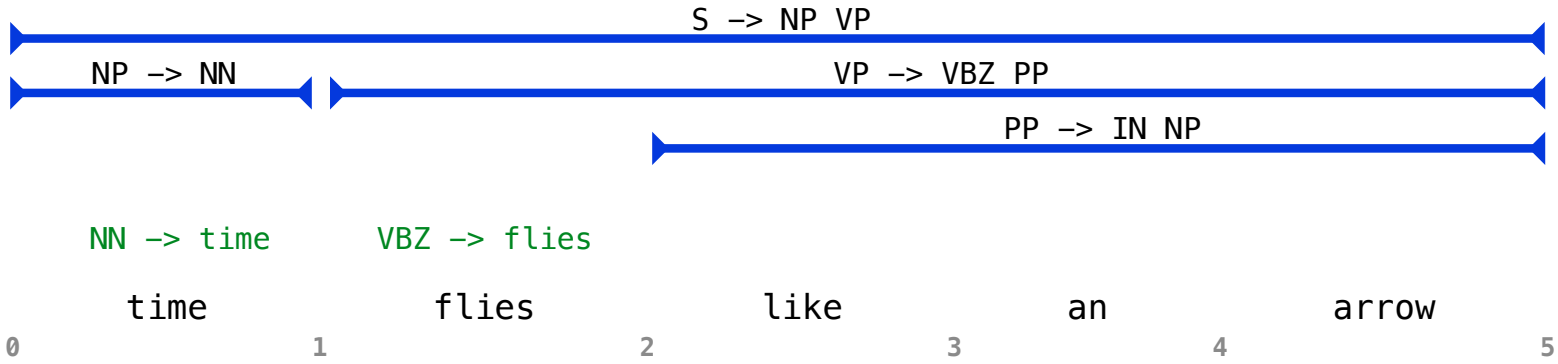

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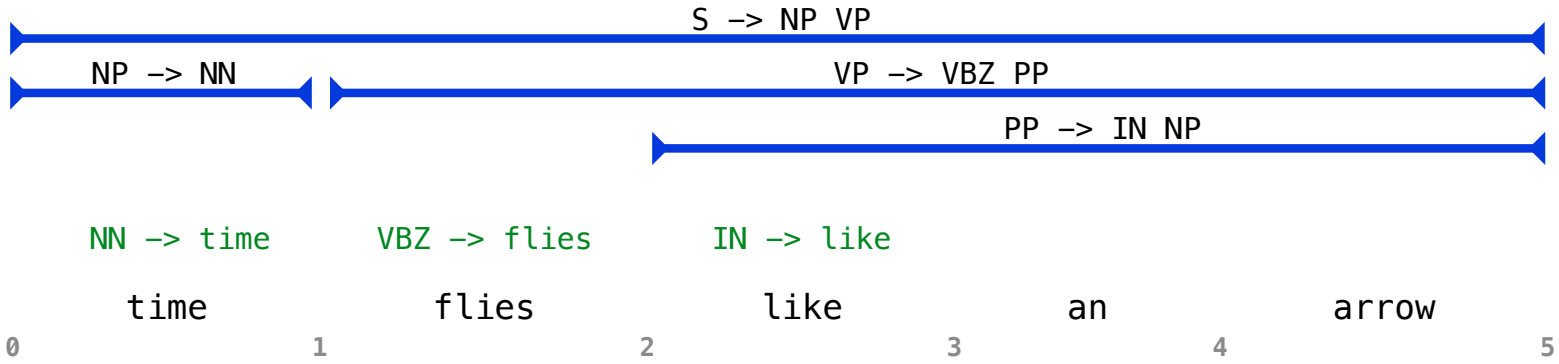

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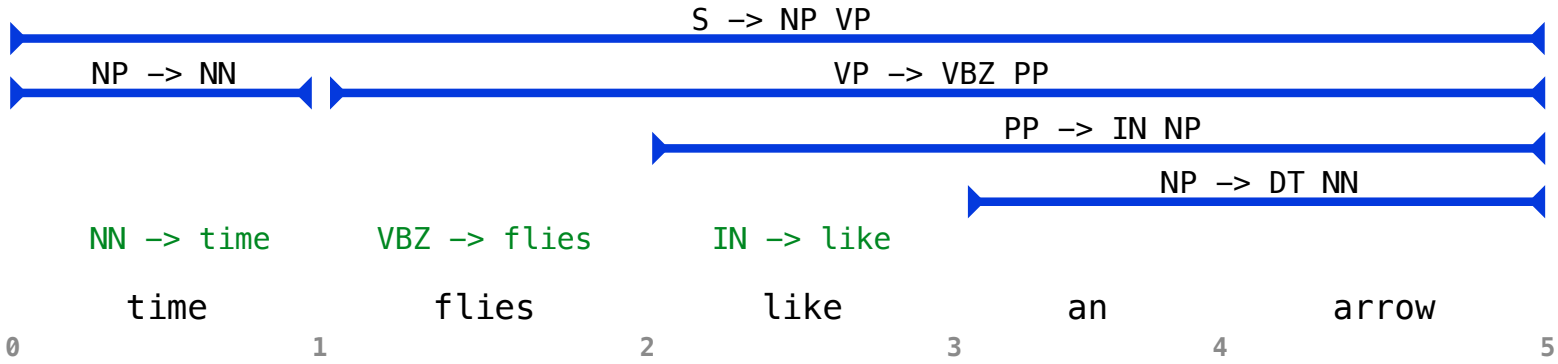

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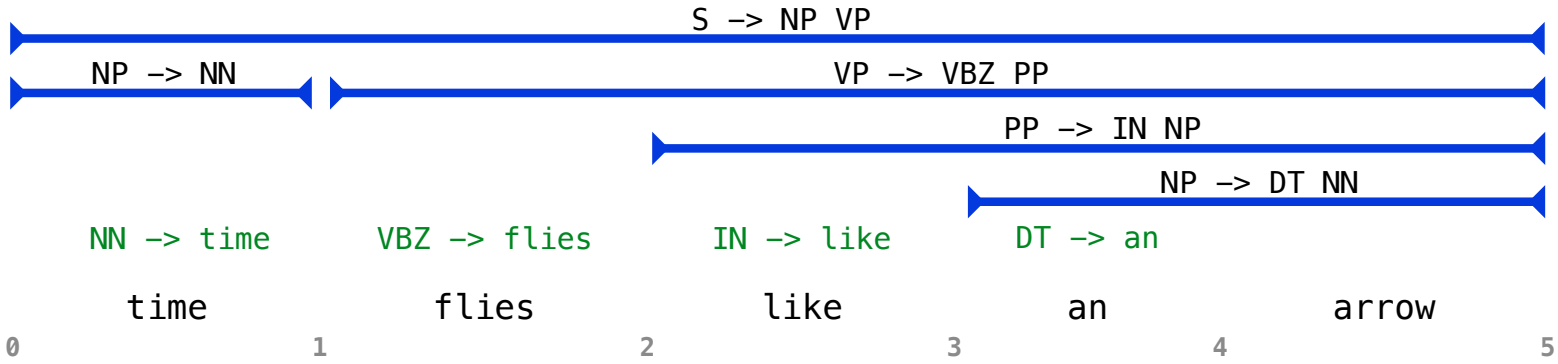

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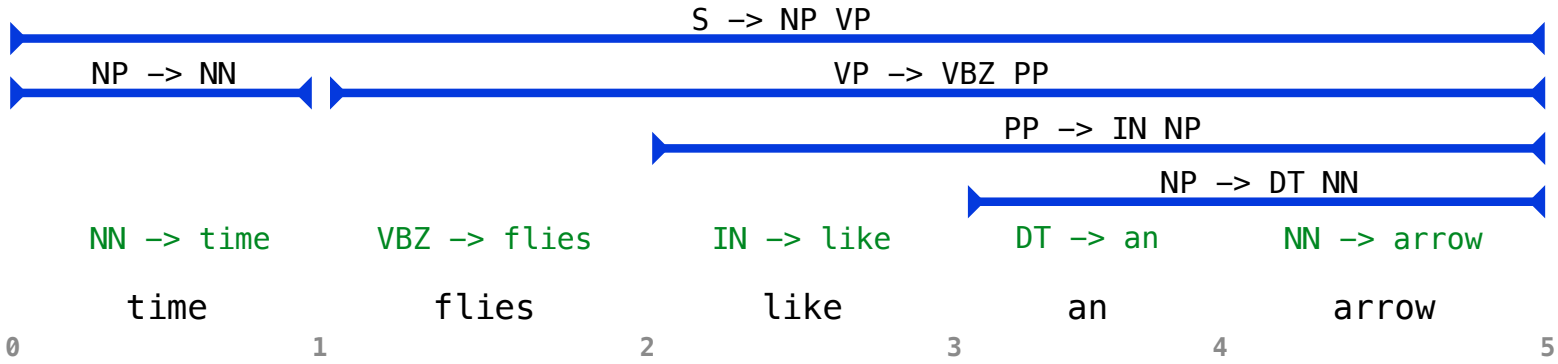

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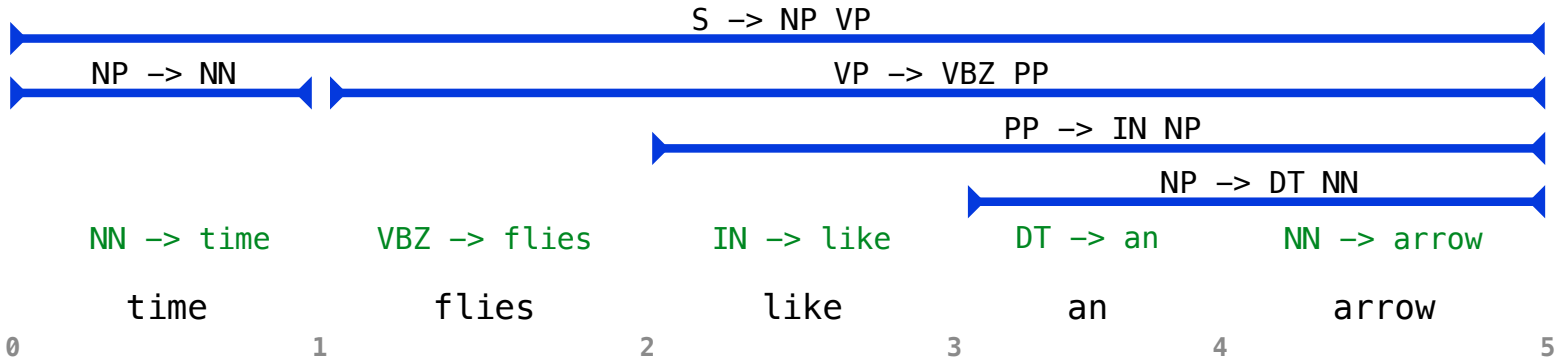


(Demo)

Tree Transformations

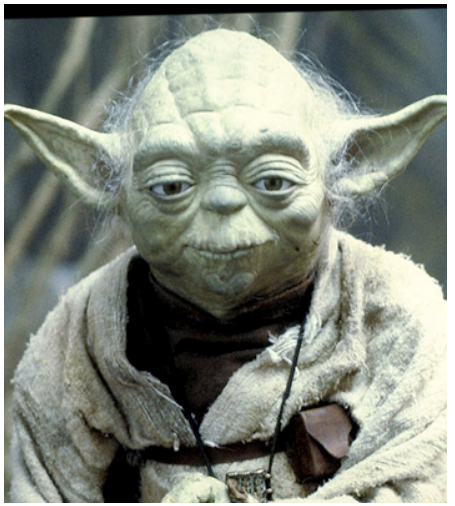
Reordering Modal Arguments

Reordering Modal Arguments

English

Reordering Modal Arguments

English ⇨ **Yoda-English**



Reordering Modal Arguments

English ⇨ **Yoda-English**

Reordering Modal Arguments

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Reordering Modal Arguments

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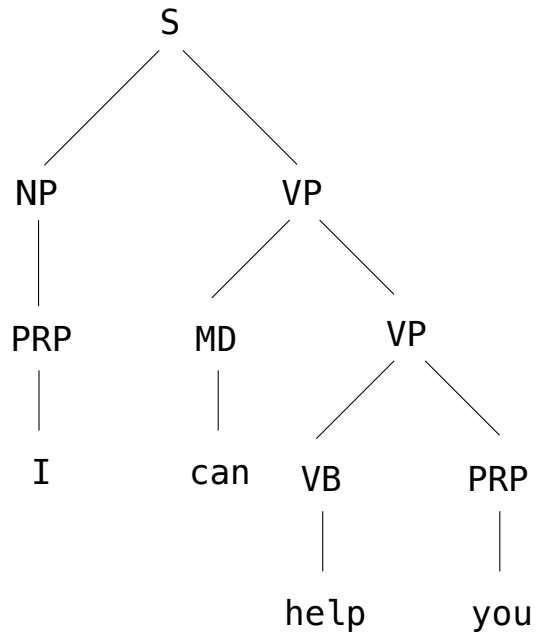

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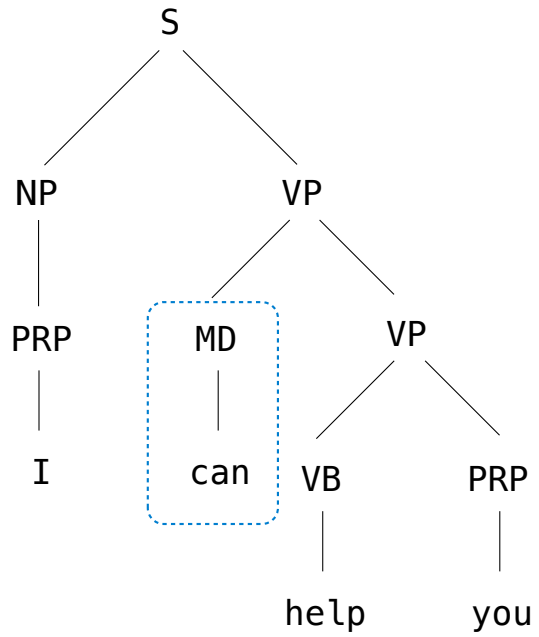

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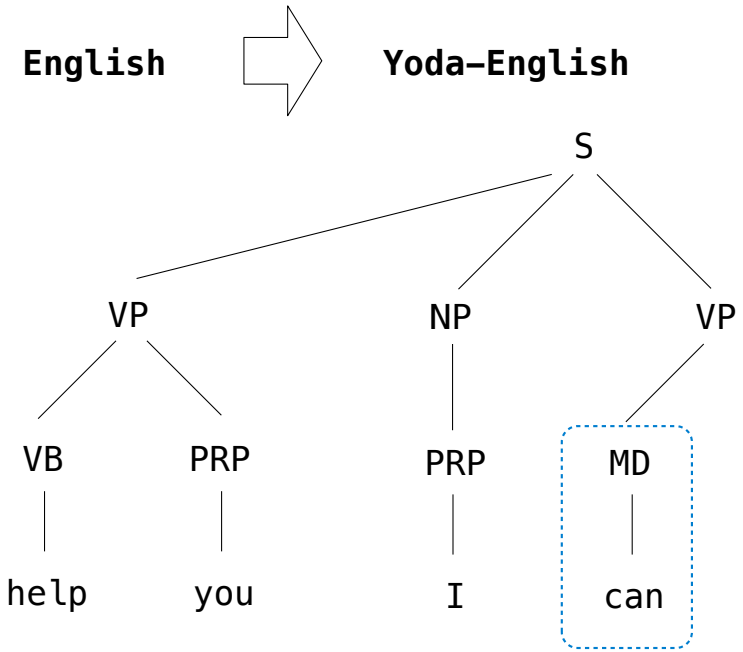

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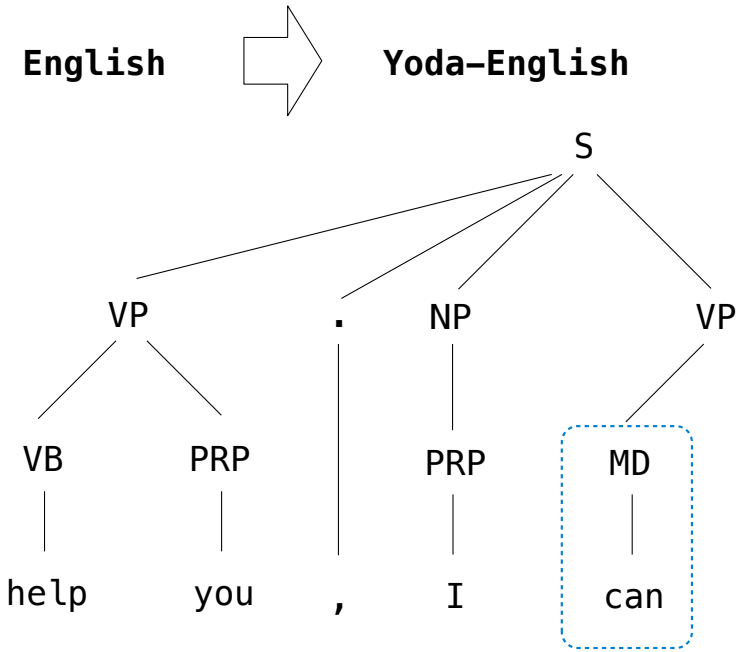

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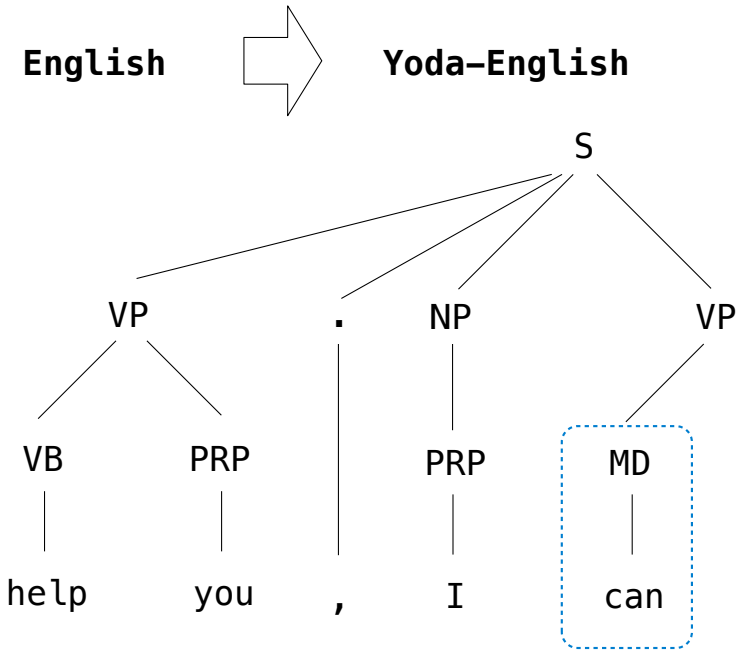

(Demo)