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6. Exercise for "Sprachverarbeitung und Text Mining"

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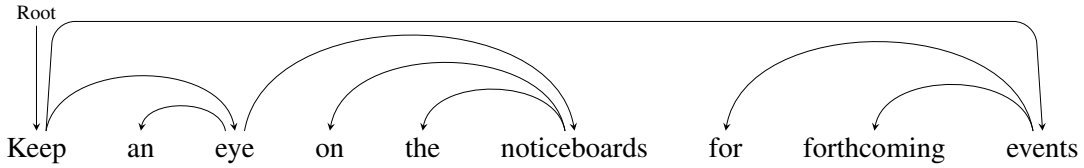
1 Knowledge Questions

1. Give a definition of Constituency Parsing in your own words.
2. What are possible applications for Constituency Parsing?
3. Give a definition of Dependency Parsing in your own words.
4. What are possible applications for Dependency Parsing?
5. What general (search-based) parsing strategies do you know? Briefly explain how they operate.

   What are the advantages of each of these strategies?
6. What is the main issue with parsers based on a CFG, regarding the ambiguity of the parsing results? How could it be fixed?

2 Dependency Grammar

Given is the following dependency graph:



Extract a bi-lexical dependency grammar for this dependency tree according to the lecture slides 14-33ff. Visualize your dependency grammar with a tree as done in the lecture slides 14-44.

3 Grammar for Yoda

Create a grammar whose Expressiveness covers at least the following sentences.

```
Much to learn you still have
Always in pairs they are a master and an apprentice
Into exile I must go
```

4 Chomsky-Normalform

A grammar $G = (V, \Sigma, P, S)$ is in the so-called Chomsky Normal Form if every production rule $p \in P$ has one of the following forms:

$$
\begin{aligned}
A &\to BC \\
A &\to a \\
S &\to \epsilon
\end{aligned}
$$

Here Σ denotes the set of all words, V denotes the set of all non-terminal symbols, S denotes the start symbol, and ϵ denotes the empty word. Assume in the following that grammars in language processing can do without the empty word ϵ.

Using the algorithm from the lecture, convert the following grammar (terminal symbols in quotes) into Chomsky Normal Form. It is sufficient to solve each problem once as an example.

$$
\begin{aligned}
S &\to NP\ VP \\
S &\to Aux\ NP\ VP \\
S &\to VP \\
NP &\to Pronoun \\
NP &\to Propernoun \\
NP &\to Det\ Nominal \\
NP &\to \text{"}the\text{"}\ Noun \\
Nominal &\to Noun \\
Nominal &\to Nominal\ Noun \\
Nominal &\to Nominal\ PP \\
VP &\to Verb \\
VP &\to Verb\ NP \\
VP &\to Verb\ NP\ PP \\
VP &\to Verb\ PP \\
VP &\to VP\ PP \\
PP &\to Prep\ NP \\
Verb &\to \text{"}drink\text{"}
\end{aligned}
$$