

(6;2

- Relating parse trees and derivations (not as in book)

DEF: A cut in a tree is a maximal set of unordered nodes.

→ every path from root to leaf is represented once

Note that cuts are preserved under replacing an element by its children!

DEF: $c_1 \prec c_2$ if c_2 can be obtained from c_1 by replacing some node by its children

least cut: {root}, greatest cut: Leaves!

Now, observe that one-step derivations correspond exactly to moving from a cut to a follower cut!

- From parse tree for w in G to derivation of w in G

maximal sequences of cuts correspond to derivations!

(but note that in an ambiguous grammar the reverse does not hold necessarily) Ex: left-most deriv. are unique for a given parse tree!

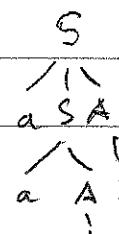
- From derivation to parse tree

inductively from left to right, for every one-step derivation, add children to respective leaf as specified by a possible production for this derivation (not unique!)

Ex: $S \xrightarrow{G} aSA \xrightarrow{G} aaAA \xrightarrow{G} aabA \xrightarrow{G} aabb$

for $G: S \rightarrow aA \mid aSA$

$A \rightarrow b$



One-to-one correspondence between parse trees and l.m. derivations