The automatic analysis of subjectivity and causal coherence in text

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Thanks to
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Clariah

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Subjectivity and causal connectives in text

The temperature rose because the sun was shining.
The neighbors must be away, because the lights are out.

Similarities

- “backward causality”: Consequence-Cause
- both imply an implicational relation $P \rightarrow Q$

Difference:

report of external reality (OBJECTIVE)
versus
conclusion of a speaker/author (SUBJECTIVE)

Topic 4: Backward causality in Dutch

The temperature rose doordat the sun was shining.
CONSEQUENCE-CAUSE, non-volitional content

Jan went home omdat he was ill.
CONSEQUENCE-CAUSE volitional actions

The neighbors must be away want the lights are out.
CLAIM-ARGUMENT / EPISTEMIC

Does anybody need to go to the bathroom? want we are leaving!
SPEECH ACT

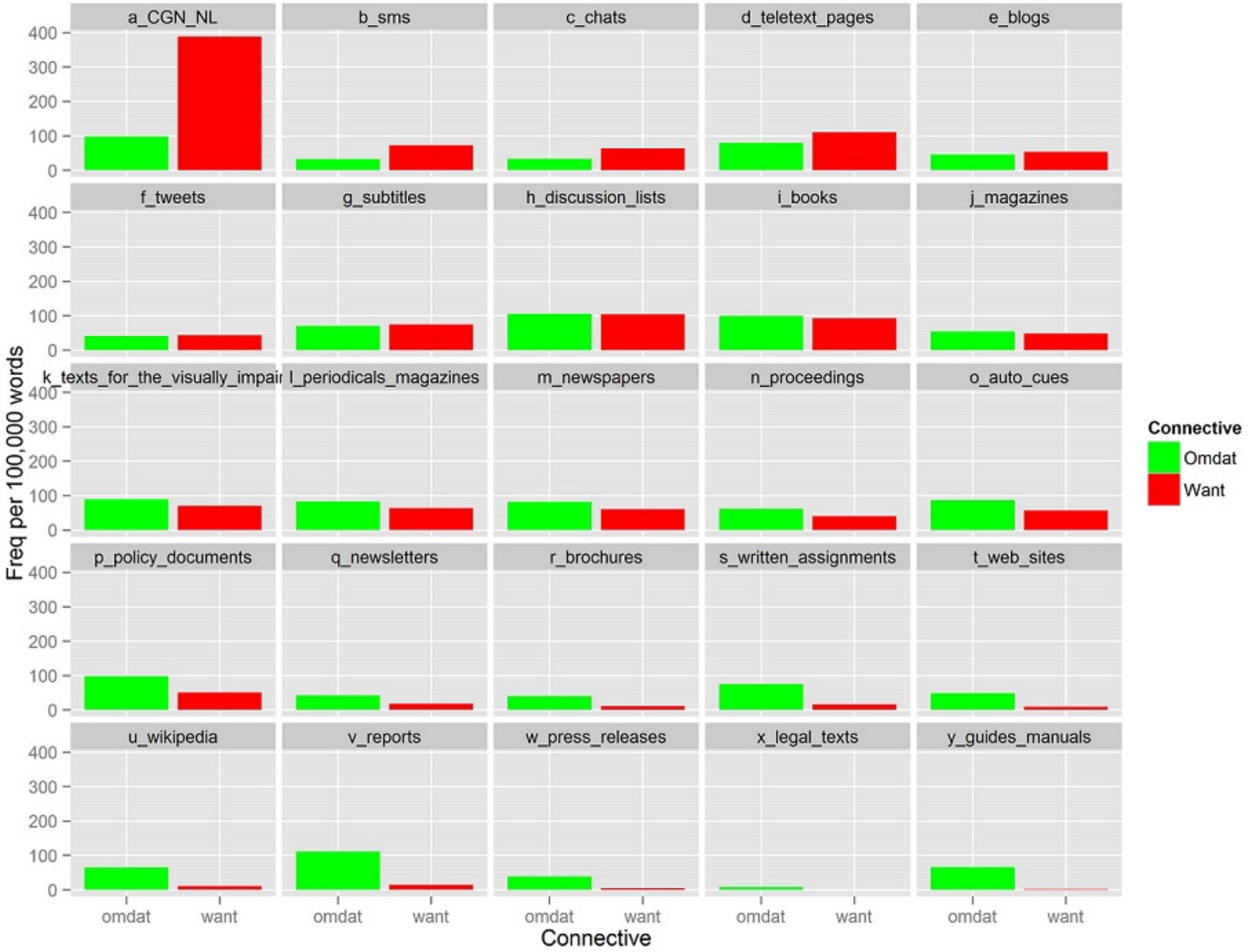
Comparion of causal connectives in Dutch in three genres

- written newspaper texts
  - high degree of editing, carefully planned
- spoken conversations
  - spontaneous, face-to-face, low degree of planning
- chat
  - spontaneous, low degree of planning, less feedback from conversational partner (no paralinguistic cues)

- Research questions:
  - do want and omdat occur in different types of context?
  - is the distribution of want and omdat genre-dependent?

Sanders & Spooren (2015). Causality and subjectivity in discourse: The meaning and use of causal connectives in spontaneous conversation, chat interactions and written text. *Linguistics, 53* (1), 53-92.

Possible role of genre



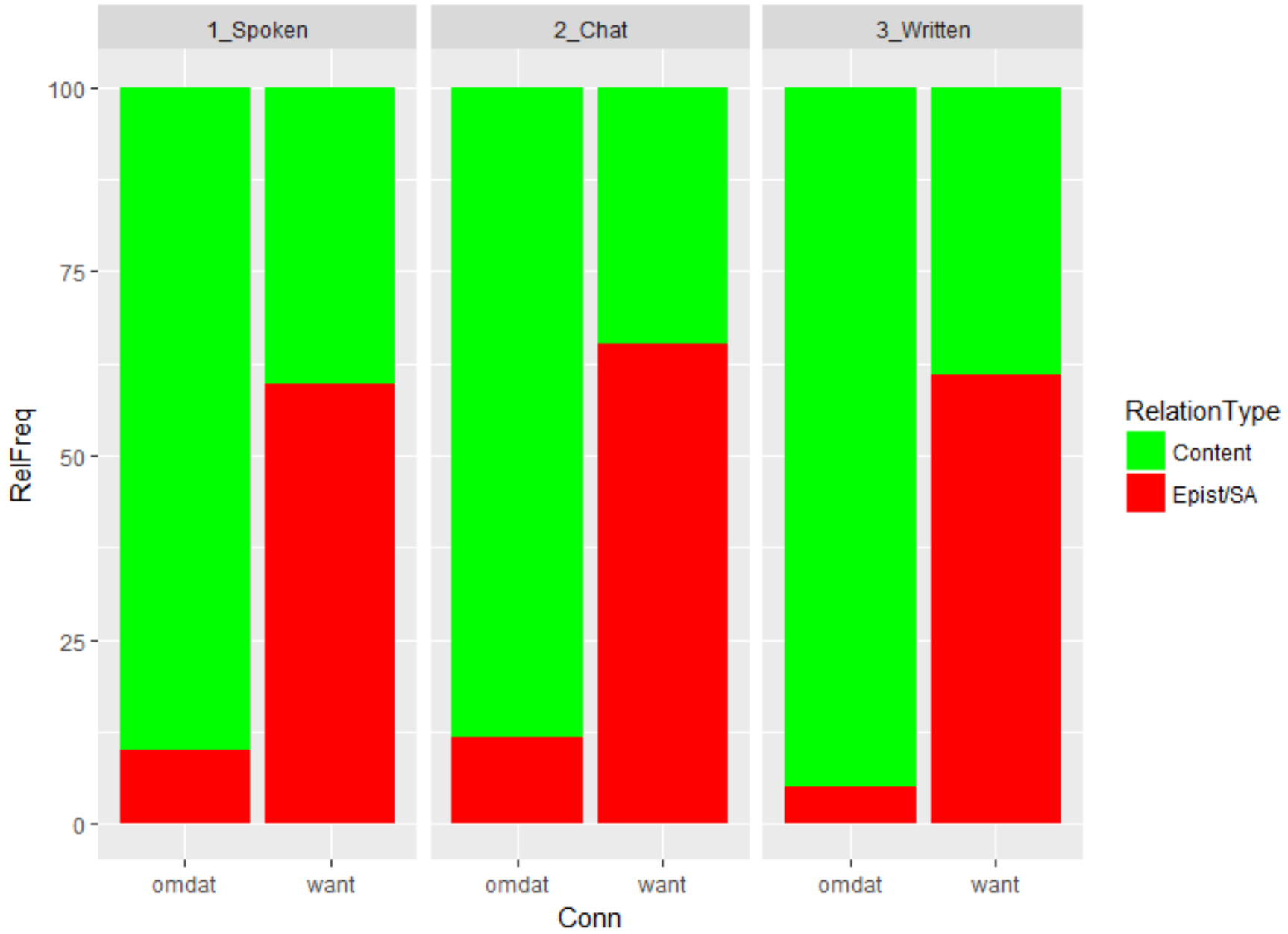
Thanks to
Tijn Schmitz

Typical research design

- Manual analysis of relatively small samples of fragments
- 100 instances of *omdat* and *want* per genre
- Each fragment is analysed on a large number of properties, among which subjectivity

Example result

Relation type as function of connective and genre



Using automatic analyses

- Less dependent on manual analyses
  - higher reliability
  - larger samples
  - larger number of genres

ACAD: Automatic Coherence Analysis of Dutch

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Goals of ACAD

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- Build a search interface, on the basis of existing Clariah components
  - corpora like SoNaR, VU-DNC, CGN
  - parsers like Alpino
  - formats like Folia
  - search facilities like CorpusStudio
- Make it possible to formulate sophisticated search queries for computationally uninitiated discourse analysts
  - translated into XQuery in the backend
- Make analyses reproduceable (and consequently more transparent)
- Extend the available corpora
  - newspaper texts (NRC and NRC.nl) from different genres (hard news, opinion, background stories) on related topics
  - WhatsAppdata of different age groups (13/14, 20-25)

How does it work?

1. *Preparation of corpora*
   - collecting and converting existing corpora
   - adding new corpora (including metadata)

2. *Find relevant cases*
   - formulate search queries to get all the causal connectives in the corpora
   - challenge: distinguish ‘false positives’ (e.g., *om* as preposition) from ‘true positives’.

How does it work?

3. *Identification of S_1 and S_2*
   - detect the size of the text segments connected by causal connectives automatically
   - challenge: incomplete S_1/S_2, embedded segments, constructions divided over different speakers (conversations, chat)

4. *Identification of the direction of the causal connection*
   - forward, backward?
   - depends on (i) type of connective (subordinating/coordinating conjunction, adverbs), (ii) semantics of the connective and (iii) grammatical position (“conn-S_1-S_2” versus “S_1-conn-S_2”)

How does it work?

5. Assessment of the subjectivity of the connection
   - how subjective is S_1/S_2? thematic text analysis (Bestgen et al., 2006)
   - the search interface determines features of the connection, such as the number of subjective adjectives and adverbs in S_1/S_2

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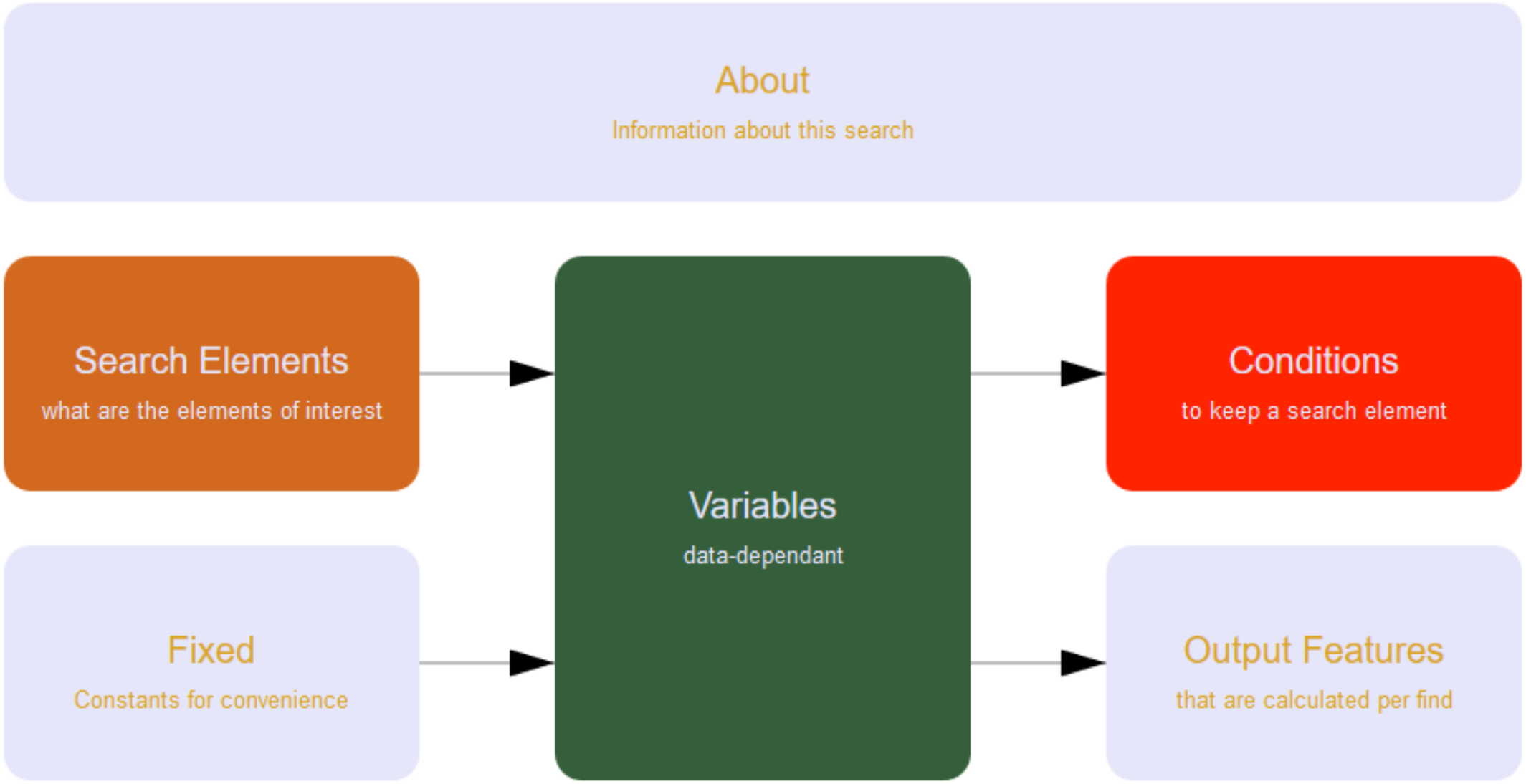
The search interface



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Editing the search: specification of variables

Search specification

Research project: **Want_Final?_2-E_2**

<< Overview

Show summary

The value of data-dependant variables is defined separately for each word or constituent that is being searched. Data-dependent variables can be of any kind, e.g.: boolean, string, constituent.

Provide the names and descriptions of the data-dependant variables here below. Make sure they are defined in the right **order**: any variable can only make use of other variables that are *above* it.

Name	Description		DELETE?
mrktype	Category of the marker in Dutch	Specify for search elements...	☐
markerCount	The number of words the marker consists of (1, 2, ...)	Specify for search elements...	☐
role	Direction into which causality is expected to go for this ma...	Specify for search elements...	☐
causativity	Kind of causativity (semantic/pragmatic)	Specify for search elements...	☐
blni	Boolean that indicates whether the marker is 'initial'	Specify for search elements...	☐
ini_type	Position of marker with respect to clause-start and to S1/S2	Specify for search elements...	☐
cpModFirstGuess	Determine whether the ancestor/parent of a marker plays a ro...	Specify for search elements...	☐
cpModParent	If the first guess of the CP has a REL or WH parent, take th...	Specify for search elements...	☐
cpMod	Any CP-type ancestor above the marker that must be taken int...	Specify for search elements...	☐
bCpIsVerbal	Any CP-type above the marker must contain a verb (WW)	Specify for search elements...	☐
blsPartOfPP	Is the parent of the marker a PP?	Specify for search elements...	☐
blsPartOfVC	Some markers may not be part of a VC - verbal complement	Specify for search elements...	☐
bConjPosOkay	Some markers must have a particular pos (e.g 'om' = VZ-CMP)	Specify for search elements...	☐
s1	List of word-nodes belonging to S1	Specify for search elements...	☐

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Controling the output

Output Features

that are calculated per find

11	s1	The words in S1	Function	get_text (1 args) edit summary...	yes	☐
12	s1_last	The last word in S1	Function	get_text (1 args) edit summary...	yes	☐
13	s1_wordcats	List of word categories in S1	Function	get_wordcat_list (1 args) edit summary...	yes	☐
14	s2	The words in S2	Function	get_text (1 args) edit summary...	yes	☐
15	s1nodeverbal	WHether the S1 contains a verb	Data-dependant variable	s1nodeVerbal	yes	☐
16	s2nodeverbal	Whether the S2 contains a verb	Data-dependant variable	s2nodeVerbal	yes	☐
17	cpModAnc_cat	Category of [cpModAnc] variable	Function	get_cat (1 args) edit summary...	yes	☐
18	lemmas_s1_neutral	All lemma's of neutral adjective in s1	Function	get_text (1 args) edit summary...	yes	☐
19	count_s1_neutral	Number of neutral adjectives in s1	Function	wrd_count (1 args) edit summary...	yes	☐
20	lemmas_s1_subjective	All lemma's of subjective adjective/adverb in s1	Function	get_text (1 args) edit summary...	yes	☐
21	count_s1_subjective	Number of subjective adjectives/adverbs in s1	Function	wrd_count (1 args) edit summary...	yes	☐
22	count_s1	Number of words in S1	Function	wrd_count (1 args) edit summary...	yes	☐

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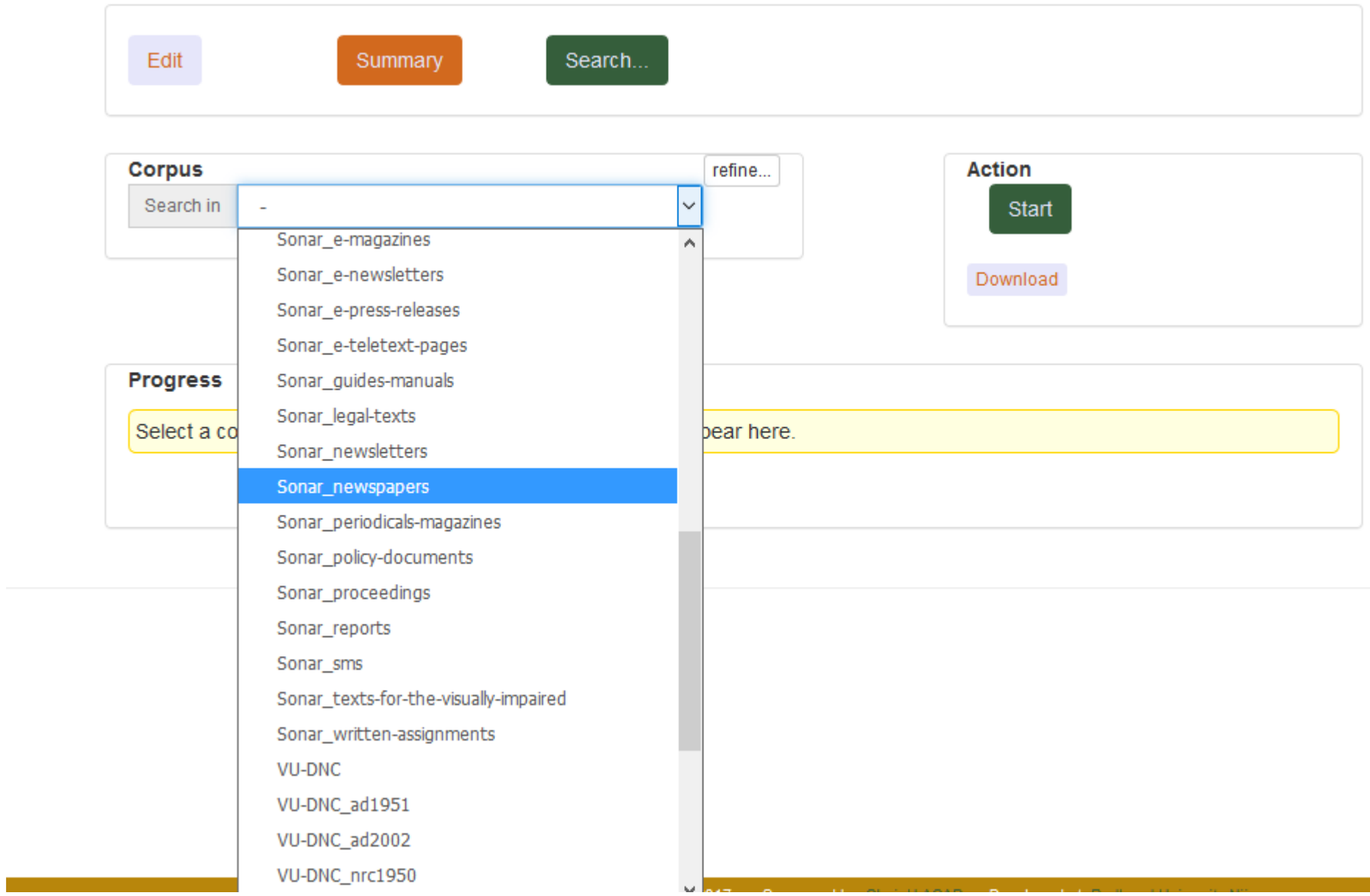
Carrying out the search: choose the corpus



ACAD in action

Thematic text analysis

- Hypothesis
  - subjective connectives have more subjective words in their ‘consequent’ than objective connectives
    - backward causals: S1$_{want}$ > S1$_{omdat}$
    - forward causals: S2 $_{dus}$ > S2 $_{daarom}$

- Method
  - gold1000 lexicon of subjective adjectives (De Smedt & Daelemans, 2012)
    - 1044 adjectives, each word rated by seven raters
  - subjective: adjectives with a score of 0.7 or higher for each of their meanings (n=653); objective: adjectives with a score ≤ 0.2 (n=171)
  - the number of adverbial and adjectival uses of these adjectives was counted in both S_1 and S_2 for each of the four connectives

- Subcorpus: Sonar newspaper corpus (>700k news articles)

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Results

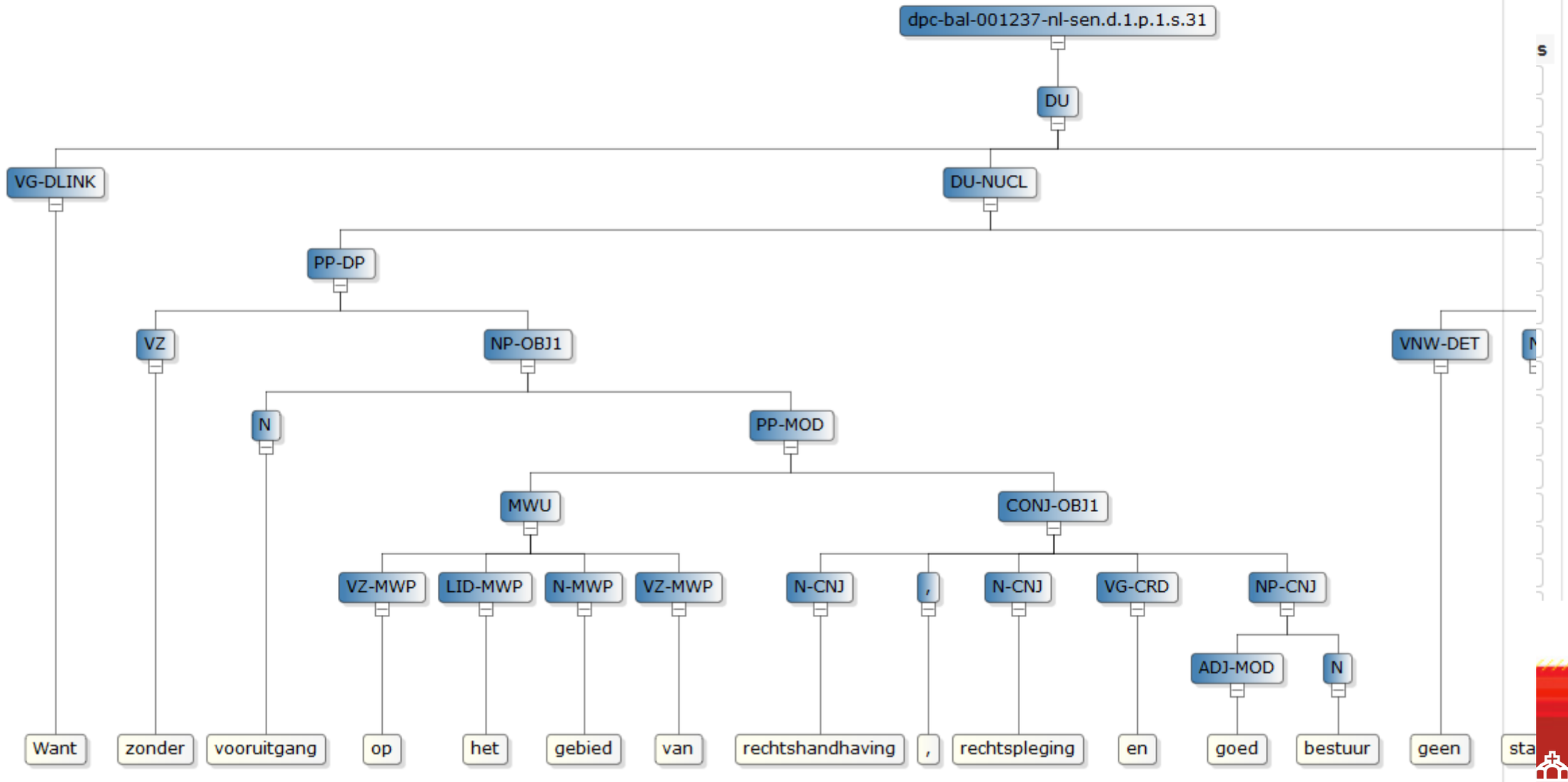
Search results

Search result line: 1 (472)

<< Result center

<< Back

Informatie...



Results

	Subjective	Objective
Forward	Dus: 109,733	Daarom: 52,483
Backward	Want: 48,136	Omdat: 114,798

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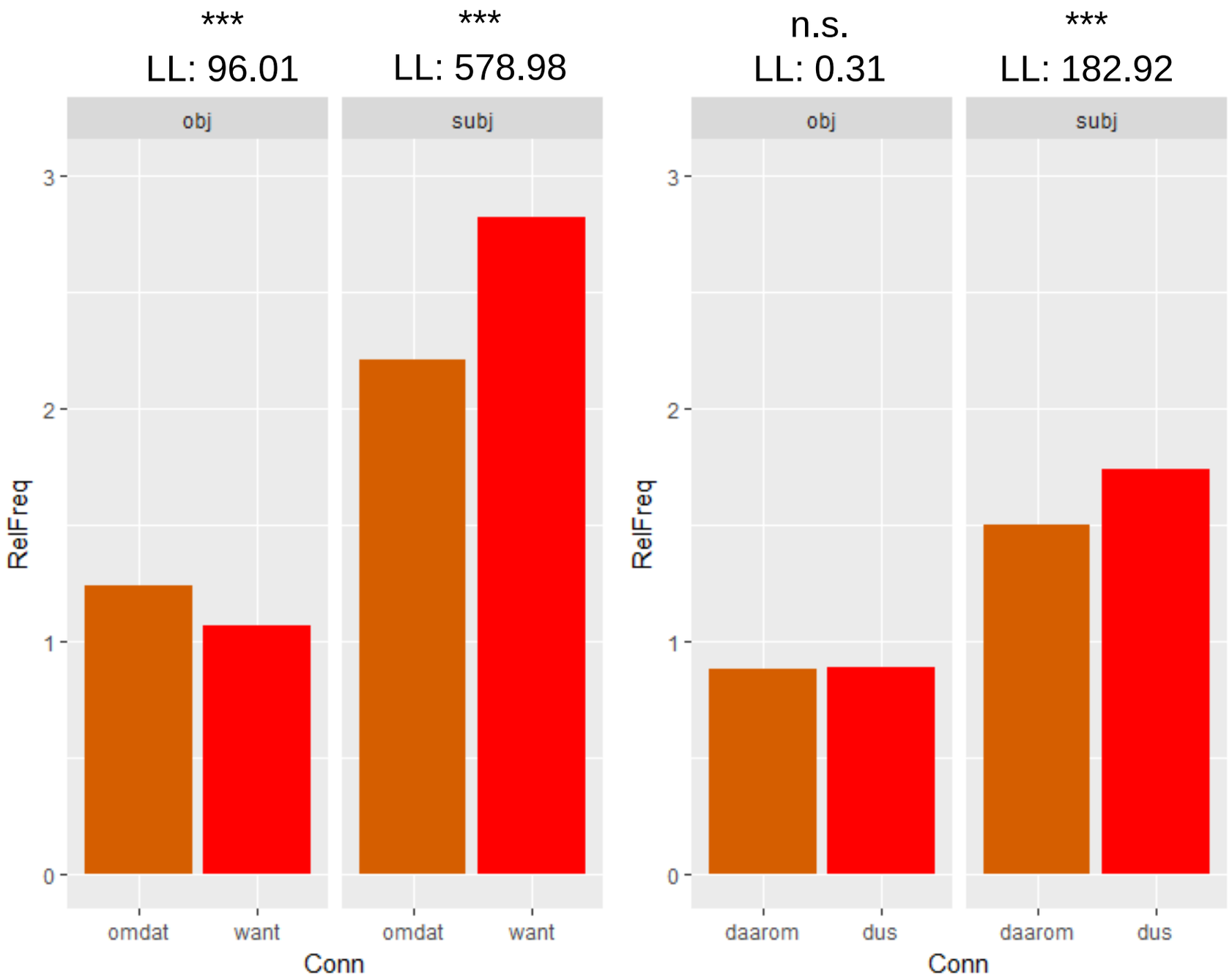
Results



Next steps

- optimize precision and recall
- add examples of queries
- make manual

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SWOT analysis

- Potential
  - allows f
    searche
    – e.g., c
      of ‘sul
  - the grai
    be usec
  - queries
    adaptec
  - in princ
    any cor
    – provic
      forma
      tagged/lemmatizesd
- Challenges