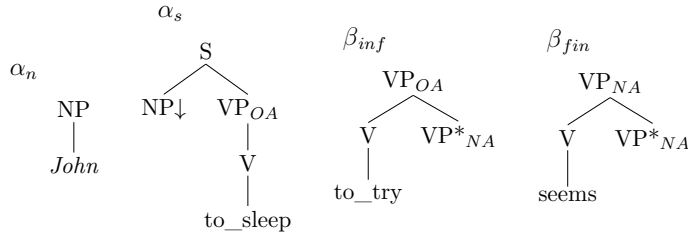# Parsing Beyond CFG
CYK Recognition for TAG: Example

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The grammar:

Input:

(1)   John seems to sleep

Parsing trace (only successful items):

	Item	Rule
1.	$[\alpha_n, 1_\top, 0, -, -, 1]$	lex-scan (*John*)
2.	$[\beta_{fin}, 11_\top, 1, -, -, 2]$	lex-scan (*seems*)
3.	$[\alpha_s, 211_\top, 2, -, -, 3]$	lex-scan (*to_sleep*)
4.	$[\beta_{fin}, 2_\top, 2, 2, 3, 3]$	foot-predict
5.	$[\alpha_n, \epsilon_\perp, 0, -, -, 1]$	move-unary from 1.
6.	$[\beta_{fin}, 1_\perp, 1, -, -, 2]$	move-unary from 2.
7.	$[\alpha_s, 21_\perp, 2, -, -, 3]$	move-unary from 3.
8.	$[\alpha_n, \epsilon_\top, 0, -, -, 1]$	null-adjoin from 5.
9.	$[\beta_{fin}, 1_\top, 1, -, -, 2]$	null-adjoin from 6.
10.	$[\alpha_s, 21_\top, 2, -, -, 3]$	null-adjoin from 7.
11.	$[\alpha_s, 2_\perp, 2, -, -, 3]$	move-unary from 10.
12.	$[\beta_{fin}, \epsilon_\perp, 1, 2, 3, 3]$	move-binary from 4. and 9.
13.	$[\alpha_s, 1_\top, 0, -, -, 1]$	substitute 8.
14.	$[\beta_{fin}, \epsilon_\top, 1, 2, 3, 3]$	null-adjoin from 12.
15.	$[\alpha_s, 2_\top, 1, -, -, 3]$	adjoin 14. into 11.
16.	$[\alpha_s, \epsilon_\perp, 0, -, -, 3]$	move-binary from 13. and 15.
17.	$[\alpha_s, \epsilon_\top, 0, -, -, 3]$	null-adjoin from 16.

. . . .

Lex-scan $\dfrac{}{[\gamma, p_\top, i, -, -, i+1]}$ $l(\gamma, p) = w_{i+1}$

Eps-scan $\dfrac{}{[\gamma, p_\top, i, -, -, i]}$ $l(\gamma, p) = \epsilon$

Foot-predict $\dfrac{}{[\beta, p_\top, i, i, j, j]}$ $\beta \in A, p$ foot node address in $\beta, i \leq j$

Move-unary $\dfrac{[\gamma, (p \cdot 1)_\top, i, f_1, f_2, j]}{[\gamma, p_\perp, i, f_1, f_2, j]}$ node address $p \cdot 2$ does not exist in γ

Move-binary $\dfrac{[\gamma, (p \cdot 1)_\top, i, f_1, f_2, k], [\gamma, (p \cdot 2)_\top, k, f'_1, f'_2, j]}{[\gamma, p_\perp, i, f_1 \oplus f'_1, f_2 \oplus f'_2, j]}$

Null-adjoin $\dfrac{[\gamma, p_\perp, i, f_1, f_2, j]}{[\gamma, p_\top, i, f_1, f_2, j]}$ $f_{OA}(\gamma, p) = 0$

Substitute $\dfrac{[\alpha, \epsilon_\top, i, -, -, j]}{[\gamma, p_\top, i, -, -, j]}$ $l(\alpha, \epsilon) = l(\gamma, p)$

Adjoin $\dfrac{[\beta, \epsilon_\top, i, f_1, f_2, j], [\gamma, p_\perp, f_1, f'_1, f'_2, f_2]}{[\gamma, p_\top, i, f'_1, f'_2, j]}$ $\beta \in f_{SA}(\gamma, p)$