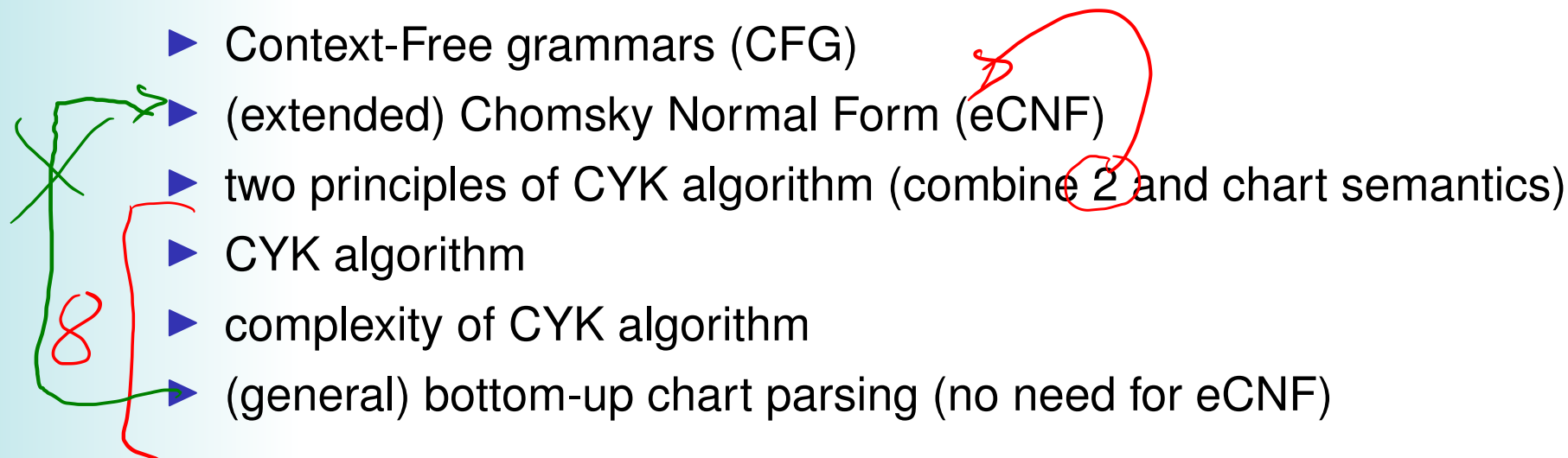


Lecture reviews — Week 08 with solutions

J.-C. Chappelier & M. Rajman

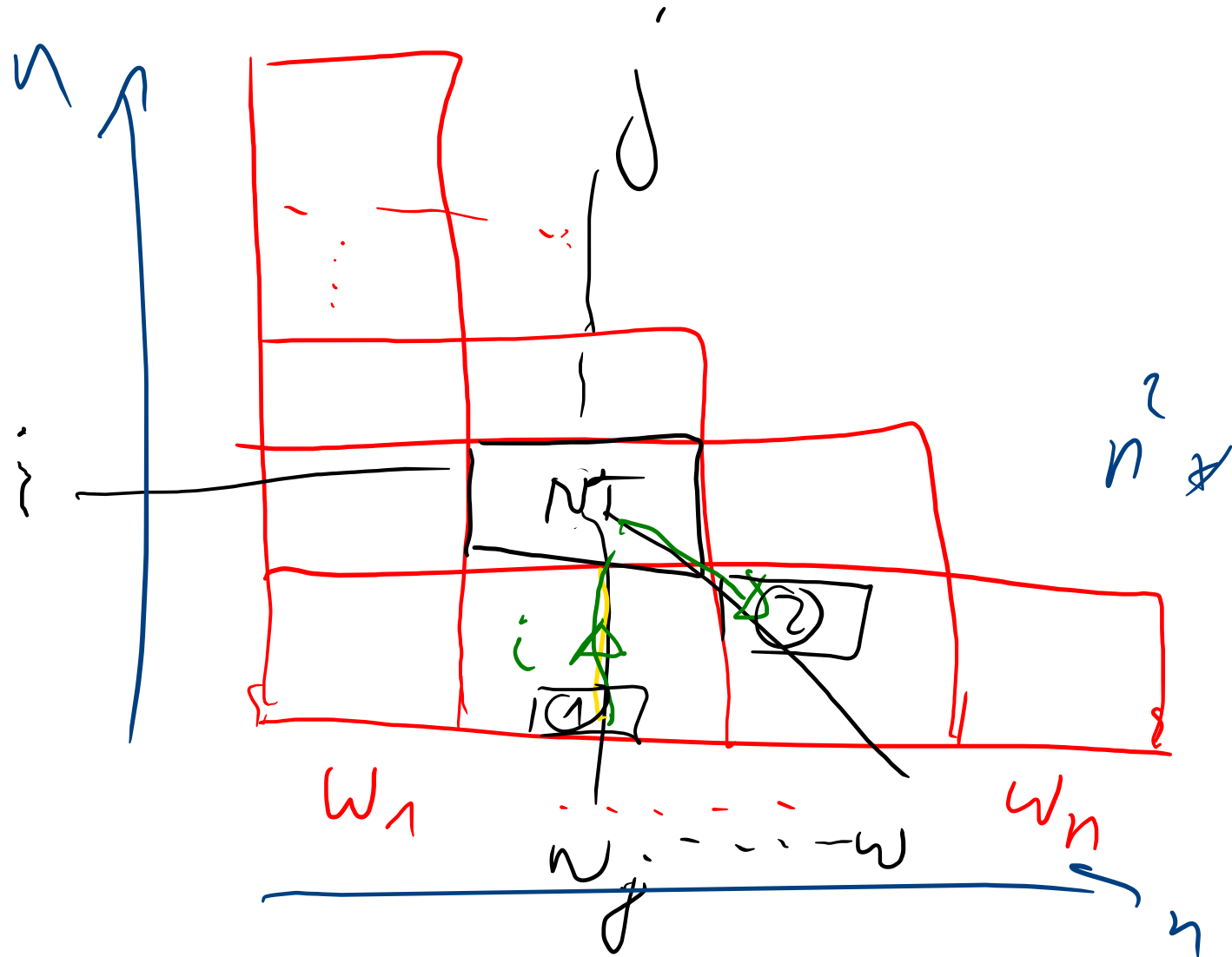
Laboratoire d'Intelligence Artificielle
Faculté I&C

Week(s 7 &) 8 keypoints

- ▶ Context-Free grammars (CFG)
 - ▶ (extended) Chomsky Normal Form (eCNF)
 - ▶ two principles of CYK algorithm (combine 2 and chart semantics)
 - ▶ CYK algorithm
 - ▶ complexity of CYK algorithm
 - ▶ (general) bottom-up chart parsing (no need for eCNF)
- 

Complexity / POS tags

non-terminal



$$NT \Rightarrow^* w_i \dots w_{j+i-1}$$

$$i \left(\begin{array}{c} \uparrow \\ \text{①} \\ \downarrow \end{array} \quad \begin{array}{c} \uparrow \\ \text{②} \\ \downarrow \end{array} \right)$$

$O(1)$

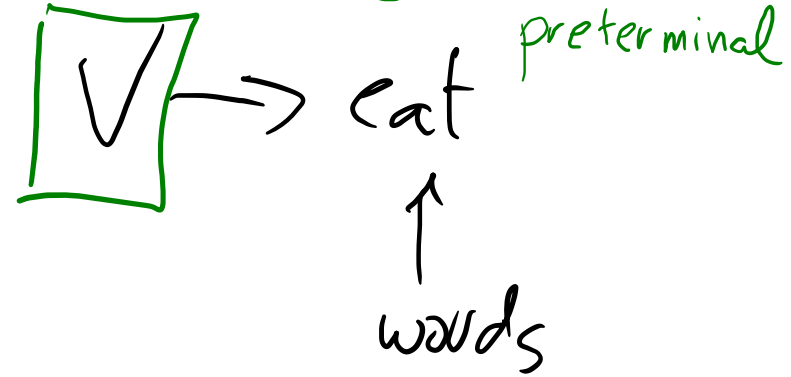
$O(n)$

$X \rightarrow Y Z$

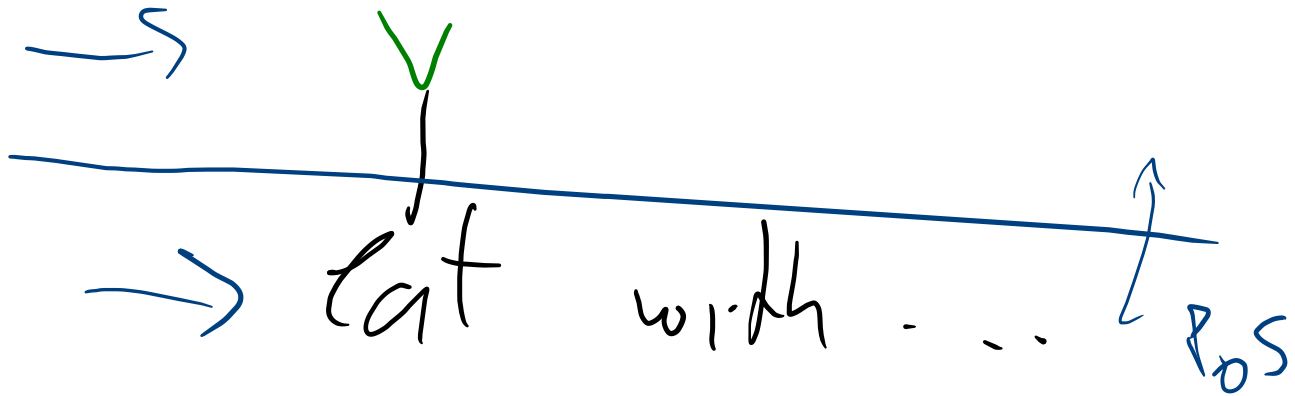
$A \rightarrow w$

"high level NTS"

POS tags \rightarrow NT



$VP \rightarrow V PNP$



Week 8 practice example

Consider the following CYK table excerpt:

	NP: 2 + 1 + 2			
	VP:			
①	AG: 2	NP: 7 + 2	2	
②	NP: 1	AG: 1	NP: 1	
③	NP: 1 VP: 1	NP: 1	AG: 1	NP: 1 VP: 1
	N: 1 V: 1	N: 1	Adj: 1	N: 1 V: 1

process

memory

efficient

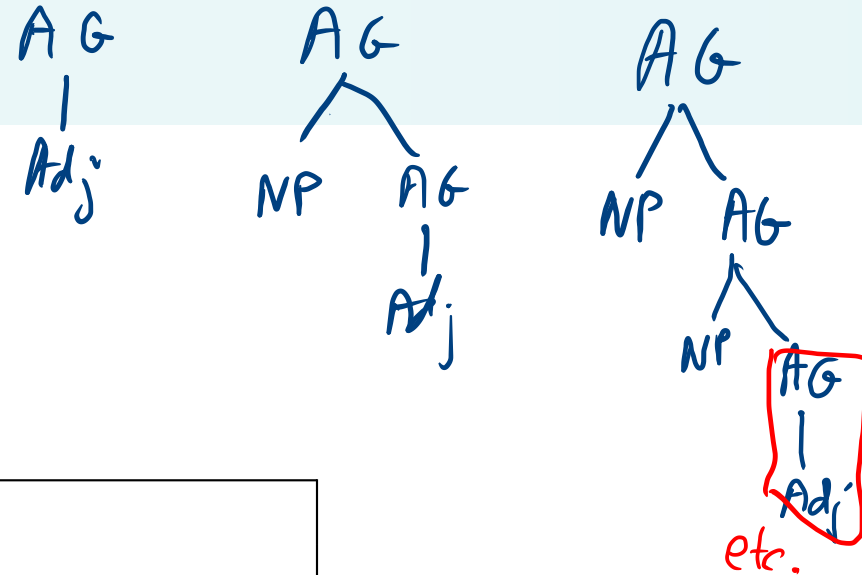
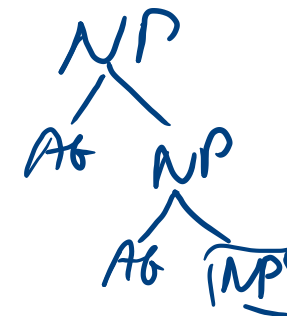
programs

filled using the former CFG excerpt:

AG --> Adj
 AG --> NP AG
 VP --> V
 VP --> V NP

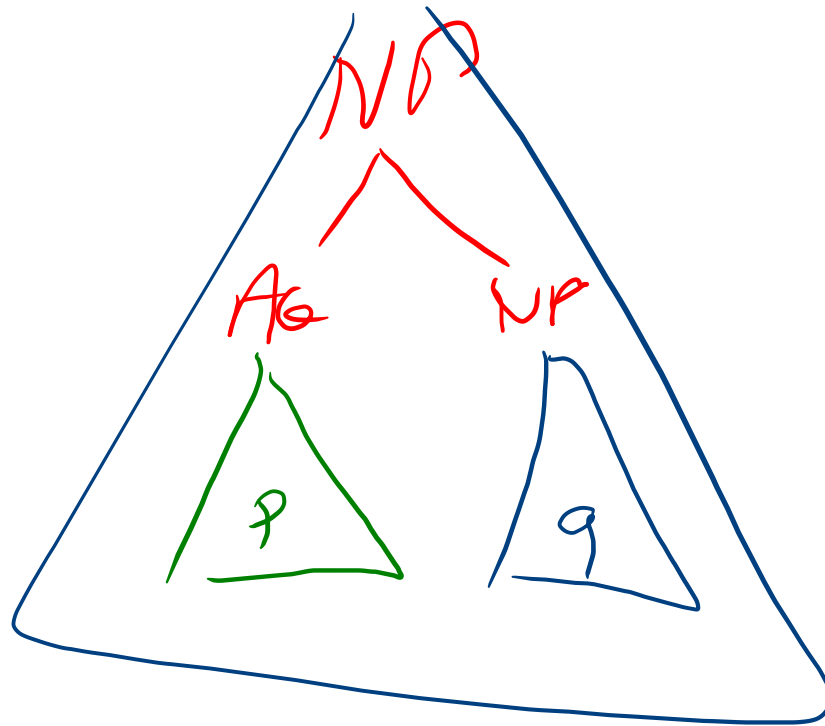
Adj | NP + Adj

NP --> N
 NP --> AG NP
 NP --> NP NP
 S --> S S



For each non-terminal in each cell, provide after each colon (:), as done in the first row, the corresponding number of derivations (subtrees).

From the chart, draw one (partial) parse tree (with root either NP or VP).



P • q

Week 8 practice example

Consider the following CYK table excerpt:

NP: $2 + 1 + 2 = 5$ VP: 2				
AG: $1 + 1 = 2$	NP: $1 + 1 = 2$			
NP: 1 VP:	AG: 1	NP: 1		
NP: 1 VP: 1 N: 1 V: 1	NP: 1 N: 1	AG: 1 Adj: 1	NP: 1 VP: 1 N: 1 V: 1	
<i>process</i>	<i>memory</i>	<i>efficient</i>	<i>programs</i>	

filled using the former CFG excerpt:

AG --> Adj
AG --> NP AG

VP --> V
VP --> V NP

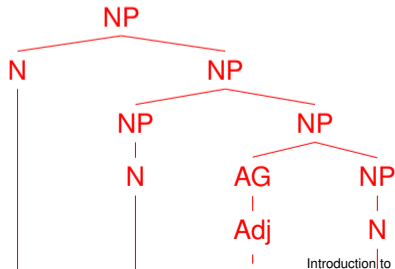
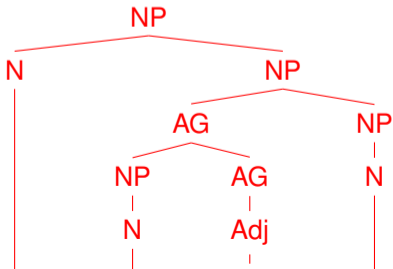
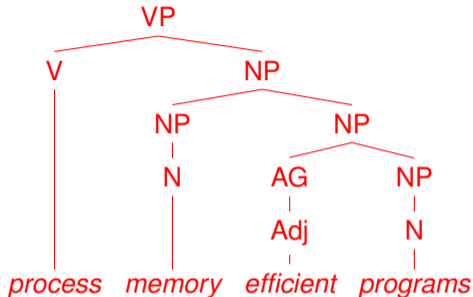
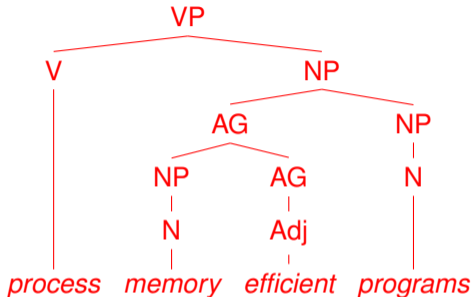
NP --> N
NP --> AG NP
NP --> NP NP

For each non-terminal in each cell, provide after each colon (:), as done in the first row, the corresponding number of derivations (subtrees).

From the chart, draw one (partial) parse tree (with root either NP or VP).

Week 8 practice example

Here (and next slide) are the seven possible trees:



Week 8 practice example

