

CFG (Context Free Grammar) : Phrase structure Grammar

Positional grammar

A. CFG consists with four components: $\langle N, T, S, P \rangle$

1. A set of non-terminal symbols, N
2. A set of terminal symbols, T
3. A designated start symbol, S , that is one of the symbols from N
4. A set of productions, P , of the form
 $A \rightarrow \alpha$

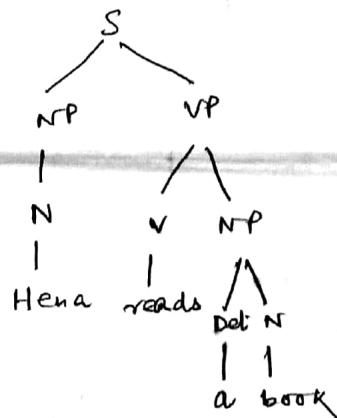
$S \rightarrow NP \ VP$

A noun phrase followed by a verb phrase

Hena reads a book

$[_S [_{NP} [_N \text{Hena}]] [_{VP} [_V \text{reads}]] [_{NP} [_{Det} \text{a}]] [_{N} \text{book}]]]$

$S \rightarrow NP \ VP \quad R_1$
 $NP \rightarrow N \quad R_2$
 $NP \rightarrow Det \ N \quad R_3$
 $VP \rightarrow V \ NP \quad R_4$
 $VP \rightarrow V \quad R_5$
 $N \rightarrow \text{Hena} / \text{She} \quad R_6$
 $V \rightarrow \text{reads} / \text{sings} / \text{sleeps} \quad R_7$



CFG and Parse tree

Noun Phrase

$NP \rightarrow \text{Pronoun}$
 $NP \rightarrow \text{Det } N$
 $NP \rightarrow \text{Noun}$
 $NP \rightarrow \text{Adj } N$
 $NP \rightarrow \text{Det Adj Noun}$
 $NP \rightarrow (\text{Det}) (\text{Adj}) \text{Noun} | \text{Pronoun}$
 \downarrow
 $NP \rightarrow (\text{Det}) (\text{AP}) \text{Noun} (\text{PP})$

They
An Orange
The foggy Morning
Chilled water
A beautiful lake in
Kashmir
Cold Milk shake

Verb phrase

$VP \rightarrow \text{Verb } (NP) (NP) (PP)^*$

$AP \rightarrow \text{Adjective Phrase}$
 $PP \rightarrow \text{Prepositional phrase}$