

Chapter 2

Context Free Grammars

Objective

Today's primary objective:

- Introduce context-free grammars and practice writing simple context-free grammars.

Sample Grammar

```
⟨SENTENCE⟩ → ⟨NOUN-PHRASE⟩⟨VERB-PHRASE⟩
⟨NOUN-PHRASE⟩ → ⟨CMPLX-NOUN⟩ | ⟨CMPLX-NOUN⟩⟨PREP-PHRASE⟩
⟨VERB-PHRASE⟩ → ⟨CMPLX-VERB⟩ | ⟨CMPLX-VERB⟩⟨PREP-PHRASE⟩
⟨PREP-PHRASE⟩ → ⟨PREP⟩⟨CMPLX-NOUN⟩
⟨CMPLX-NOUN⟩ → ⟨ARTICLE⟩⟨NOUN⟩
⟨CMPLX-VERB⟩ → ⟨VERB⟩ | ⟨VERB⟩⟨NOUN-PHRASE⟩
  ⟨ARTICLE⟩ → a | the
    ⟨NOUN⟩ → boy | girl | flower
      ⟨VERB⟩ → touches | likes | sees
        ⟨PREP⟩ → with
```

Grammar has 10 variables, 27 terminals (regular alphabet plus space characters) and 18 rules.

Ex. Context-Free Grammar

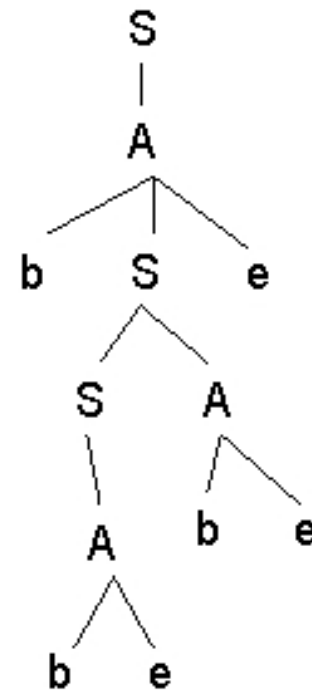
- $S \rightarrow SA$
- $S \rightarrow A$
- $A \rightarrow bSe$
- $A \rightarrow be$

Example: b and e matched
as parentheses

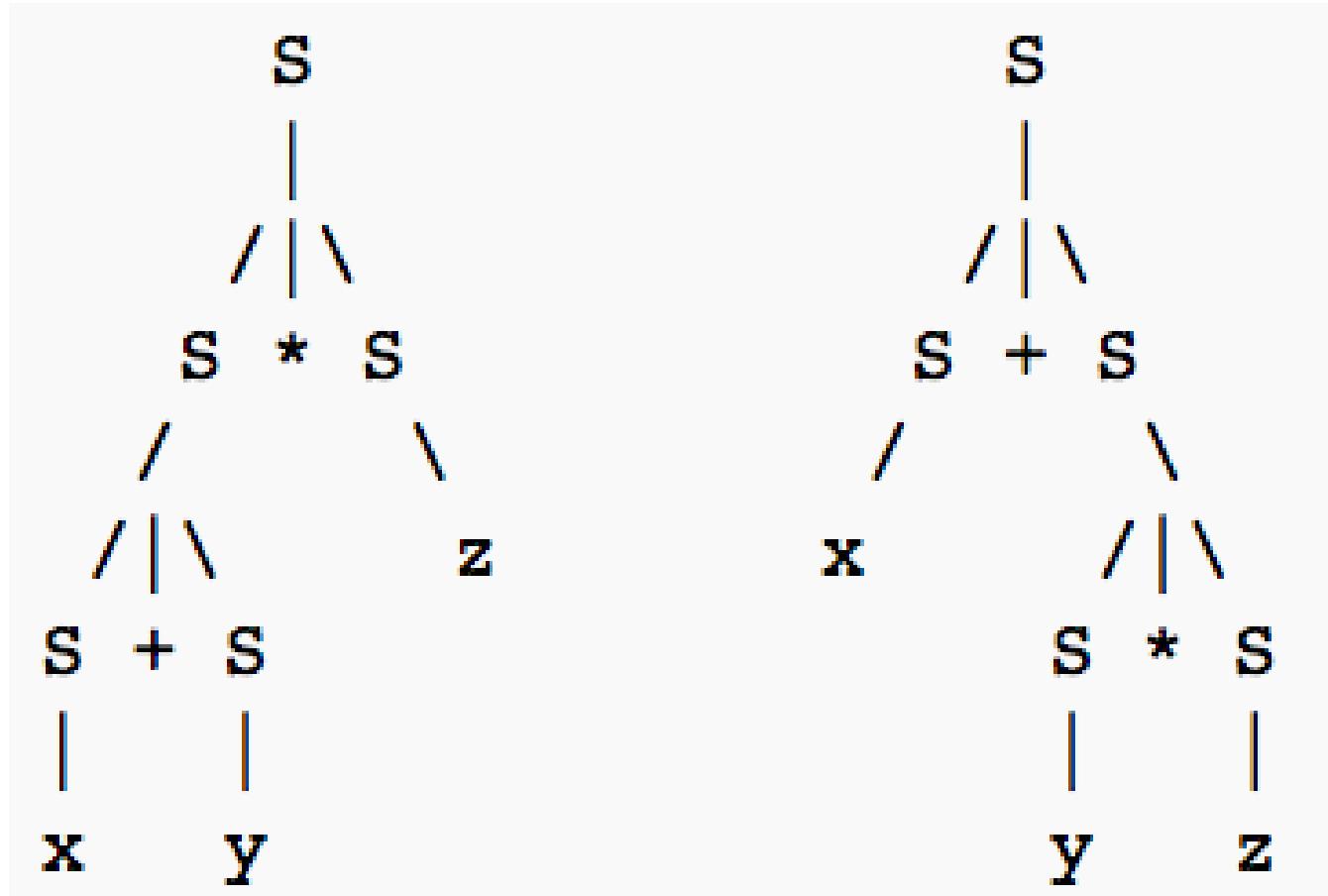
derivation of bbebee

S
A
bSe
bSAe
bAAe
bbeAe
bbebee

hierarchical
parse tree



Compare



From <https://brilliant.org/wiki/context-free-grammars/>