Parsing so far Bottom-up Chart Parsing: the CKY algorithm ISCL-BA-06 \* Parsing is the task of automatic syntactic analysis For most practical purposes, context-free grammars are the most useful formalism for parsing
We can formulate parsing as Çağrı Çöltekin ccoltekin@sfs.uni-tuebingen.de Top-down: begin with the start symbol, try to produce the input string to be parsed
Bottom up: begin with the input, and try to reduce it to the start symbol University of Tübingen Seminar für Sprachwissenschaft · Both strategies can be cast as search with backtracking Winter Semester 2020/21 Backtracking parsers are inefficient: they recompute sub-tri Bottom-up parsing as search Dealing with ambiguity  $S \rightarrow NP \ VF \ NP \rightarrow Pm \ N \ NP \rightarrow Pm \ N \ NP \rightarrow Pm \ N \ NP \rightarrow V \ NP \ VP \rightarrow V \ NP \rightarrow V \ NP$ → NP VE  $S \rightarrow NP VF$   $NP \rightarrow Det N$   $VP \rightarrow V NP$   $VP \rightarrow V$   $Det \rightarrow a$   $Det \rightarrow the$   $N \rightarrow cat$   $N \rightarrow dog$   $V \rightarrow bittes$   $N \rightarrow bittes$ Dealing with ambiguity Dealing with ambiguity  $S \rightarrow NP VP$   $NP \rightarrow Prn N$   $NP \rightarrow Prn$   $VP \rightarrow V NP$   $VP \rightarrow V S$   $N \rightarrow duck$   $V \rightarrow duck$   $V \rightarrow saw$   $Prn \rightarrow I$  $S \rightarrow NP VP$   $NP \rightarrow Pm N$   $NP \rightarrow Pm$ Ĩ  $NP \rightarrow Pm$   $VP \rightarrow V NP$   $VP \rightarrow V$   $VP \rightarrow VS$   $N \rightarrow duck$   $V \rightarrow duck$   $V \rightarrow saw$   $Pm \rightarrow I$ Prn → sh Pm → she Prn → her Prn → her Dealing with ambiguity Dealing with ambiguity  $\rightarrow$  NP VI  $\rightarrow$  NP VF  $NP \rightarrow Prn N$   $NP \rightarrow Prn$  $NP \rightarrow Pm N$   $NP \rightarrow Pm$ NI  $NP \rightarrow Prn$   $VP \rightarrow V NP$   $VP \rightarrow V$   $VP \rightarrow V S$   $N \rightarrow duck$   $V \rightarrow duck$  $NP \rightarrow Pm$   $VP \rightarrow V NP$   $VP \rightarrow V$   $VP \rightarrow V S$   $N \rightarrow duck$   $V \rightarrow duck$   $V \rightarrow saw$   $Pm \rightarrow I$  $\text{Prn} \to I$ Prn → she Prn → her Prn → she Prn → her duck Dealing with ambiguity Dealing with ambiguity  $\rightarrow$  NP VP  $\rightarrow$  NP VF  $S \rightarrow NP \ VF \ NP \rightarrow Pm \ N \ NP \rightarrow Pm \ N \ NP \rightarrow VF \ NP \rightarrow V \ NP \rightarrow V \ NP \rightarrow V \ NP \rightarrow V \ N \rightarrow duck \ V \rightarrow duck \ V \rightarrow saw \ Pm \rightarrow I \ Pm \rightarrow che$ NP → Prn N NP → Prn  $NP \rightarrow Prn$   $VP \rightarrow V NP$   $VP \rightarrow V$   $VP \rightarrow VS$   $N \rightarrow duck$   $V \rightarrow duck$ NP Pm Pm V → saw Prn → I Ĭ Prn → she Prn → she Prn → her Prn → sne Prn → her Dealing with ambiguity Dealing with ambiguity  $S \rightarrow NP VP$   $NP \rightarrow Pm N$   $NP \rightarrow Pm$   $VP \rightarrow VNP$   $VP \rightarrow V$   $VP \rightarrow V$   $VP \rightarrow VS$   $V \rightarrow duck$   $V \rightarrow duck$   $V \rightarrow saw$   $V \rightarrow IP$   $VP \rightarrow V$   $VP \rightarrow VS$   $V \rightarrow Saw$   $V \rightarrow Saw$  $S \rightarrow NP VI$   $NP \rightarrow Prn N$   $NP \rightarrow Prn$ NI  $NP \rightarrow Prn$   $VP \rightarrow V NP$   $VP \rightarrow V$   $VP \rightarrow VS$   $N \rightarrow duck$   $V \rightarrow duck$   $V \rightarrow sav$ Ï Prn → I Prn → she Prn → her 8





