Language Dynamics in the Dutch Golden Age

linguistic and socio-cultural aspects of intra-author variation

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Project overview

- 16th and 17th century Dutch: linguistic variation and change
- This project: **intra-author variation**, i.e., variation within individual, influential language users
- **Data:** P.C. Hooft, Stevin, Coornhert, Vondel, …
- **Approach:** Use computational methods to allow large-scale search for morpho-syntactic structures, enabling systematic research into variation patterns
- **Methodology:**
  1. Corpus selection and cleaning
  2. *Close reading* for linguistic and literary analysis
  3. Identifying sociological features
     - location, genre, audience, gender, …
  4. Extracting morphological features
     - negation, case, infinitival clauses, …
- **Direct method:** use and improve tools for historical Dutch
- **Indirect method**: text modernization, tools for modern Dutch

1 Direct method: automatic and manual enrichment

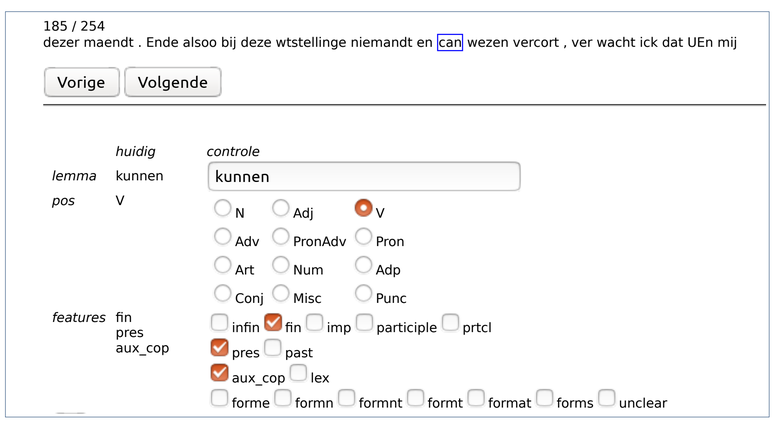
Letter of P.C. Hooft [1] to the mayors of Muiden, June 18, 1609, asking to postpone the election for guard commanders. *En* is used both as conjuction and negation.

> [...] dat UE. de keur **en** bevestinge der bevelhebberen over de schutterie gelieven sal wt te stellen **ende** op te houden tot op Sondach over acht daeghen werdende den achtentwintichsten dezer maendt. **Ende** alsoo bij deze wtstellinge niemandt **en** can wezen vercort [...]
> *that you please postpone the choice and confirmation of the commanders of the guard and hold off until Sunday in eight days, being the 28th of this month. And also with this delay nobody will be opposed*

- Enrichment using the Adelheid tagger for Middle Dutch [2]:

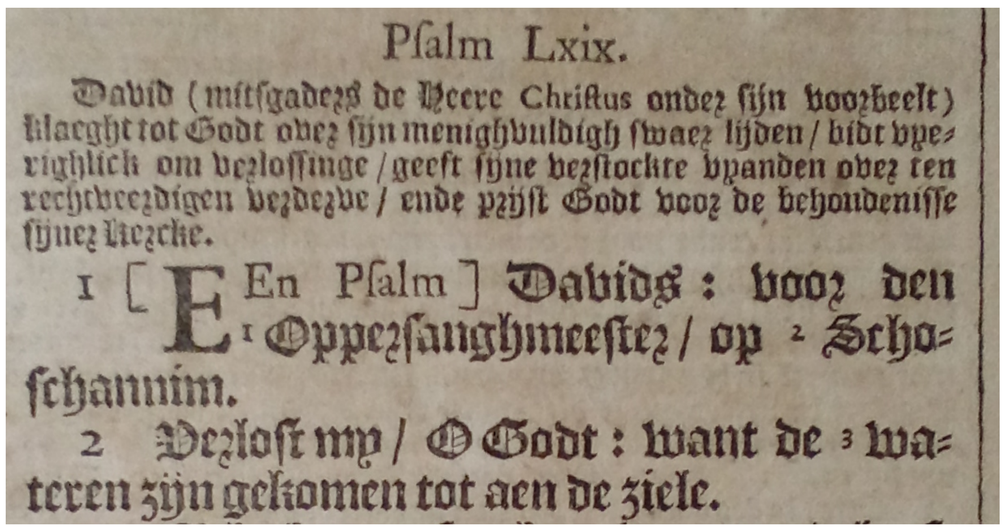
word	lemma	POS
dat	dat	Art(def)
UE	vee	N(sing,forme)
.	.	Punc(period)
de	te	Adp()
keur	eekhoorn	N(prop)
en	in	Adp()
bevestinge	bezating	N(sing,forme)
[...]		
Ende	en	Conj(coord)
alsoo	alzo	Adv(gener)
bij	bij	Adp()
deze	deze	Art(def,forme)
wtstellinge	stalling	N(plu,forme)
niemandt	???	N(sing)
en	en	Adv(neg)
can	kunnen	V(fin,pres,aux_cop)
wezen	zijn	V(infin)
vercort	???	N(sing)

- Automatic tagging provides useful results
- Still many errors, manual correction desired
- In preparation: annotation correction sessions with newly developed tool



2 Indirect method: automatic modernization

- Modernization of spelling and grammar allows use of tools for modern Dutch
- *Note:* some features (e.g., negative concord and case marking) are lost after modernization
- Automatic conversion is possible using parallel text to train algorithms and construct a translation lexicon
- Relatively large parallel text available in diachronic translations of the Bible



Pſalm Lxix.

David (mitſgadezs de Heere Chriſtus onder ſijn voorbeelt) klaeght tot Godt over ſijn menighvuldigh ſwaer lijden / bidt vpe= righlick om verloſſinge / geeft ſijne verſtockte vyanden over ten rechtveerdigen verderve / ende prijſt Godt voor de behoudeniſſe ſijnes Kerckes.

1 [EEn Pſalm] Davids : voor den [1] Oppezſanghmeeſtez / op [2] Schoſchannim.

2 Verloſt my / O Godt : want de [3] wateren zijn gekomen tot aen de ziele.

> 1637: Verlost my, o Godt : want de wateren zijn gekomen tot aen de ziele.
> 1888: Verlos mij, o God ! want de wateren zijn gekomen tot aan de ziel.
> *Save me, O God; for the waters are come in unto my soul.*

- Statistical Machine Translation using Moses [3]
- Alternative: start from scratch using various rule-based and machine learning-based approaches
  - Construct 1-to-1 translation lexicon using sentences of equal length
  - Perform alignment to handle sentences of unequal length
  - Compile a set of manual modernization rules (e.g., strip case markers)
  - Construct many-to-1 translation lexicon using aligned sentences
  - Use POS-information for already modernized words to choose the right alternative for historical words
    - ◇ *haer* + V → *hen*
    - ◇ *haer* + N → *hun*
  - Compile rules to address punctuation differences
- Results of both approaches are comparably accurate
  - BLEU score for evaluation of machine translation [4]
  - Moses: 0.61631 (corrected for capitalization: 0.63867)
  - From scratch: 0.62715
- Combination of approaches not straightforward
  - Sequential application leads to decreased performance
  - Translation results not applicable as input between approaches
  - Translation errors propagate
  - Exception: Moses + manual rules (0.64418)

References

[1] Hendrik van Tricht. *De briefwisseling van Pieter Corneliszoon Hooft*. Tjeenk Willink / Noorduijn, 1976.

[2] Hans van Halteren and Margit Rem. Dealing with orthographic variation in a tagger-lemmatizer for fourteenth century Dutch charters. *Language Resources and Evaluation*, 47(4):1233–1259, 2013.

[3] Philipp Köhn, Hieu Hoang, Alexandra Birch, Chris Callison-Burch, Marcello Federico, Nicola Bertoldi, Brooke Cowan, Wade Shen, Christine Moran, Richard Zens, et al. Moses: Open source toolkit for statistical machine translation. In *Proceedings of the 45th annual meeting of the ACL on interactive poster and demonstration sessions*, pages 177–180. Association for Computational Linguistics, 2007.

[4] Kishore Papineni, Salim Roukos, Todd Ward, and Wei-Jing Zhu. BLEU: a method for automatic evaluation of machine translation. In *Proceedings of the 40th annual meeting on association for computational linguistics*, pages 311–318. Association for Computational Linguistics, 2002.

Acknowledgements

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