Parsing Beyond CFG
CYK Recognition for TAG: Example

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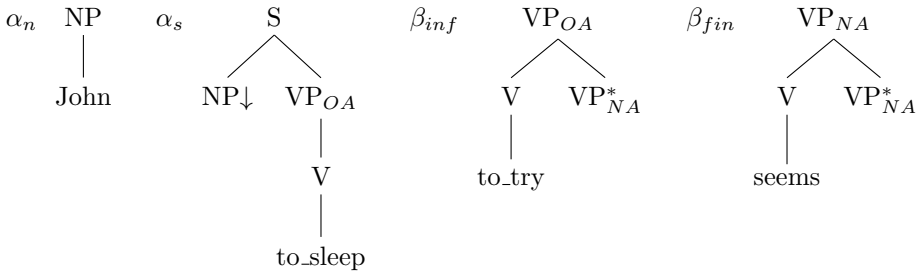
The grammar:



Input:

(1) John seems to sleep

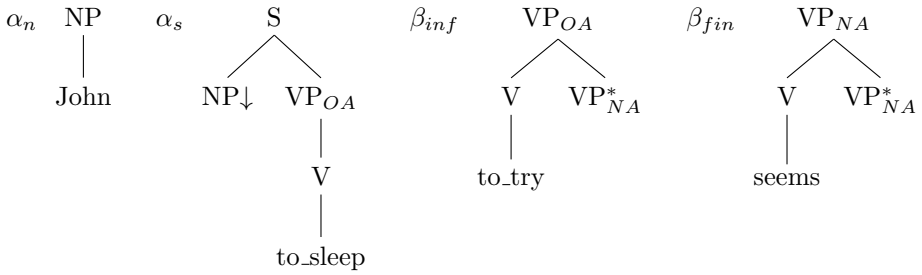
In the following, "to sleep" is treated like a single token.

Parsing trace (only successful items) for the binary CYK:

	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.	$[\alpha_n, \epsilon_\bot, 0, -, -, 1]$	move-unary from 1.
6.	$[\beta_{fin}, 1_\bot, 1, -, -, 2]$	move-unary from 2.
7.	$[\alpha_s, 21_\bot, 2, -, -, 3]$	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.	$[\alpha_s, 2_\bot, 2, -, -, 3]$	move-unary from 10.
12.	$[\beta_{fin}, \epsilon_\bot, 1, 2, 3, 3]$	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.	$[\alpha_s, \epsilon_\bot, 0, -, -, 3]$	move-binary from 13. and 15.
17.	$[\alpha_s, \epsilon_\top, 0, -, -, 3]$	null-adjoin from 16.

Second algorithm.

Same grammar:



Input:

(2) John seems to sleep

Parsing trace (only successful items) for the CYK with dotted productions. We write $\langle \gamma, p \rangle$ for the node in γ at address p.

	Item	Rule
1.	$[\langle \alpha_n, \varepsilon \rangle \rightarrow \bullet \langle \alpha_n, 1 \rangle, 0, -, -, 0]$	axiom
2.	$[\langle \alpha_s, \varepsilon \rangle \rightarrow \bullet \langle \alpha_s, 1 \rangle \ \langle \alpha_s, 2 \rangle, 0, -, -, 0]$	axiom
3.	$[\langle \alpha_s, 2 \rangle \rightarrow \bullet \langle \alpha_s, 21 \rangle, 2, -, -, 2]$	axiom
4.	$[\langle \alpha_s, 21 \rangle \rightarrow \bullet \langle \alpha_s, 211 \rangle, 2, -, -, 2]$	axiom
5.	$[\langle \beta_{fin}, \varepsilon \rangle \rightarrow \bullet \langle \beta_{fin}, 1 \rangle \ \langle \beta_{fin}, 2 \rangle, 1, -, -, 1]$	axiom
6.	$[\langle \beta_{fin}, 1 \rangle \rightarrow \bullet \langle \beta_{fin}, 11 \rangle, 1, -, -, 1]$	axiom
7.	$[\langle \alpha_n, \varepsilon \rangle \rightarrow \langle \alpha_n, 1 \rangle \bullet, 0, -, -, 1]$	lex-scan from 1.
8.	$[\langle \alpha_s, 21 \rangle \rightarrow \langle \alpha_s, 211 \rangle \bullet, 2, -, -, 3]$	lex-scan from 4.
9.	$[\langle \beta_{fin}, 1 \rangle \rightarrow \langle \beta_{fin}, 11 \rangle \bullet, 1, -, -, 2]$	lex-scan from 6.
10.	$[\langle \alpha_n, \varepsilon \rangle_\perp, 0, -, -, 1]$	convert 7.
11.	$[\langle \alpha_s, 21 \rangle_\perp, 2, -, -, 3]$	convert 8.
12.	$[\langle \beta_{fin}, 1 \rangle_\perp, 1, -, -, 2]$	convert 9.
13.	$[\langle \alpha_n, \varepsilon \rangle_\top, 0, -, -, 1]$	null-adjoin 10.
14.	$[\langle \alpha_s, 21 \rangle_\top, 2, -, -, 3]$	null adjoin 11.
15.	$[\langle \beta_{fin}, 1 \rangle_\top, 1, -, -, 2]$	null-adjoin 12.
16.	$[\langle \alpha_s, \varepsilon \rangle \rightarrow \langle \alpha_s, 1 \rangle \bullet \langle \alpha_s, 2 \rangle, 0, -, -, 1]$	substitute 2., 13.
17.	$[\langle \alpha_s, 2 \rangle \rightarrow \langle \alpha_s, 21 \rangle \bullet, 2, -, -, 3]$	move right 3., 14.
18.	$[\langle \beta_{fin}, \varepsilon \rangle \rightarrow \langle \beta_{fin}, 1 \rangle \bullet \langle \beta_{fin}, 2 \rangle, 1, -, -, 2]$	move right 5., 15
19.	$[\langle \alpha_s, 2 \rangle_\perp, 2, -, -, 3]$	convert 17.
20.	$[\langle \beta_{fin}, \varepsilon \rangle \rightarrow \langle \beta_{fin}, 1 \rangle \langle \beta_{fin}, 2 \rangle \bullet, 1, 2, 3, 3]$	foot adjoin 19., 18.
21.	$[\langle \beta_{fin}, \varepsilon \rangle_\perp, 1, 2, 3, 3]$	convert 20.
22.	$[\langle \beta_{fin}, \varepsilon \rangle_\top, 1, 2, 3, 3]$	null adjoin 21.
23.	$[\langle \alpha_s, 2 \rangle_\top, 1, -, -, 3]$	root adjoin 11., 22.
24.	$[\langle \alpha_s, \varepsilon \rangle \rightarrow \langle \alpha_s, 1 \rangle \langle \alpha_s, 2 \rangle \bullet, 0, -, -, 3]$	move right 16., 23.
25.	$[\langle \alpha_s, \varepsilon \rangle_\perp, 0, -, -, 3]$	convert 24.
26.	$[\langle \alpha_s, \varepsilon \rangle_\top, 0, -, -, 3]$	null adjoin 25.