

The Cornetto database: architecture and alignment issues of combining lexical units, synsets and an ontology

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Overview

- Goal of the project
- Database architecture
- Alignment
- Form:Meaning:Synset:Type



Goals of the Cornetto project

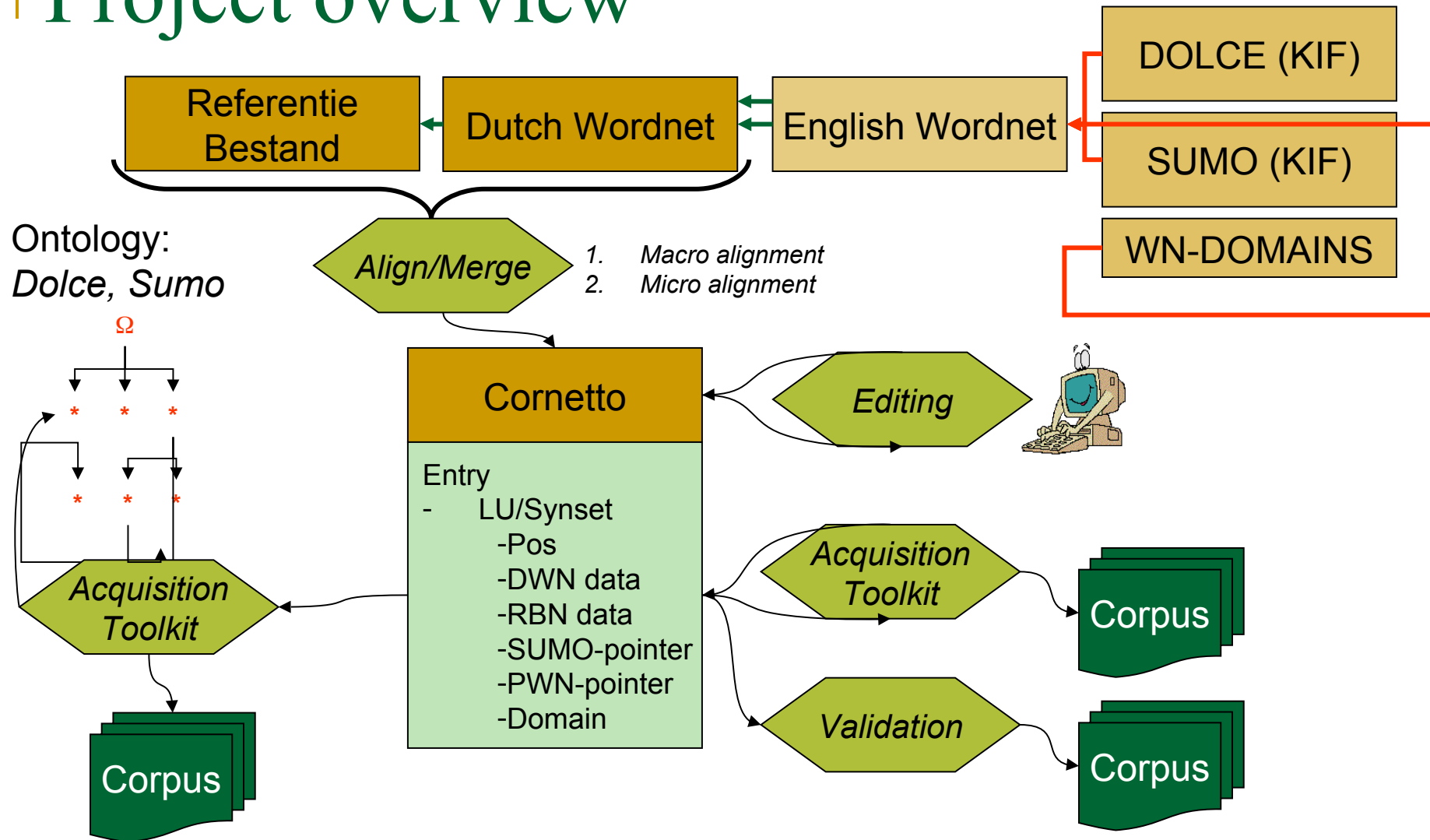
- **C**ombinatorial **R**elational **N**etwerk voor **T**aal **I**Oepassing
- Stevin tender project (STE05039) to develop a lexical semantic database for Dutch:
 - 40K Entries: generic and central part of the language
 - Rich horizontal and vertical semantic relations
 - Combinatoric information
 - Ontological information
- Automatic acquisition toolkit
- April 2006-March 2008, extended to July 2008
- License: TST-centrale, Nederlandse Taalunie, **free for research**
- Partners: Vrije Universiteit Amsterdam, Universiteit Amsterdam, Universiteit Leuven, Irion Technologies
- <http://www.let.vu.nl/onderzoek/projectsites/cornetto/start.htm>



Approach

- Combine the information from two existing Dutch lexical resources:
 - The Dutch wordnet (DWN): synsets and lexical semantic relations
 - The Referentiebestand Nederlands (RBN): morpho-syntactic information, semantic information, pragmatic information, frame structures, lexical functions and combinatorics
- Link to English WordNet
- Link to Wordnet Domains
- Link to SUMO

Project overview



Database architecture

Two types of semantic resources

■ RBN:

- ❑ Lexical units
- ❑ Form-meaning relation
- ❑ Linguistic knowledge to use forms in a meaning
- ❑ Semantic-syntactic combinatoric frames

■ DWN:

- ❑ Based on WordNet (Fellbaum 1998): relational conceptual model of the lexicon
- ❑ Synsets: set of synonyms that represent a concept
- ❑ Semantic relations between synsets, i.e. abstracts from the specific form of particular synonyms

Combinatorics

slots	fillers (lex/conc)	fillers (coll)
action	<i>behandelen</i> (someone treat)	<i>iem. behandelen</i>
theme	<i>patiënt</i> (a patient treat)	<i>een patiënt behandelen</i>
state	<i>ziekte</i>	<i>iem. behandelen <u>voor</u> een ziekte</i> (someone treat for a disease)
	<i>behandelen</i>	<i>iem. <u>aan</u> zijn verwondingen</i> (someone at his injuries treat)
		<i>een ziekte behandelen (a disease treat)</i>

Different starting points RBN & DWN

- RBN tends to abstract from meaning specialization: => explained in examples, e.g. **helder** (*bright*) applied to liquids, light and colours.
- DWN tends to specialize meaning due to synonyms that represent more specific concepts: => explained by synsets, **helder** (*bright*) as a synonym of **onbewolkt** (*unclouded*) raises a different meaning.
- Cornetto will result in a new meaning structure based on both view points
- This will result in merging and splitting word meanings and synsets

Lexical Unit & Synsets

- Lexical Unit = form-meaning relation, such that:
 - form = abstract representation of certain realizations;
 - part-of-speech is the same;
 - meaning is the same, where meaning is defined by a reference to a unique Synset;
- Synset = Set of synonyms (LUs) that refer to the same entities in most contexts.
 - Defined by lexical semantic relations;
 - Defined by reference to ontology Terms or KIF expressions involving Terms from the ontology;



Data structure overview

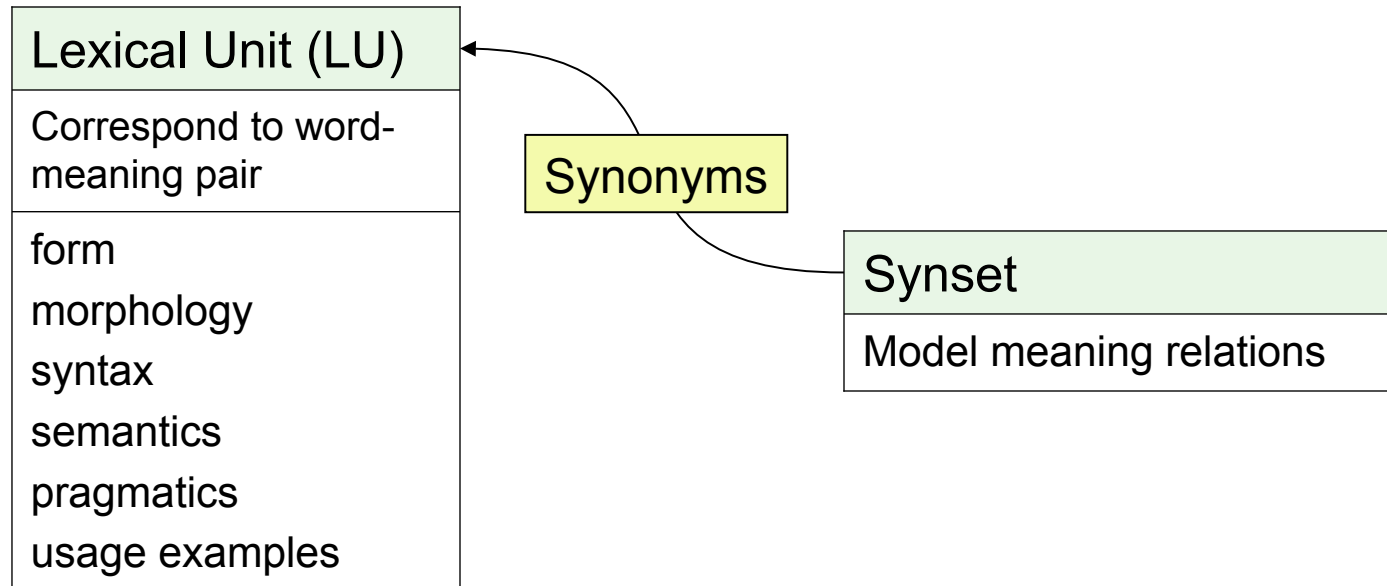
■ Collections:

- ❑ Lexical units (LU): -> mainly derived from RBN
- ❑ Synsets (SY): -> mainly derived from DWN
- ❑ Terms (TE): -> based on SUMO/MILO, linked to PWN
- ❑ Domains (DM): -> based on Wordnet domains

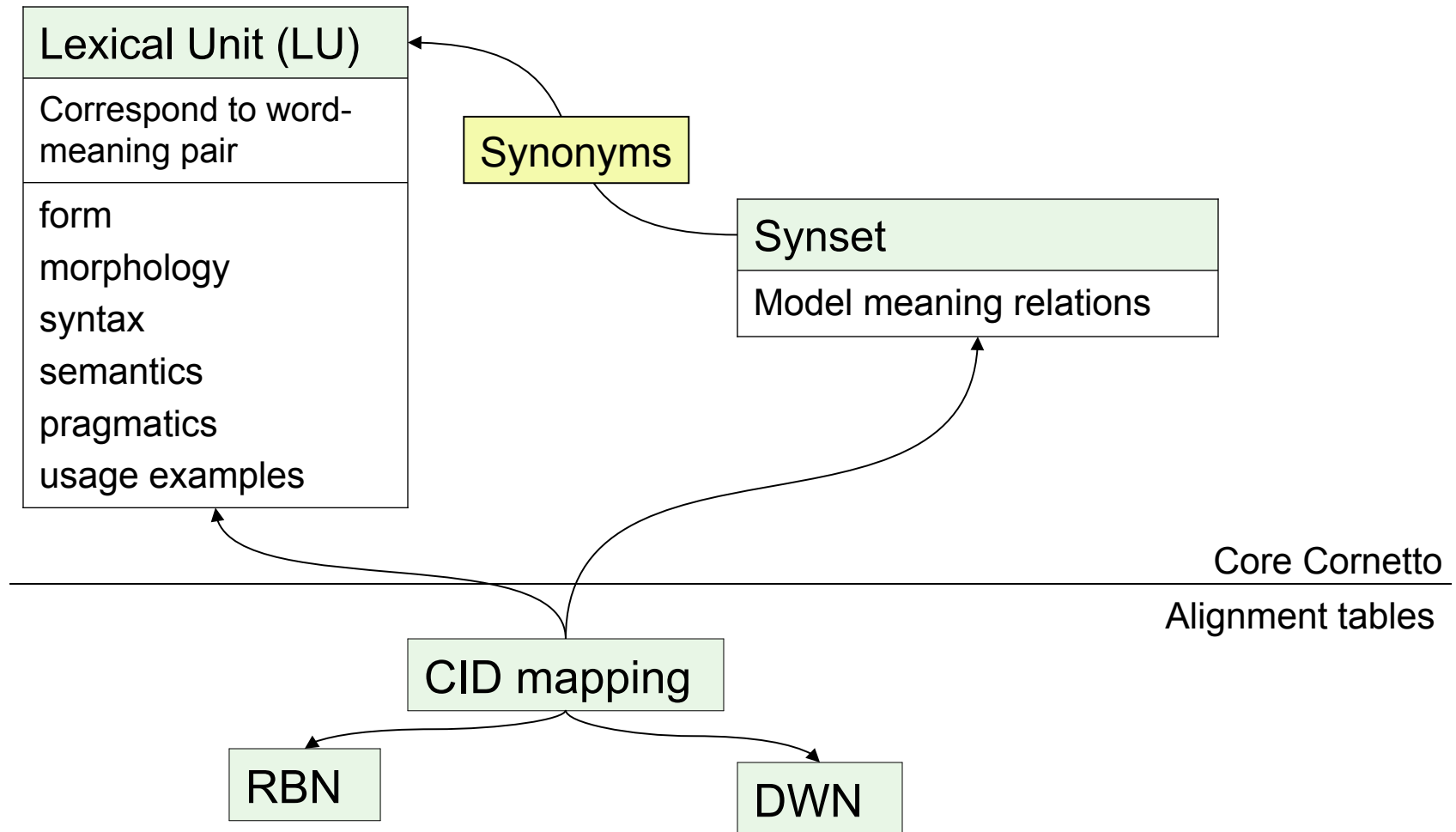
■ Mappings:

- ❑ LU<-> SY
- ❑ SY <-> SY (within Dutch and from Dutch to English)
- ❑ SY <-> TE
- ❑ SY <-> DM

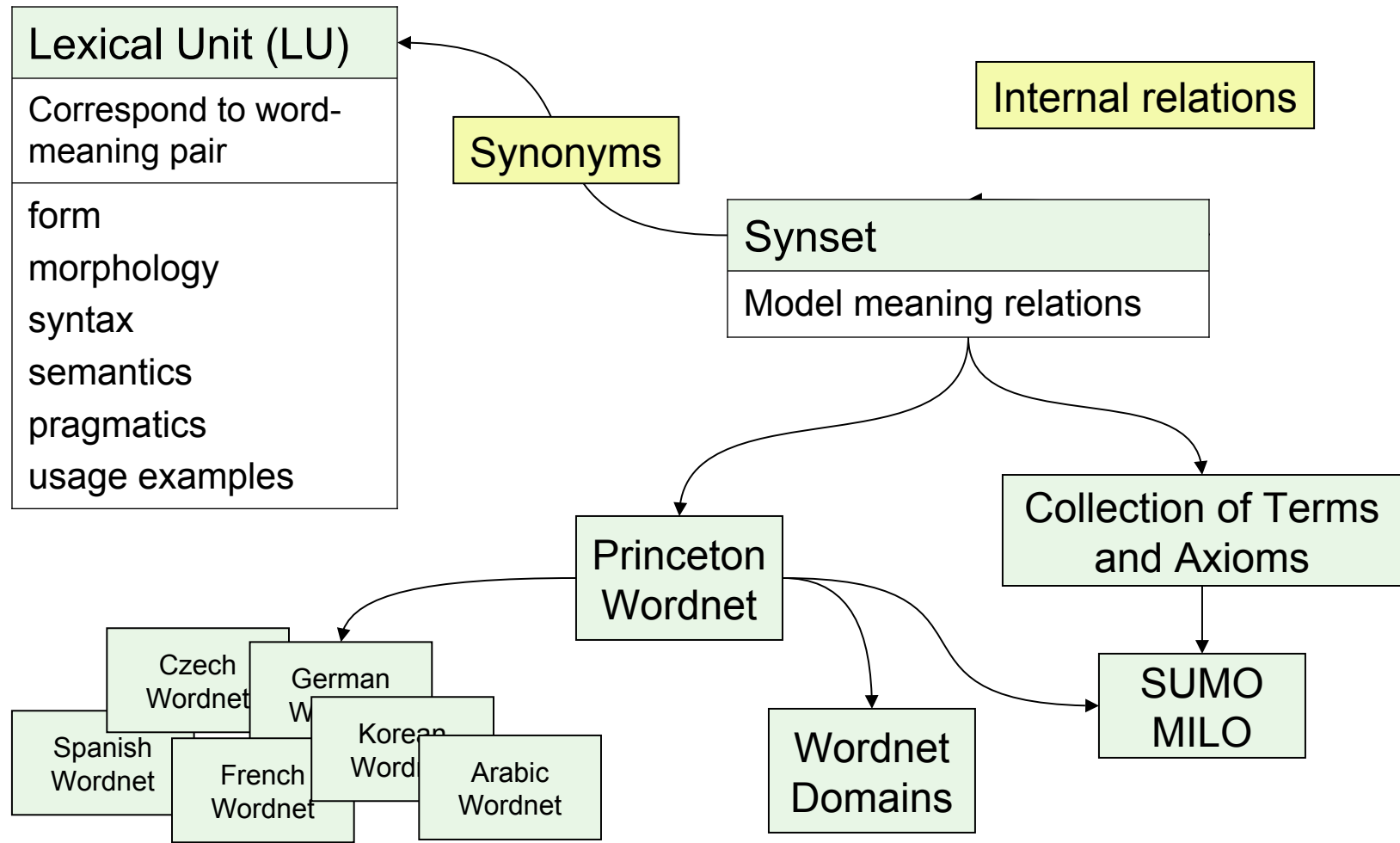
Data Organization



Data Organization



Data Organization



Database system

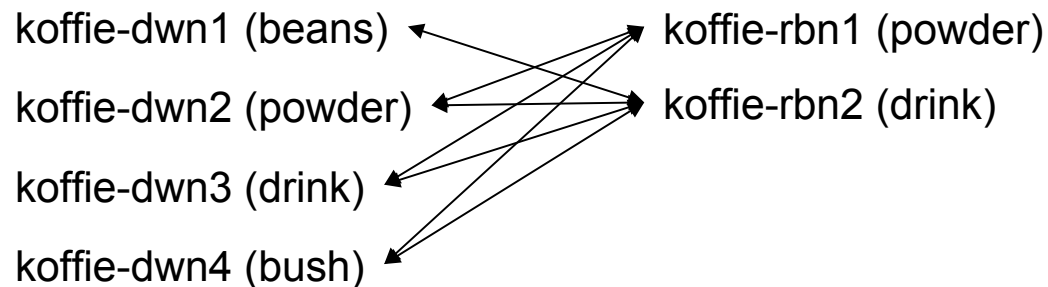
- Implemented in DebVisDic:
 - <http://deb.fi.muni.cz/index.php>
- Databases:
 - Cornetto LUs
 - Cornetto Synsets
 - Sumo hierarchy
 - Princeton Wordnet 2.0
- Client programs:
 - <http://deb.fi.muni.cz/clients.php>



Alignment of lexical resources

Alignment of Lexical Units NOT synsets!

- Generate all weighted combinations, e.g. koffie (coffee):



- Produce merged output with mappings above probability threshold, which is a new structure of word meanings:

koffie-cbn1 (beans) (source dwn1)
koffie-cbn2 (powder) (source dwn2, rbn1)
koffie-cbn3 (drink) (source dwn3, rbn2)
koffie-cbn4 (bush) (source dwn4, dwn2)

koffie-cbn1 (powder) (source rbn1)
koffie-cbn2 (drink) (source rbn2)
koffie-cbn3 (beans) (source dwn1)
koffie-cbn4 (powder?) (source

koffie-cbn5 (drink?) (source dwn3)
koffie-cbn6 (bush) (source dwn4)

Strategies for the macro-alignment

	Conf.	Dev.	Factor	LINKS	
1: 1 RBN & 1 DWN meaning, no synonyms	97.1	4,9	3	9936	8,1%
2: 1 RBN & 1 DWN meaning	88.5	8,6	3	25366	20,8%
3: 1 RBN & >1 DWN meaning	53.9	8,1	1	22892	18,7%
4: >1 RBN & 1 DWN meaning	68.2	17,2	1	1357	1,1%
5: overlapping hyperonym word	85.3	23,3	2	7305	6,0%
6: overlapping hyponyms	74.6	22,1	2	21691	17,7%
7: overlapping domain-clusters	70.2	15,5	2	11008	9,0%
8: overlapping definition words	91.6	7,8	3	22664	18,5%

- 8 reviewers
- 100 random links per strategy
- nouns, verbs, adjectives, adverbs
- single confidence score per link based on all weighted strategies



Results of the macro-alignment

	LUS	LINKED		NOT-LINKED
RBN	66.024	47.250	72%	18.774
VLIS	106.504	46.924	44%	59.580
RBN-VLIS LINKS		58.053		

Cornetto Mapping Record

- CID unique pointer to bind them all
- C_LU_ID LU id to be assigned to each LU in CDB
- C_SY_ID SYNSET id to be assigned to each synset in CDB
- C_FORM lexical form
- C_SEQ_NR sequence number in CDB
- R_LU_ID LU id currently used in RBN
- R_SEQ_NR sequence number currently used in RBN
- D_LU_ID LU id currently used in DWN (original Vlis ID)
- D_SEQ_NR sequence number currently used in DWN
- D_SY_ID synset id currently used in DWN
- Score confidence score assigned by algorithm
- Status manually confirmed
- Name editor



Form : Meaning : Synset :
Type
Relations

Combining resources

- Wonderful opportunities
- Many problems

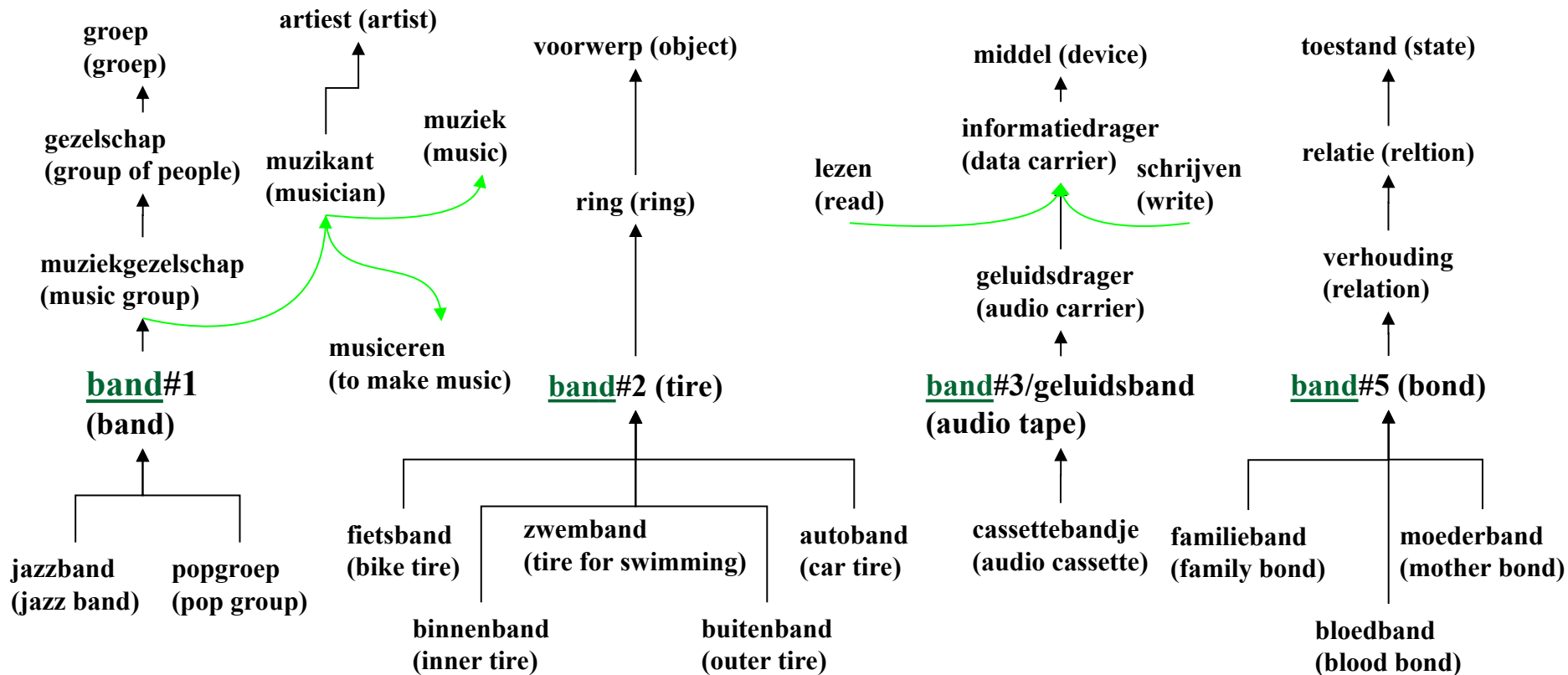


Combinatorics
in een band spelen (to play in a band)
een band oprichten (to start a band)
de band speelt (the band plays)

Combinatorics
de band oppompen (to pump air in a tire)
een band plakken (to fix a whole in a tire)
een lekke band (flat tire)
de band springt (the tire explodes)

Combinatorics
de band starten (to start a tape)
op de band opnemen (to record on a tape)
de band afspelen (to play from a tape)

Combinatorics
een goede/sterke band (a good strong bond)
de banden verbreken (to break all bonds)
een band hebben met iemand (to have a bond with s.o.)



Lexical Unit: relation form and meaning

- Inflectional variants, *appel, appels, appelen*
- Spelling variants
 - Meaning is identical
 - Pronunciation is mostly identical (*droppel, druppel*)
 - Spelling is different but the morphology is mostly the same: spelling variation can be systematic or incidental but it is in both cases conventional.
- Shortening:
 - Meaning is identical
 - Pragmatics is usually different
 - Pronunciation and spelling are different
 - Reduction in length for efficiency:
 - short forms (bus vs autobus)
 - abbreviation
 - contractions
 - acronyms



Relation between synsets & types

- Many problems relate to linguistic phenomena:
 - gender, perspective, aspect, diminutives, politeness, pejoratives, part-of-speech constraints, compounding, derivations, multi-word expressions and collocation constraints



Lexical Unit: Meaning variants

- Roles, including male/female variants, e.g.:
 - **theoloog** (male theologist)/theologe (female theologist)
 - **leraar** (male teacher)/**lerares** (female teacher)
 - **secretaresse** (female secretary) vs. **mannelijke secretaresse?** (male secretary)
 - **kleuterleidster** (female care taker for very young children at kindergarten) vs. **kleuterleider?**

Lexical Unit: Meaning variants

Criteria for distinguishing different concepts:

- If defined exhaustively as a role that is neutral with respect to male/female
- AND
- If the male/female form can be derived with a regular and compositional derivation

THEN 1 LU for the abstract neutral form.

- In all other cases: separate LUs, possibly related to different ontology terms or a KIF expressions, depending on the ontology.

■ Consequences:

- Single LU for *theoloog* (theologist):
 - neutral form (possibly zero-derivation) for *man*.
 - neutral form or apply a derivational rule to create *theologe* when applied to *woman*
- Separate LUs for *leraar* (male teacher) and *lerares* (female teacher), there is no neutral form. The same applies to *verpleger* (male nurse) and *verpleegster* (female nurse).



KIF-like expression for perspective

sell: *subj(x), direct obj(z), indirect obj(y)*

versus

buy: *subj(y), direct obj(z), indirect obj(x)*

$\Leftrightarrow$ (and (instance x Human) (instance y Human)
(instance z Entity) (instance e FinancialTransaction)
(source x e) (destination y e) (patient e))

The same process but a different perspective by subject and object realization: **marry** in Russian two verbs, **apprendre** in French can mean **teach** and **learn**

Synsets versus Ontology Types

- Synsets can be names for terms that are disjoint Types:
 - $\text{water}_{\text{NL}} = \text{Water}_{\text{SUMO}}$
 - $\text{zand}_{\text{NL}} = \text{Sand}_{\text{SUMO}}$
- Many Synsets are lexicalizations that can name instances of the same Type in different contexts:
 - water used for a purpose
 - water occurring somewhere or originating from
 - water being the result of a process
- The latter do not grant the introduction of new Types in the ontology

Synsets versus Ontology Types

- Difficulties distinguishing the types:
 - $\{\text{water:1;majem=liquid appearance}\}_{\text{DWN}} \cong ?$
 $\text{Water}_{\text{SUMO}}$
 - $\{\text{water:2}\} = \text{WaterArea}_{\text{SUMO}}$
 - $\{\text{water:4=element}\} = \text{Water}_{\text{SUMO}} [\text{chemical element}]$

Complex ontology mapping

- theewater (*for making tea*)
 - (exists (?A ?W)
 - (and
 - (instance ?W Water)
 - (hasPurposeForAgent ?W
 - (exists (?T)
 - (and
 - (instance ?T Tea)
 - (part ?W ?T))))))
 - Simplified representation as list of triplets
 - (instance, 0, Water) , (instance, 1, Tea) , (component, 0, 1)
(instance, 2, Making) , (component, 0, 2)

Cornetto Synset

water

d_n-20623 [noun] water:1, majem:1 SCHEIK kleur- en s
d_n-26238 [noun] water:2 AARDR rivier, sloot, kanaal e
n_n-534296 [noun] water:3 GEOL helderheid van diama
d_n-44037 [noun] water:4 in algemene zin als element
d_n-34850 [noun] water:5, lichaamsvocht:1 FYSIOL

Concept Relations Tree Revtree Edit Xml

C_SY_ID: d_n-20623
Synonyms: water:1/r_n-42415, majem:1/d_n-166370

PoS specific: NOUN_HET
Definition: kleur- en smaakloze vloeistof waarva
atomen waterstof en 1 atoom zuurstof bestaan
Differentiae: 0
VLIS domains: SCHEIK
SUMO: (=, , Water)

-->> [HAS_HYPERONYM] vloeistof:1/d_n-204
<<-- [HAS_HYPONYM] oppervlaktewater:1/
<<-- [HAS_HYPONYM] pekel:1, pekelnat:1/d
<<-- [HAS_HYPONYM] weekwater:1, week
<<-- [HAS_HYPONYM] doopwater:1/d_n-333
<<-- [HAS_HYPONYM] rijstenat:1, rijstewate
<<-- [HAS_HYPONYM] pompwater:1/d_n-414
<<-- [HAS_HYPONYM] koelwater:1/d_n-2333
<<-- [HAS_HYPONYM] rivierwater:1/n_n-5255
<<-- [HAS_HYPONYM] bergwater:1/n_n-5036

Querying a dictionary is complete.

DEBVisDic English WordNet

water: Search Search in all

[n] body of water:1, water:2
[n] urine:1, piss:1, pee:1, piddle:1, weewee:1, water:5
[n] water system:2, water supply:1, water:3
[n] water:1, H2O:1
[n] water:4
[n] water:6

Preview Tree Revtree Edit Query Xml

POS: n ID: ENG20-14000512-n BCS: 2
Synonyms: water:1, H2O:1
Definition: binary compound that occurs at room temperature as a clear colorless odorless
tasteless liquid; freezes into ice below 0 degrees centigrade and boils above 100 degrees
centigrade; widely used as a solvent
Domain: chemistry
SUMO/MILO: Water

-->> [hypernym] binary compound:1
-->> [hypernym] liquid:3
-->> [holo_portion] tear:1, teardrop:2
-->> [holo_portion] perspiration:1, sweat:1, sudor:1
-->> [holo_portion] body of water:1, water:2
-->> [holo_portion] snowflake:1, flake:1
-->> [holo_portion] ice crystal:1, snow mist:1, diamond dust:1, poudrin:1, ice needle:1,
frost snow:1, frost mist:1
-->> [holo_portion] dewdrop:1
-->> [holo_portion] ice:1, water ice:1
-->> [eng_derivative] water:1, irrigate:1
-->> [eng_derivative] water:2
<<-- [eng_derivative] water:1, irrigate:1
<<-- [eng_derivative] water:2
<<-- [derived] aqueous:1
<<-- [derived] aquatic:1
<<-- [derived] hydraulic:1
<<-- [hyponym] tap water:1



Cornetto Synset

regenwater

d_n-19186 [noun] regenwater:1 METEO water dat in de vorm van regen uit de hemel komt

Concept Relations Tree Revtree Edit Xml

C_SY_ID: d_n-19186
Synonyms: regenwater:1/r_n-31020

PoS specific: NOUN_HET
Definition: water dat in de vorm van regen uit de hemel komt
Differentiae: in de vorm van regen
VLIS domains: METEO
SUMO: (instance, 0, Water), (instance, 1, Raining), (result, 0, 1), (+, , Water)

-->> [HAS_HYPERONYM] water:1, majem:1/d_n-20623
 <<-- [HAS_HYPONYM] zakwater:1/n_n-535300
 <<-- [HAS_HYPONYM] regenval:1/d_n-30416

Equivalence relations:
 [EQ_NEAR_SYNONYM] rain:2, rainwater:1/ENG20-14156848-n

WordNet domains: chemistry

Querying a dictionary is complete.

Cornetto Synset

theewater

d_n-20059 [noun] theewater:1 CUL water om thee te zetten

Concept Relations Tree Revtree Edit Xml

C_SY_ID: d_n-20059
Synonyms: theewater:1/r_n-37570

PoS specific: NOUN_HET
Definition: water om thee te zetten
Differentiae: om thee mee te zetten
VLIS domains: CUL
SUMO: (instance, 0, Water), (instance, 1, Tea), (component, 0, 1), (instance, 2, Making), (resource, 0, 2), (result, 1, 2)

-->> [HAS_HYPERONYM] water:1, majem:1/d_n-20623

Equivalence relations:

Querying a dictionary is complete. Item(s): 1

Water used for a purpose

- ❑ theewater (*for making tea*)
 - (instance, 0, Water) , (instance, 1, Tea) , (component, 0, 1) (instance, 2, Making) , (component, 0, 2)
- ❑ koffiewater (*for making coffee*)
- ❑ bluswater (*for extinguishing fire*)
 - (instance, 0, Water) , (instance, 1, Fire) , (instance, 2, Process) , (instrument, 0, 2) , (finishes, 2, 1)
- ❑ scheerwater (*for shaving*)
- ❑ afwaswater (*for cleaning dishes*)
- ❑ waswater (*for washing*)
 - (instance, 0, Water) , (instance, 1, Washing) , (instrument, 0, 1)
- ❑ badwater (*for bading*)
- ❑ koelwater (*for cooling*)
- ❑ spoelwater (*for flushing*)
- ❑ drinkwater (*for drinking*)
 - (instance, 0, Water) , (instance, 1, Drinking) , (patient, 0, 1)



The end....



Progress

Criteria for manual work

- Most-frequent words (1000 most frequent verbs)
- Most-polysemous words (1800 nouns with 4 or more meanings)
- Suspect words based on different approaches RBN and DWN:
 - ❑ Nouns with SHIFT label
 - ❑ Adjectives
- Entries with many unmatched LUs
- Synsets with:
 - ❑ many equivalence relations
 - ❑ conflicting SUMO mappings
- Semantic closure:
 - ❑ all hypernyms of qualified LUs and synsets (to be selected)
 - ❑ Concepts with many descendants (important in hierarchy) in terms of meronym and hyponym relations
- Imports from the acquisition toolkit

Final resulting database

- All data that are available (RBN + VLIS)
- Different status label:
 - monosemous entry with single LU-Synset mapping (NO UNLINKED cases):
 - manual link
 - automatic link + reliability
 - bisemeous entry, each LU linked to Synset (NO UNLINKED cases):
 - manual link
 - automatic link + reliability
 - trisemeous entry, each LU linked to Synset (NO UNLINKED cases):
 - manual link
 - automatic link + reliability
 - All other manually modified LUs and synsets (both in DWN and Cornetto): status manual

Numbers of entries and concepts

Table 1: Form units in Cornetto

RBN + DWN FUs	37.000
Only RBN FUs	6.000
Only DWN FUs	47.000
Total number of entries (= FUs) in Cornetto	90.000

Table 2: Reliable automatically aligned entries

monoseme	Monosemous in RBN and DWN and no empty SS or LU (good alignment score)	22.000
monoseme	Monosemous in RBN and DWN with additional empty LU or SS (less reliable alignment scores)	2200
biseme	No empty SS or LU in both RBN and DWN (good alignment score)	250
biseme	Empty SS or LU in both DWN and RBN (less reliable alignment scores)	2500

Demo

Cornetto Synset

bas

Search Search in all

d_n-10187 [noun] bas:1, basstem:1 MUZ laagste mannenstem
 d_n-15805 [noun] bas:2 MUZ baszanger, basspeler
 d_n-10194 [noun] bas:3, baspartij:1 MUZ

Cornetto LU

bas

Search Search in all

r_n-6013 noun, bas:1, zangstem
 r_n-6014 noun, bas:2, zanger
 r_n-6015 noun, bas:3, contrabas
 r_n-6016 noun, bas:4, basgitaar
 r_n-6019 noun, bas:5

Cornetto Synset

basgitaar

Search Search in all

d_n-10189 [noun] basgitaar:1 MUZ als bas gestemde gitaar

Concept Relations Tree Revtree Edit Xml

C_SY_ID: d_n-10189
 Synonyms: basgitaar:1/r_n-6026

PoS specific: NOUN_DE
 Definition: als bas gestemde gitaar
 Differentiae: laag, viersnarig
 VLIS domains: MUZ
 SUMO: (+, , Guitar)

-->> [HAS_HYPERONYM] basinstrument:1/d_n-21425
 -->> [HAS_HYPERONYM] gitaar:1/d_n-28225
 -->> [CO_INSTRUMENT_AGENT] basgitarist:1/d_n-15807
 -->> [HAS_MERO_PART] bassnaar:1/d_n-27044

WordNet domains: music

Querying a dictionary is complete. Item(s): 1

Examples Edit Xml

LU_ID: r_n-6016 C_SEQ_NR: 4
 [n] bas length: shortening

Morphology:
 forms: bassen

countability: count type: artefact

(true)

as stemmen
 excol

s:(Roland Knoppe)
 racol

basinstrument

[*] d_n-21425 [noun] basinstrument:1 MUZ

Concept Relations Tree Revtree Edit Xml

C_SY_ID: d_n-21425
 Synonyms: basinstrument:1/d_n-40434

PoS specific: NOUN_HET
 Differentiae: voor de baspartij
 VLIS domains: MUZ
 SUMO: (+, , MusicalInstrument)

-->> [HAS_HYPERONYM] muziekinstrument:1, instrument:2/d_n-40434
 <<-- [HAS_HYPONYM] basbazuin:1/d_n-38269
 <<-- [HAS_HYPONYM] basklarinet:1/d_n-38275
 <<-- [HAS_HYPONYM] bombardon:1/d_n-21665
 <<-- [HAS_HYPONYM] contrabas:1, bas:5, basviool:1/d_n-3317
 <<-- [HAS_HYPONYM] fagot:1/d_n-22341
 <<-- [HAS_HYPONYM] basblokfluit:1/d_n-10188
 <<-- [HAS_HYPONYM] basgitaar:1/d_n-10189
 <<-- [CO_PATIENT_INSTRUMENT] basversterker:1/d_n-2143
 -->> [ROLE_INSTRUMENT] baspartij:1, bas:3/d_n-10194
 -->> [ROLE_INSTRUMENT] bassen:2/d_v-970

WordNet domains: music

bassen

d_v-6541 [verb] bassen:1, snauwen:1, bekken:1, blaffen:5, grauwen:2, katten:1, sneren:1
 d_v-970 [verb] bassen:2 MUZ een basinstrument bespelen

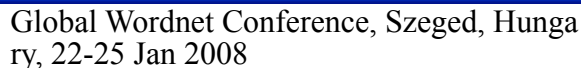
Concept Relations Tree Revtree Edit Xml

C_SY_ID: d_v-970
 Synonyms: bassen:2/d_v-22196

PoS specific: VERB_INTRANSITIVE
 Definition: een basinstrument bespelen
 Differentiae: een basgitaar
 VLIS domains: MUZ
 SUMO: (=, , InstrumentalMusic)

-->> [HAS_HYPERONYM] bespelen:1/d_v-1252
 -->> [INVOLVED_AGENT] basgitarist:1/d_n-15807
 -->> [INVOLVED_AGENT] bassist:1/d_n-21429
 -->> [INVOLVED_INSTRUMENT] basinstrument:1/d_n-21425
 -->> [INVOLVED_INSTRUMENT] basversterker:1/d_n-21431

WordNet domains: music



Cornetto LU

bas Search Search in all

r_n-6013 noun, bas:1, zangstem
 r_n-6014 noun, bas:2, zanger
 r_n-6015 noun, bas:3, contrabas
 r_n-6016 noun, bas:4, basgitaar
 d_n-21942 noun, bas:5

Form Examples Edit Xml

C_LU_ID: r_n-6016 C_SEQ_NR: 4
 Examples:
 Example: 37756 [+]
 canonical form: een bas stemmen
 type: fixed subtype: lexcol

Example: 37757 [+]
 canonical form: op bas:(Roland Knoppe)
 type: fixed subtype: gracol

Example: 37758 [+]
 canonical form: bas spelen
 type: fixed subtype: lexcol

Querying a dictionary is complete. Item(s): 5

Cornetto LU

behandelen

r_v-1170 verb, behandelen:1, omgaan met iets of iemand

r_v-1171 verb, behandelen:2, bespreken

r_v-1172 verb, behandelen:3, trachten te genezen

d_v-24304 verb, behandelen:4

d_v-24305 verb, behandelen:5

d_v-520197 verb, behandelen:6

d_v-24306 verb, behandelen:7

d_v-24302 verb, behandelen:8

d_v-24303 verb, behandelen:9

Form Examples Edit Xml

C_LU_ID:r_v-1170 C_SEQ_NR

Examples:

Example: 855 [+]

canonical form: als een normaal me

type: fixed subtype: pragma

Example: 856 [+]

canonical form: het personeel goed

type: free

Example: 857 [+]

canonical form: een klacht behande

type: free

Example: 858 [+]

canonical form: met zorg behande

type: fixed

Example: 859 [+]

canonical form: met respect behandelen

type: fixed

Querying a dictionary is complete. Item(s): 9

Cornetto LU

behandelen

r_v-1170 verb, behandelen:1, omgaan met iets of iemand

r_v-1171 verb, behandelen:2, bespreken

r_v-1172 verb, behandelen:3, trachten te genezen

d_v-24304 verb, behandelen:4

d_v-24305 verb, behandelen:5

Form Examples Edit Xml

C_LU_ID:r_v-1171 C_SEQ_NR: 2

Examples:

Example: 1132 [+]

canonical form: de slag bij Warns behandelen in de geschiedenisles

type: free

Example: 1133 [+]

canonical form: uitputtend/grondig/uitgebreid behandelen

type: fixed subtype: lexcol

Querying a dictionary is complete. Item(s): 9

Cornetto LU

behandelen

r_v-1170 verb, behandelen:1, omgaan met iets of iemand

r_v-1171 verb, behandelen:2, bespreken

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d_v-24304 verb, behandelen:4

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Form Examples Edit Xml

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Querying a dictionary is complete. Item(s): 9

ru | STEVIN

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Cornetto LU

behandelen

- r_v-1170 verb, behandelen:1, omgaan met ie
- r_v-1171 verb, behandelen:2, bespreken
- r_v-1172 verb, behandelen:3, trachten te gene
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- d_v-24305 verb, behandelen:5
- d_v-520197 verb, behandelen:6
- d_v-24306 verb, behandelen:7
- d_v-24302 verb, behandelen:8
- d_v-24303 verb, behandelen:9

Form Examples Edit Xml

C_LU_ID: r_v-1172 C_SEQ_NR
[verb] behandelen

Morphology:

type: derivation flex conjugation: typ
flex mode: inf flex tense: ntense flex

Syntax:

trans: tran separ: onsch class: main
complementation: np, pp [...] np
iemand voor /met iets behandelen

Semantics:

type: action
resume: trachten te genezen
definition: XVD: als arts een patiënt
hypernyms: verrichten

Querying a dictionary is complete.

Cornetto LU

behandelen

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- d_v-24306 verb, behandelen:7
- d_v-24302 verb, behandelen:8
- d_v-24303 verb, behandelen:9

Form Examples Edit Xml

```
- <cdb_lu c_seq_nr="3" type="swu" is_complete="true" c_lu_id="r_v-1172">
  <form form-cat="verb" form-spelling="behandelen"/>
  <morphology_verb>
    <morpho-type>derivation</morpho-type>
    <flex-conjugation>
      <flex-conjugationtype>regular</flex-conjugationtype>
    </flex-conjugation>
    <flex-mode>inf</flex-mode>
    <flex-tense>ntense</flex-tense>
    <flex-number>nnumber</flex-number>
    <flex-person>nperson</flex-person>
  </morphology_verb>
  <syntax_verb>
    <sy-trans>tran</sy-trans>
    <sy-separ>onsch</sy-separ>
    <sy-class>main</sy-class>
    <sy-peraux>h</sy-peraux>
    <sy-valency>tri</sy-valency>
    <sy-reflexiv>nrefl</sy-reflexiv>
    <sy-subject>pers</sy-subject>
    <sy-complementation>
```

The image displays three overlapping windows of the Cornetto Synset application. The foreground window is titled 'Cornetto Synset' and shows a search for 'drinkwater'. The search results are as follows:

- Concept:** d_n-16556 [noun] drinkwater:1 CUL water dat geschikt is om gedronken te worden
- Relations:** (empty)
- Tree:** (empty)
- Revtree:** (empty)
- Edit:** (empty)
- Xml:** (empty)
- C_SY_ID:** d_n-16556
- Synonyms:** drinkwater:1/r_n-11588
- PoS specific:** NOUN_HET
- Definition:** water dat geschikt is om gedronken te worden
- Differentiae:** geschikt voor consumptie
- VLIS domains:** CUL
- SUMO:** (+, , Water) , (instance, 0, Water) , (instance, 1, Drinking) , (patient, 0, 1)
- >> [HAS_HYPERONYM]** water:1, majem:1/d_n-20623
- WordNet domains:** chemistry

The status bar at the bottom of the foreground window indicates 'Querying a dictionary is complete.' and 'Item(s): 1'. The background windows show similar interfaces with searches for 'n_n-503673' and 'bluswater'.