Cues for verb-finality in adult-directed and child-directed Dutch

Aleksei Nazarov

Utrecht University

Institute for Language Studies

Overview

- Dutch PP and separable verb particle (SVP) order w.r.t. verb
  - Optionality & difference in transparency to learning Dutch basic word order
- GrETEL: existing tool to facilitate searching treebanks
- Child-directed and adult-directed texts searched
  - Spoken and written
- Results:
  - PP order tends to be transparent, and more so in child-directed speech
  - SVP order tends to be opaque, but less so in child-directed speech
  - No major threats to learnability expected from existing results

Dutch word order

- Dutch generally acknowledged as verb-final language (e.g. Koster 1975)
  - Verb-finality in embedded clauses, but V2 in main clauses

Die doceerde taalkunde
they taught linguistics
*… dat die doceerde taalkunde
that they taught linguistics

*Die taalkunde doceerde
they linguistics taught
… dat die taalkunde doceerde
that they linguistics taught

- Creates learnability challenge: main clauses are generally more frequent, but only embedded clauses show “underlying” word order
  - Constructions with non-verb-final embedded clauses: additional problem?

Dutch PP constructions (Broekhuis & Corver 2020a,b)

- In main clauses, PPs can be only after the verb
- Embedded clauses: PPs before or after the verb

Die doceerde in Utrecht
they taught in Utrecht

… dat die doceerde in Utrecht
that they taught in Utrecht

*Die in Utrecht doceerde
they in Utrecht taught

… dat die in Utrecht doceerde
that they in Utrecht taught

- Postverbal PP in embedded clauses: violates strict verb-finality, potentially takes away from cues (*non-transparent* word order)

Dutch particles

- Separable verb particles (SVPs; Booij & Audring 2020):
  - Separated from verb in main clauses

Die gaat in Utrecht door-t_{gaat} *Die door-gaat in Utrecht $t_{door\text{-}gaat}$
they goes in Utrecht SVP   *they SVP-goes in Utrecht*
"They (will) continue in Utrecht"

  - In verb clusters, may be adjacent to or separate from their host verb
  - Separate word order provides a cue for verb-finality (*transparent*)

adjacent: … dat die [[[$t_{door\text{-}gaan}$] t_{willen}] heeft] willen door-gaan
that they has want.INF SVP-continue.INF
separate: … dat die [[[door-t_{gaan}] t_{willen}] heeft] willen gaan
that they SVP has want.INF continue.INF

Combination

- SVPs and PPs combined:
  - Hard constraint: when SVP and PP are adjacent, PP comes first

    … dat die in Utrecht door heeft willen gaan
    that they in Utrecht SVP has want continue
    *… dat die door in Utrecht heeft willen gaan
    that they SVP in Utrecht has want continue

  - Otherwise, SVP and PP order seems independent

    in U door heeft willen gaan / door heeft willen gaan in U
    in U heeft willen doorgaan / **heeft willen doorgaan in U**

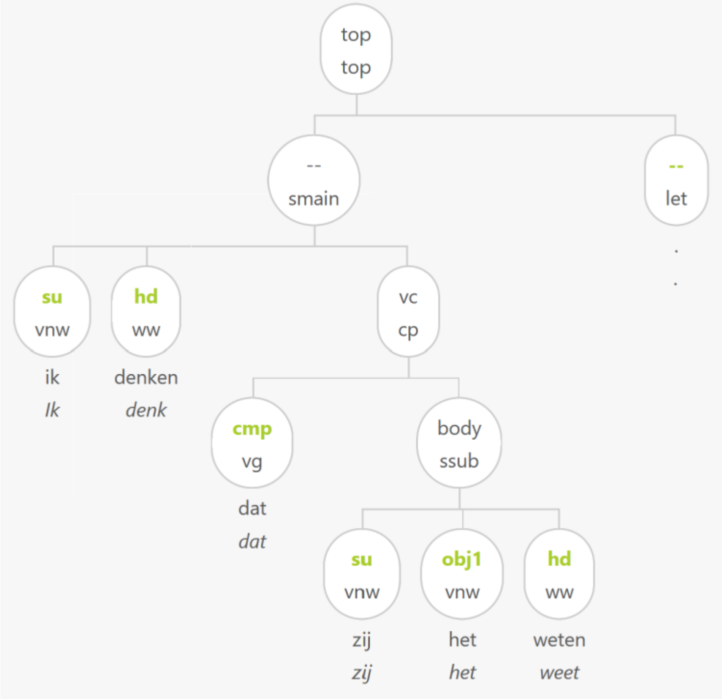
    - How often do *doubly opaque* orders occur? Tradeoff between SVP/PP?

GrETEL

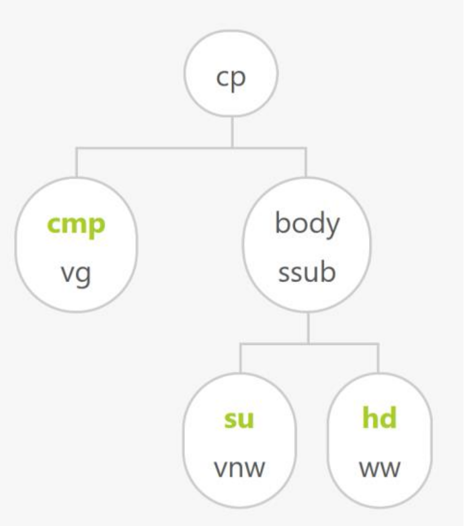
- Greedy Extraction of Trees for Empirical Linguistics, version 4 used (Odijk et al. 2018)
- Parses corpora with Alpino parser (Bouma et al. 2001)
  - Trees with constituency and dependency elements
  - Pre-uploaded corpora, some of which have been checked manually
- Searches Alpino-parsed treebanks (XML) using XPath
- Crucially: generates XPath expressions by generalizing from example sentences
  - Give the tool an example sentence and ask it to find sentences/constructions “just like this”

GrETEL

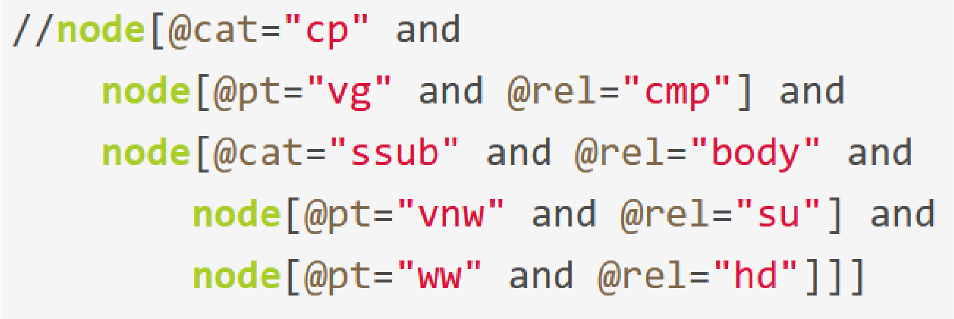
- Example: “Ik denk dat zij het weet.”
  I think that she it knows
- Parse by Alpino =>



- Select only word class + features of “dat”, “zij”, “weet”:



- Resulting query:



```
//node[@cat="cp" and
    node[@pt="vg" and @rel="cmp"] and
    node[@cat="ssub" and @rel="body" and
        node[@pt="vnw" and @rel="su"] and
        node[@pt="ww" and @rel="hd"]]]
```

Corpora searched

- LASSY Klein (Noord et al. 2013): **written, adult-directed**;
  parses manually checked
- CGN (Corpus Gesproken Nederlands, Van Eerten 2007):
  spoken, adult-directed;
  parses manually checked
- BasiLex (Tellings et al. 2015): **written, child-directed** (textbooks for younger children; subset of corpus uploaded to GrETEL 4)
- Dutch subcorpora of CHILDES (MacWhinney 2000): **spoken, child-directed** + child productions

- Queries developed and calibrated initially on LASSY Klein corpus, then re-calibrated on CGN and other corpora

Statistics of construction occurrence

	Written				Spoken					
	Adult-directed (LASSY)		Child-directed (BasiLex)		Adult-directed (CGN)		Child-directed (CHILDES)		Child-produced (CHILDES)	
Phenomenon	abs	Per 1000s	abs	Per 1000s	abs	Per 1000s	abs	Per 1000s	abs	Per 1000s
PP+V	16,928	260	3,362	128	12,758	98	4,075	10	1,257	4
SVP+V	695	11	115	4	755	6	78	<1	27	<1
PP+SVP+V	280	4	37	1	218	2	11	<1	1	<1
Total number of sents	65,200		26,239		129,923		351,859		351,859	

- PPs in embedded clauses much more common than SVPs
- Both constructions occur more rarely towards right of the table (= in spoken or child-directed material)

PP order results

	Written		Spoken		
	Adult-directed	Child-directed	Adult-directed	Child-directed	Child-produced
% preverbal PP	51%	74%	71%	77%	80%
total PP sentences	16,928	3,362	12,758	4,075	1,368

- Preverbal PPs are expected to be the unmarked order (transparent wrt verb-finality)
- Proportionally more preverbal PPs towards right of table (spoken or child-directed)
- Child-directed and child-produced speech have similar rates (still sign. different)
    - Child-directed: slight positive correlation between child’s age and preverbal PPs

PP order: per PP function

	Written		**Spoken**		
	Adult-directed	Child-directed	Adult-directed	Child-directed	Child-produced
% preverbal PP, location/direction	79%	92%	88%	88%	86%
% preverbal PP, modification	**50%**	65%	64%	63%	70%
% preverbal PP, predicate complement	37%	70%	60%	**75%**	**77%**
% preverbal PP, overall	51%	74%	71%	77%	80%

- These 3 Alpino-coded PP functions account for 92%-98% of cases (as per corpus)
- Location/direction: overattested in preverbal position (O/E, Kendall’s tau)
- Modification, pred. comp.: underattested with preverbal PP, except bold numbers

SVP order results

	Written		Spoken		
	Adult-directed	Child-directed	Adult-directed	Child-directed	Child-produced
% separated SVP	12%	26%	30%	51%	48%
total SVP sentences	695	115	755	78	27

- Tendency against separated particles (even though they are more transparent)
  - But more separated particles towards right hand side of table
- Are separated particles dispreferred because of processing difficulties (non-adjacency)?
  - No significant correlation between length of verb cluster and separate/adjacent SVP (except in spoken adult-directed corpus)

Combination results (expected percentages)

	Written		Spoken		
	Adult-directed	Child-directed	Adult-directed	Child-directed	Child-produced
% PP Pcl… V	5% (6%)	32% (20%)	15% (21%)	46% (39%)	
% Pcl… V PP	6% (6%)	5% (7%)	9% (9%)	9% (12%)	100%
% PP Pcl-V	50% (45%)	46% (55%)	47% (50%)	27% (37%)	
% Pcl-V PP	40% (44%)	16% (19%)	29% (21%)	18% (11%)	
Total PP+Pcl+V	280	37	218	11	1

- No apparent interaction: no consistent over- or underattestation
  - Doubly opaque order (nr. 4) is not extremely rare
- Word order constraint obeyed in all token sentences

Discussion

- PPs: preverbal position preferred across the board, but even more so in child-directed speech
  - This enhances the evidence for word-finality, especially in child-directed speech
  - Child-directed and child-produced speech matches quite well
- SVPs: separated particles dispreferred across the board, but less so in child-directed speech
  - Number of SVP tokens is quite small, should be no significant obstacle for learnability
- The constructions don’t seem to interact
  - No tradeoff in terms of evidence for word-finality, *double opacity* allowed

Conclusion

- PP and SVP word order varies, but should not be a major problem for learning of verb-finality
  - PP word order is mostly transparent in child-directed speech (and child productions)
  - SVP word order is not always transparent, but few SVP tokens anyway
- GrETEL is effective in searching for infrequent constructions
- Future work:
  - Modelling learnability of verb finality
  - Which factors lead to less transparent orders, why more in adult-directed text?
  - Work with larger corpora

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