Preparatory Course: Syntax 1

Lecture 1 (12.10.2007)

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http://www.coli.uni-saarland.de/courses/msc-prep-07/

Syntax: What does it mean?

We can view syntax/syntactic theories in a number of ways, two of which are the following:

- Psychological way/model: syntactic structures correspond to what is in heads of speakers and hearers
- Computational way/model: syntactic structures are formal objects which can be mathematically treated/manipulated

Syntactic Analysis

- Focus on collection of words and rules with which we generate strings of those words, i.e., sentences (generative grammar)
- Syntax attempts to capture the nature of those rules

1. Colourless green ideas sleep furiously.
2. *Furiously sleep ideas green colourless.

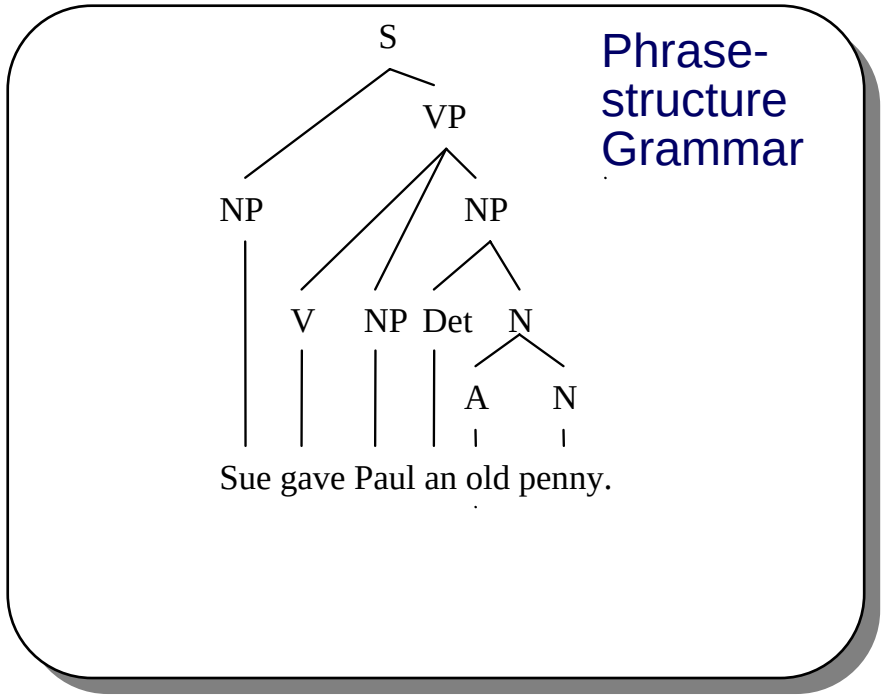
- What generalisations are needed to capture the difference between grammatical and ungrammatical sentences?

Phrase Structure Grammars (PSGs)

- Grouping, or constituency, is used

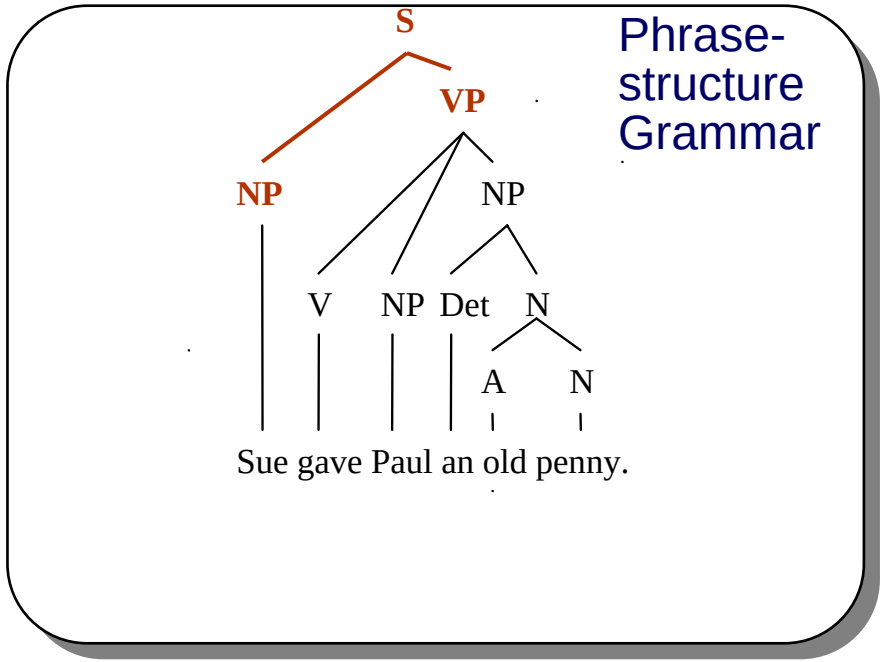
(1) Sue gave Paul an old penny.

Phrase Structure Grammars (PSGs)



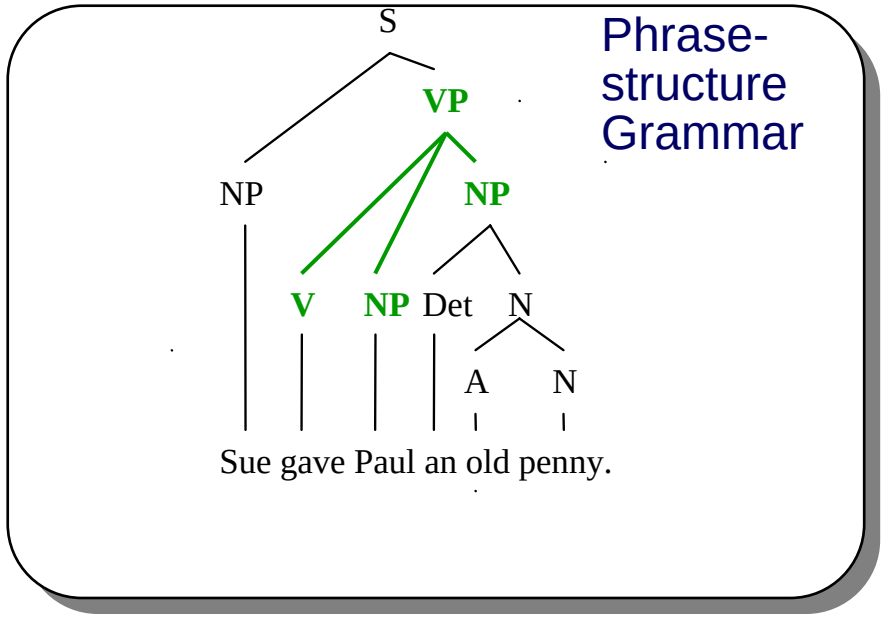
$S \rightarrow NP\ VP$

Phrase Structure Grammars (PSGs)



S → NP VP

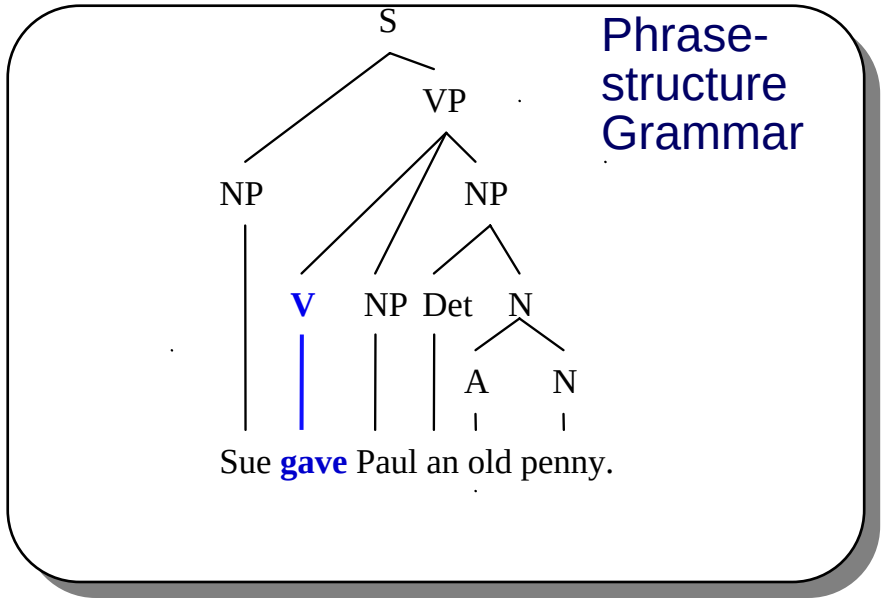
Phrase Structure Grammars (PSGs)



S → NP VP

VP → V NP NP

Phrase Structure Grammars (PSGs)



$S \rightarrow NP\ VP$
$VP \rightarrow V\ NP\ NP$

$V \rightarrow$ gave

The Transformational Tradition

Roughly speaking, **transformational syntax** (GB = Government and Binding, P&P = Principles and Parameters,...) has focused on the following:

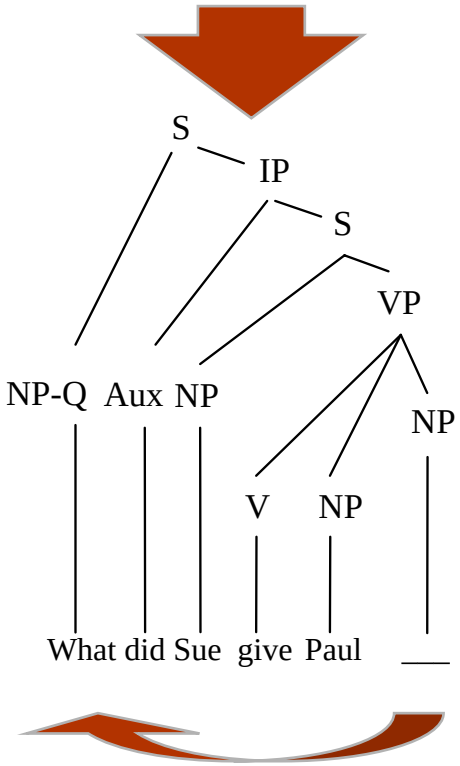
- Explanatory adequacy: the data must fit with a deeper model, that of universal grammar
- Psychological: does the grammar make sense in light of what we know of how the mind works?
- Theory-driven: data should ideally fit with a theory already in place (often based on English)

The Transformational Tradition (cont.)

- Universality: generalisations must be applicable to all languages
- Transformations: (surface) sentences are derived from underlying other sentences, e.g., passives are derived from active sentences

The Transformational Tradition (cont.)

Sue gave Paul an old penny



The Transformational Tradition (cont.)

But this kind of theory does not lend itself well to computational applications

Making it computational

How is a syntactic theory useful for computational linguistics?

- Parsing: take an input sentence and return the syntactic analysis and/or state whether it is a valid sentence
- Generation: take a meaning representation and generate a valid sentence

=> Both tasks are often subparts of practical applications, such as Machine Translation (MT) and Dialogue systems, for instance

Computational Needs

To use a grammar for parsing or generation, we need to have a grammar that meets several criteria:

- Accurate: gives a correct analysis
- Precise: tells a computer exactly what it is that one wants it to do
- Efficient: able to parse a sentence and return one or only a small number of parses
- Useful: is relatively easy to map a syntactic structure to its meaning

=> These needs are not necessarily why the computational formalisms were developed, but they are some of the reasons why people use them.