KATHOLIEKE UNIVERSITEIT
LEUVEN

QUERYING TREEBANKS BY EXAMPLE

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KU LEUVEN

CLIN 22 – January 20th, 2012

NEDERBOOMS

- **Exploitation of Dutch treebanks for research in linguistics**

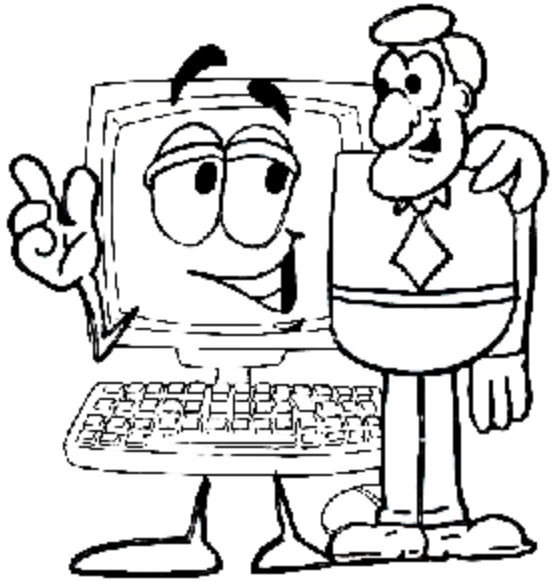
- September 2010 – February 2012
- Frank Van Eynde (CCL) and Hans Smessaert (NGTG)
- Liesbeth Augustinus and Vincent Vandeghinste (CCL)
- CLARIN Project

- Goals
  - User-friendly tools
  - Access to large data files
  - Fast and accurate

CLARIN
Common Language Resources and Technology Infrastructure

NEDERBOOMS

How can we combine the **data-oriented approach** of **treebank mining** with the **knowledge-oriented** method of **theoretical and descriptive linguistics?**



OUTLINE

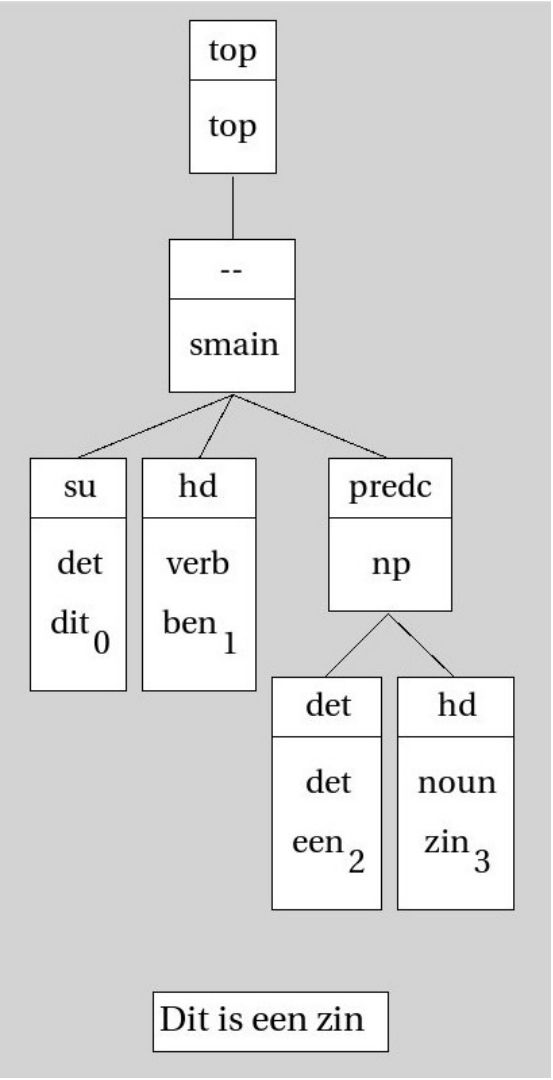
- The Nederbooms project
- **Querying LASSY**
  - **Existing tool & querying issues**
  - GrETEL
- Conclusion and future research

LASSY

- Written texts
  - Wikipedia, books, newspapers, reports, websites, law texts...
- ALPINO parser (van Noord)
  - Automatic syntactic annotation, XML-trees
- LASSY small
  - 1 million words, 65200 sentences
  - Manually corrected
- LASSY large
  - 1.5 billion words
  - Not corrected

ALPINO

“Dit is een zin” >> ALPINO parser >>



QUERYING LASSY

- Existing search tool: **dtsearch** (Kloosterman 2007)
  - Query language **XPath**

    = standard query language for xml trees

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- Some examples
  - “look for all nodes in which a noun is modified by the adjective 'politiek' e.g. *politieke discussies*”

```
//node/node[@root='politiek' and @pos='adj']/../
node[@pos='noun']
```

  - “look for all subclauses where the participle occurs before the finite verb e.g. *... dat het gebeurd is*”

```
//node[@cat='ssub' and ((./node[@rel='vc' and
@cat='ppart']/node[@rel='hd' and @pos='verb']/@begin <
./node[@rel='hd' and @pos='verb']/@begin)) and (./node[@rel='vc'
and @cat='ppart']/node[@rel='hd' and
@pos='verb']/../../node[@rel='hd' and @pos='verb'])]
```

QUERYING LASSY

XPath

- Not user-friendly
- Knowledge of Alpino grammar necessary

= problematic for non-technical linguists

- Verify theory through data with corpus or treebank examples
- Time consuming, requires some effort

How to make interaction between computational linguistics and theoretical linguistics possible?

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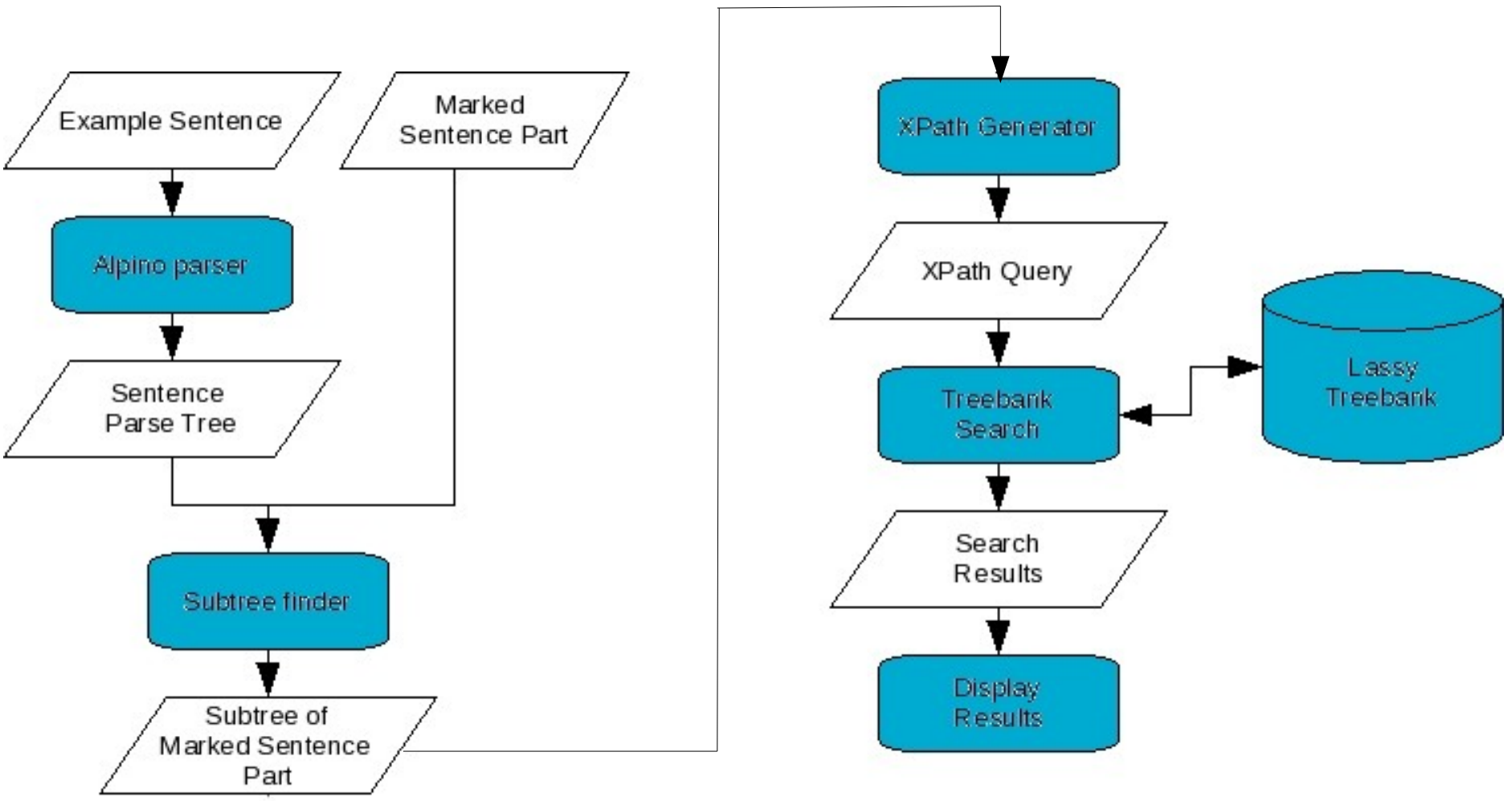
GrETEL

- **Gr**eedy **E**xtraction of **T**rees for **E**mpirical **L**inguistics

- Search tool based on example sentences
- Input = natural language
- No explicit knowledge of formal query language nor Alpino grammar required
- Bridge gap between descriptive and computational linguistics

GrETEL - architecture



GrETEL – input

Zowel [NP] als [NP] + singular or plural?

bv. Zowel de politie als de brandweer is/zijn ter plaatse. (Taaladvies.net)

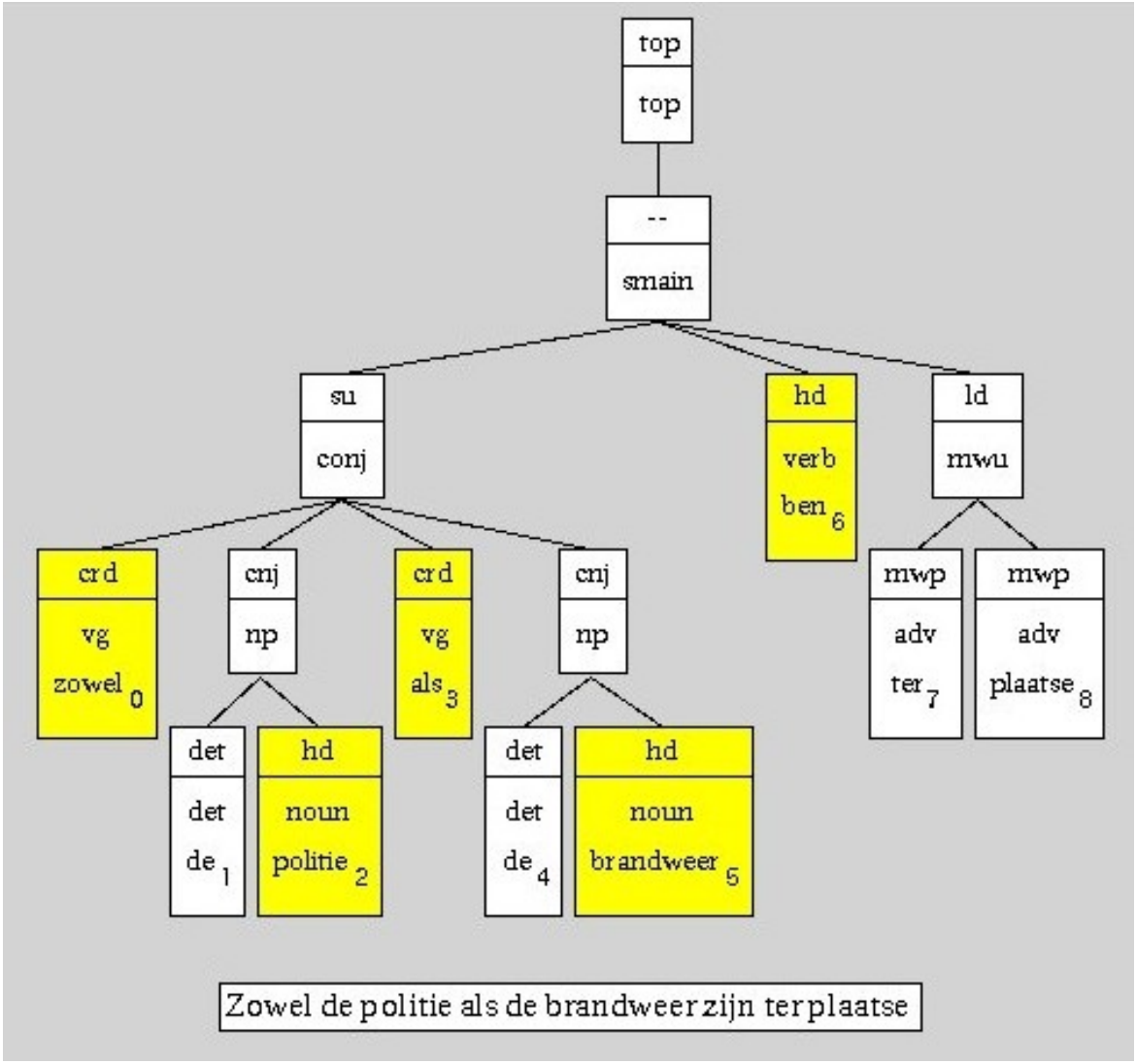
“Both the police and the fire brigade is/are on site.”

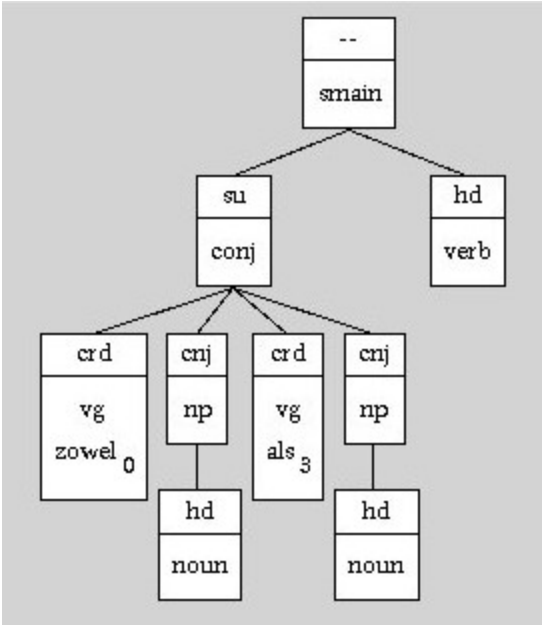
>> parsed with Alpino

GrETEL – annotation

>> add info to Alpino parse

GrETEL – subtree





GrETEL – XPath

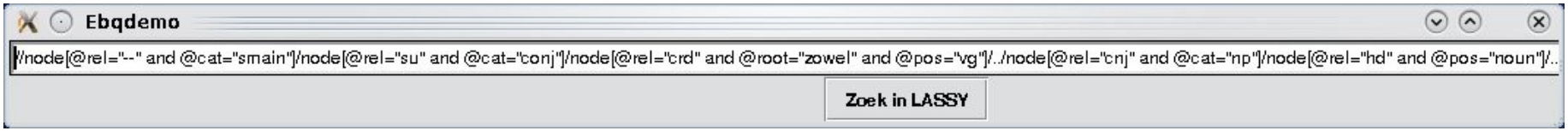
- XPath generated automatically

```
//node[@cat='smain' and ./node[@rel='su' and
@cat='conj']/node[@rel='crd' and @root='zowel' and
@pos='vg']/../node[@rel='cnj' and @cat='np']/node[@rel='hd'
and @pos='noun']/../../node[@rel='crd' and @root='als' and
@pos='vg']/../node[@rel='cnj' and @cat='np']/node[@rel='hd'
and @pos='noun']/../../../node[@rel='hd' and @pos='verb']]
```

= long, specific query

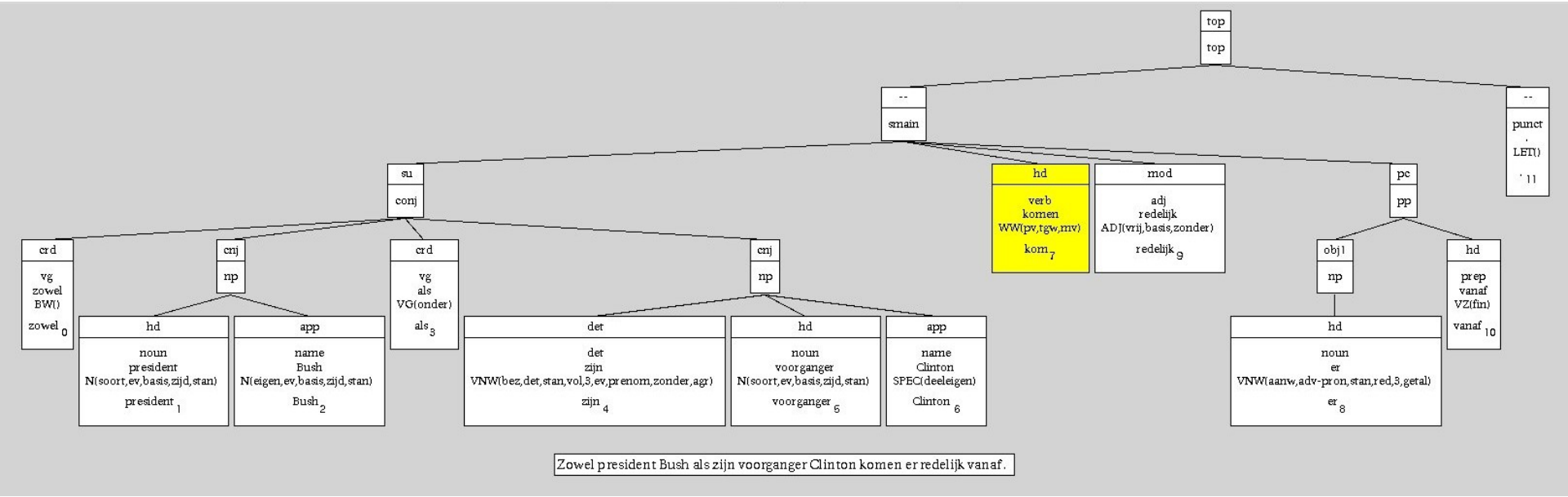
> manually adaptable in advanced search mode

- to generalise (include names, pron)
- to specify (look for singular finite verbs only)



GrETEL – output

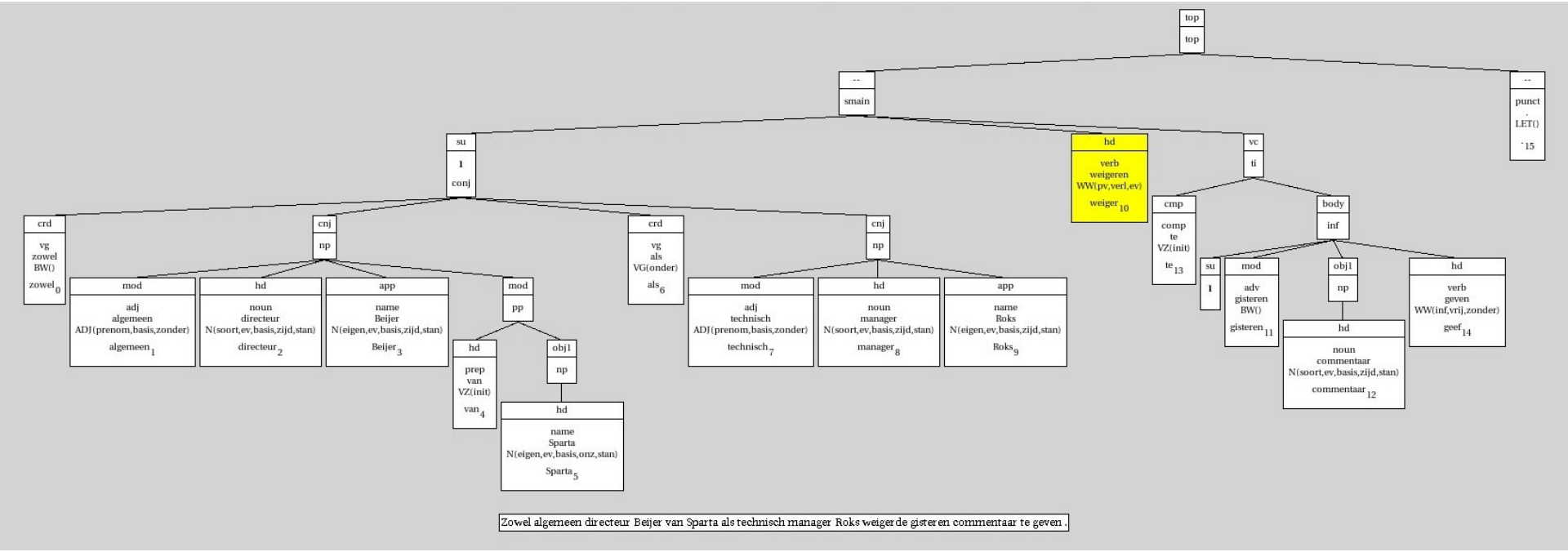
- 22 results > sample of similar sentences
- Singular and plural form of the finite verb



Zowel president Bush als zijn voorganger Clinton **komen** er redelijk vanaf.

“Both president Bush and his predecessor Clinton did reasonably well.”

GrETEL – output



Zowel algemeen directeur Beijer van Sparta als technisch manager Roks **weigerde** gisteren commentaar te geven.

“Both general director Beijer of Sparta and technical manager Roks refused to comment yesterday.”

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CONCLUSION

- **Nederbooms**: Treebank mining for empirical linguistics

- Search tool for descriptive linguistics: **GrETEL**
  - LASSY Treebank
  - User-friendly:
    - input = natural language
    - XPath generator > knowledge of formal query language not required
    - ordering filter
    - basic and advanced search mode
  - Output = sample of similar sentences

FUTURE RESEARCH

- Speed up search
  - > query LASSY large (1.5 billion words)
  - > breadth-first string representation, Varro (Martens 2010)
- Add more features
  - > e.g. query subcorpora
- Automatically look for closely-related examples (more or less specific)
- Add more quantitative information
- Webservice

Thanks for your attention!

Questions?

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