SYNTAX

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What is Syntax?

- Structure of language
  - How words are arranged together and related to one another
  - Ordering words in sequences to express meanings for which no separate word exists.
- Goal of syntactic analysis
  - relate surface form to underlying structure, to support semantic analysis
- Syntactic representation
  - typically a tree structure

Regularities in language

- Word n-grams model **regularities in word sequences**
- Part-of-speech n-grams model **regularities in word category sequences.**
- Language has richer structure.
- Two views of linguistic structure:
  1. Constituency = phrase structure grammar= context-free grammars (CFGs)
  2. Dependency Structure
     - Dependency structure shows which words depend on (modify or are arguments of) which other words.

Phrase Structure Grammar

- Phrase structure organizes words into nested constituents

- **Starting unit: words**

  the, cat, cuddly, by, door

- **Words combine into phrases**

  the cuddly cat, by the door

- **Phrases can combine into bigger phrases**

  the cuddly cat by the door

Phrase Structure Grammar

- Phrase structure organizes words into nested constituents - Can represent the grammar with CFG rules
- **Starting unit: words** are given a category (part of speech = pos)

  the, cat, cuddly, by, door

  Det N Adj P N
- **Words combine into phrases** with categories

  the cuddly cat, by the door

  NP →Det Adj N ★ PP →P NP
- **Phrases can combine into bigger phrases** recursively

  the cuddly cat by the door

  NP →NP PP

Dependency Structure

- Dependency structure shows which words depend on (modify or are arguments of) which other words.

Put the book on the big table in the room next to the vase.

Why is Syntax Important?

- Many aspects of meaning can be learnt using the syntactic structure.
  - The NP preceding VP is likely the subject of the action.
  - The NP following the VP is likely the object of the action.
- Knowing basic units is helpful in modeling language.
  - You can use this to predict or complete the sentence.
  - Re-organize sentences or simplify them.

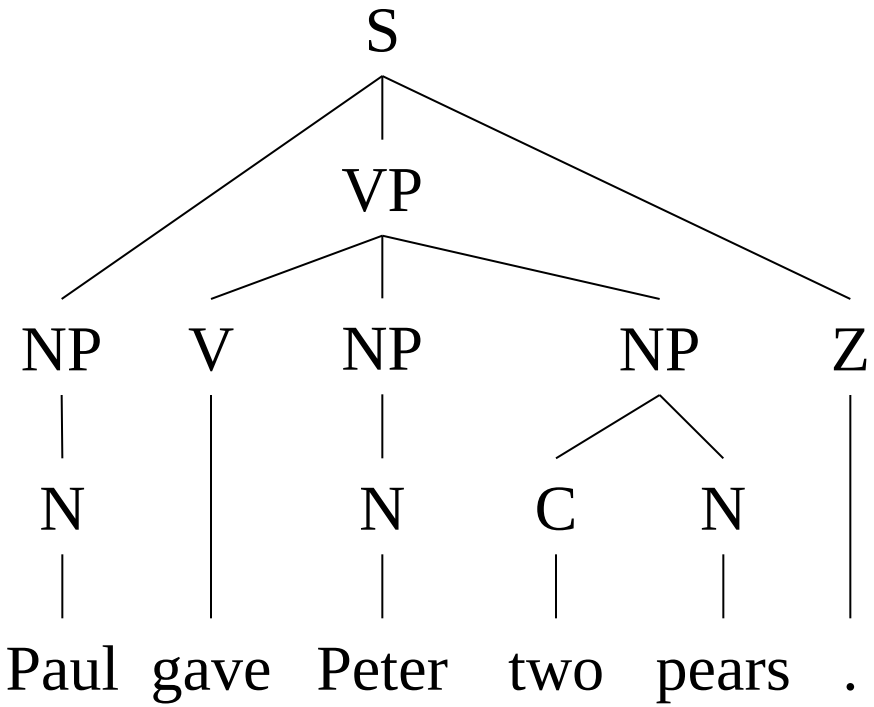
- Grammar checkers
- Question answering
- Information extraction
- Machine translation
- Semantic role labeling

Syntactic Structure

- Different shapes in different theories
- Typically a tree
  - Phrasal (constituent) tree, parse tree
  - Dependency tree

Example of Constituent Tree

- Constituency: abstraction— groups of words behaving as a single units, or constituents
- ((Paul (gave Peter (two pears))) .)



Example of Dependency Tree

- [#,0] ([gave,2] ([Paul,1], [Peter,3], [pears,5] ([two,4])), [.,6])