Wiktionary
The Metalexicographic and the Natural Language Processing Perspective

Christian M. Meyer

TECHNISCHE UNIVERSITÄT DARMSTADT

Dissertation talk
Technische Universität Darmstadt, 28. October 2013.

Wiktionary

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encyclopedia
Wiktionary
['wɪkʃənrɪ] *n.*,
a wiki-based Open Content dictionary

Main Page
Community portal
Preferences
Requested entries
Recent changes
Random entry (by language)
Help
Donations
Contact us

Toolbox
What links here
Related changes
Upload file
Special pages
Printable version
Permanent link
Page information
Cite this page
Add definition

In other projects
Wikipedia

Visibility

Entry | Discussion | Citations | Read | Edit | History | Search

boat

English [edit]

Etymology [edit]

From Middle English *boot*, *bot*, *boet*, *boyt* ("boat"), from Old English *bāt* ("boat"), from Proto-Germanic **baitaz*, **baitan* ("boat, small ship"), from Proto-Indo-European **bheid-* ("to break, split"). Cognate with Old Norse *beit* ("boat").

Old Norse *bātr* (whence Icelandic *bátur*, Norwegian *båt*), Dutch *boot*, German *Boot*, and French *bateau* are all ultimately borrowings from the Old English word.

Wikipedia has an article on:
Boat

A **boat** kept on land

Pronunciation [edit]

- (*RP*) enPR: bōt, IPA: /bəʊt/, X-SAMPA: /b@Ut/
- Rhymes: -əʊt
- (*GenAm*) enPR: bōt, IPA: /boʊt/, X-SAMPA: /boUt/
- Rhymes: -oʊt
- Audio (US) 0:00 MENU

Noun [edit]

boat (*plural* **boats**)

1. A craft used for transportation of goods, fishing, racing, recreational cruising, or military use on or in the water, propelled by oars or outboard motor or inboard motor or by wind.
2. (*poker slang*) A full house.
3. (*chemistry*) One of two possible conformations of cyclohexane rings (the other being chair), shaped roughly like a boat.

Usage notes [edit]

There's no explicit limit, but the word ***boat*** usually refers to a relatively small watercraft that is generally smaller than a "ship" and

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Motivation

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New lexicographic paradigm: collaborative lexicography

Motivation

TECHNISCHE UNIVERSITÄT DARMSTADT

New lexicographic paradigm: collaborative lexicography

Why care?

- The Web leads to quickly changing business models of dictionary publishers
  - → unclear future of the Deutsches Wörterbuch (the “Grimm”)
  - → downsizing of Duden incl. editorial staff
- Collaborative encyclopedias are about to replace expert-built ones
  - → radical changes to Brockhaus encyclopedia
- Large amount of freely available information for language technology

The Metalexicographic Perspective

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Research Question:

Implications of collaborative construction on lexicography

Wiktionary
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a wiki-based Open Content dictionary

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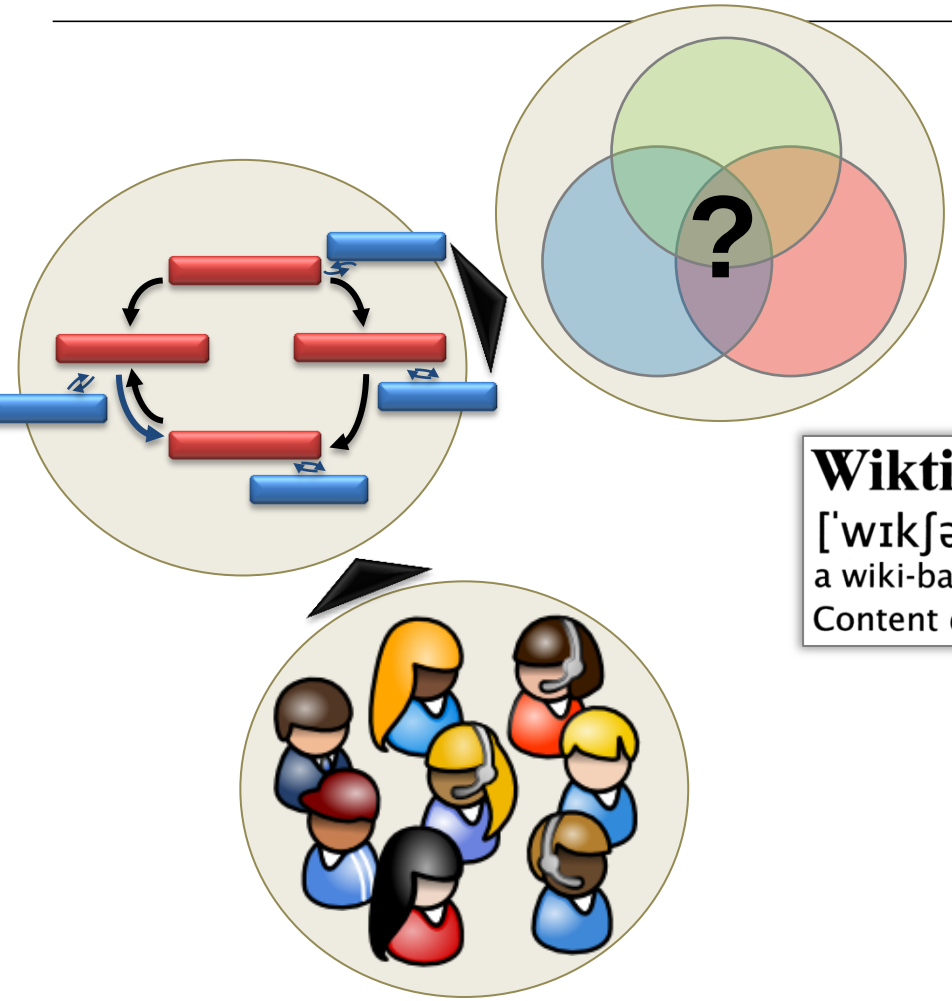
The Metalexicographic Perspective



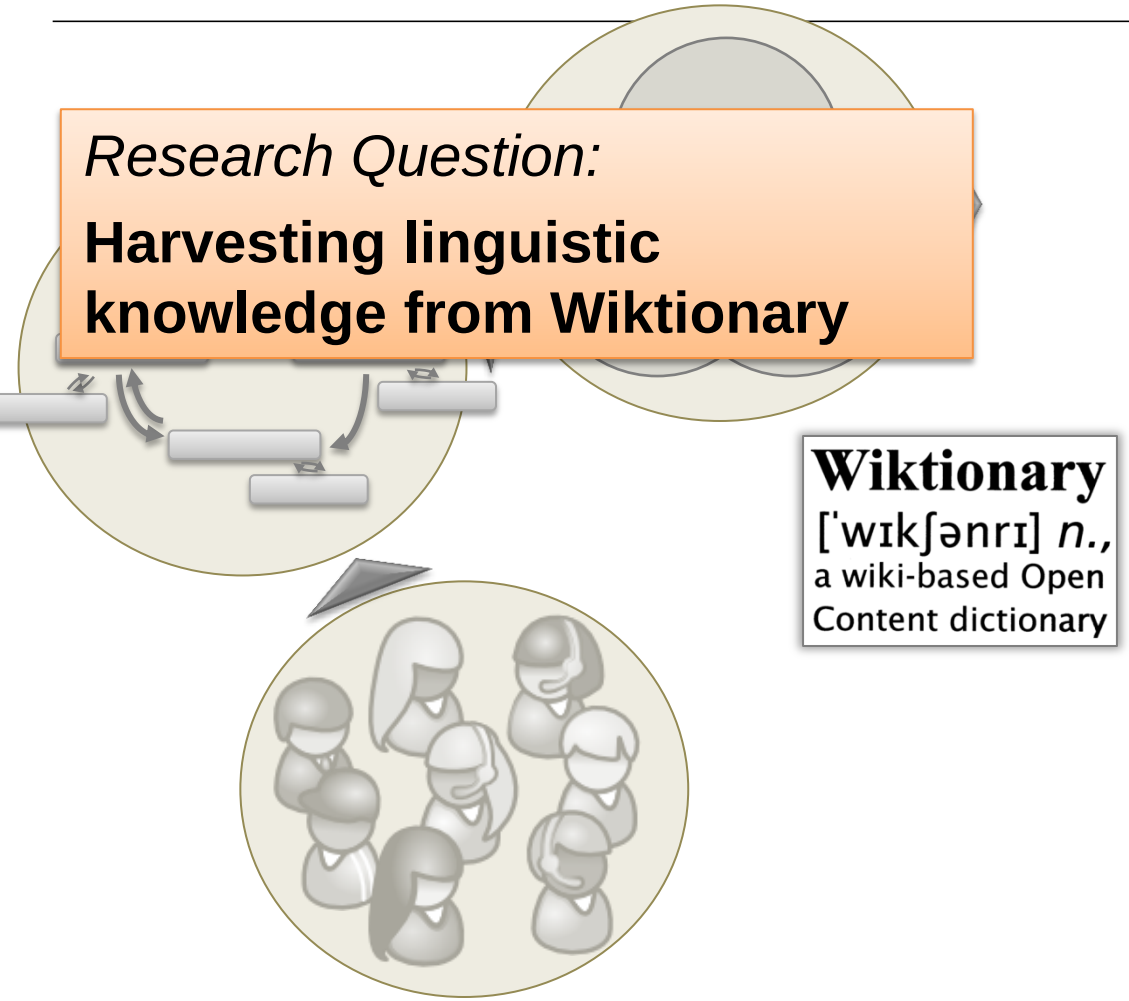
Research Question:

Implications of collaborative construction on lexicography

Contributions:

- **Comprehensive description of Wiktionary**
- **Analysis of the collaborative lexicographic process**
- **Quantitative comparison of dictionaries**

The Natural Language Processing Perspective



Research Question:

Harvesting linguistic knowledge from Wiktionary

Wiktionary
[ˈwɪkʃənrɪ] *n.*,
a wiki-based Open Content dictionary

The Natural Language Processing Perspective

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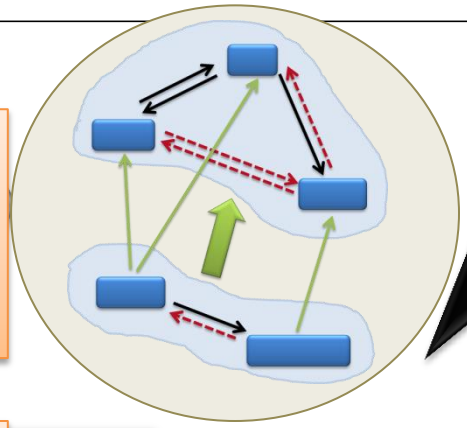
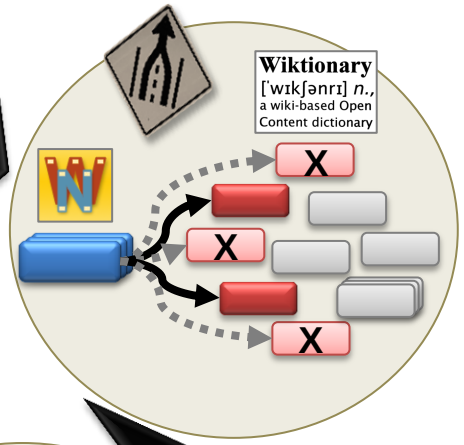
Research Question:

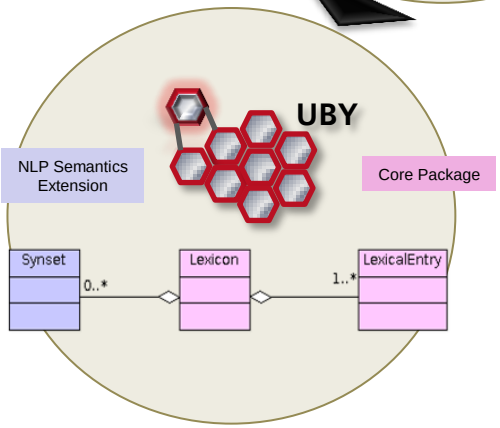
Harvesting linguistic knowledge from Wiktionary

Contributions:

- **Extracting & disambiguating lexical-semantic information**
- **Alignment of Wiktionary and WordNet at sense level**
- **Standardized representation based on LMF**







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Research Goals

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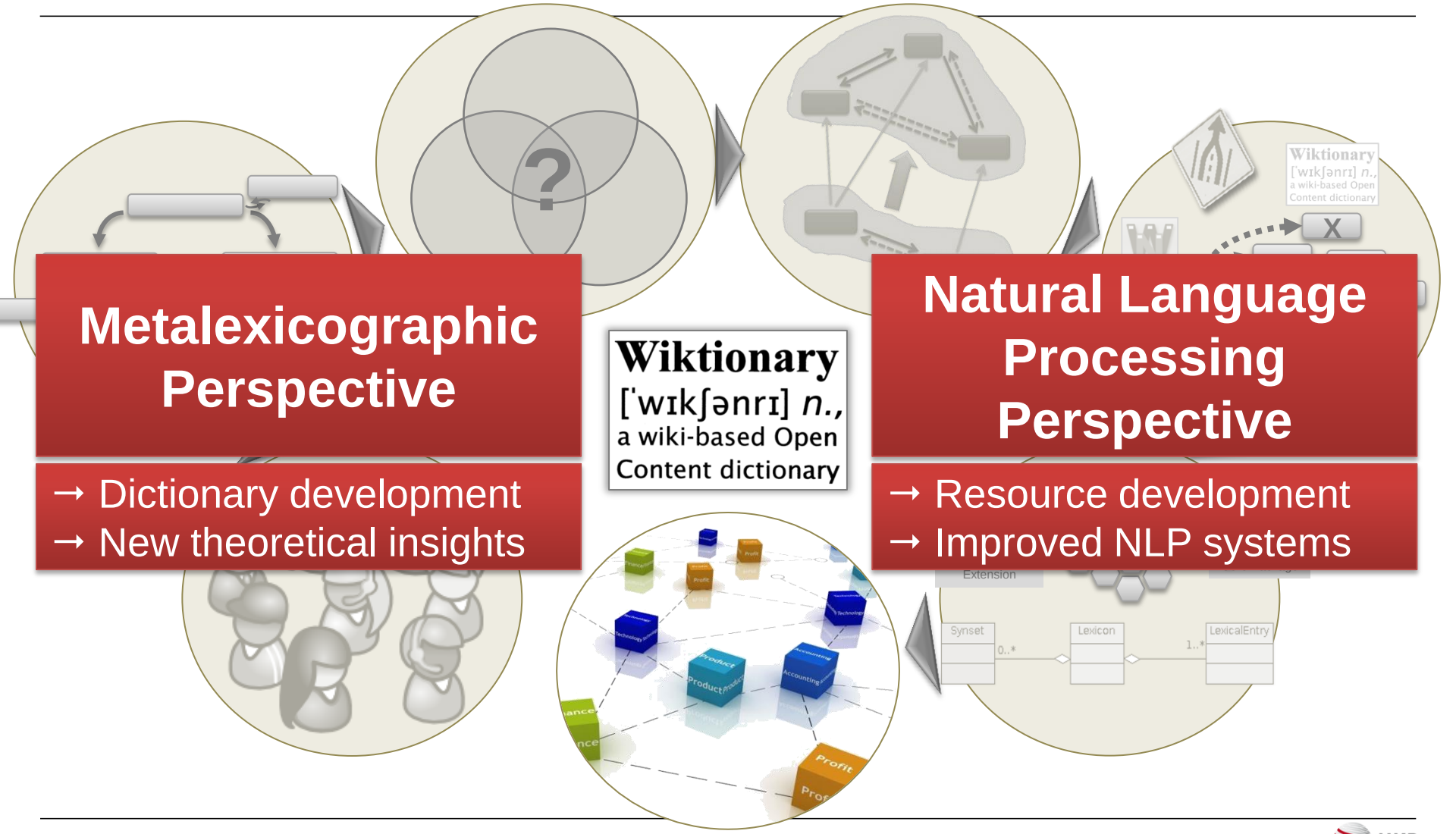

Metalexicographic Perspective

→ Dictionary development
→ New theoretical insights

Natural Language Processing Perspective

→ Resource development
→ Improved NLP systems

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Interdisciplinary Relationships

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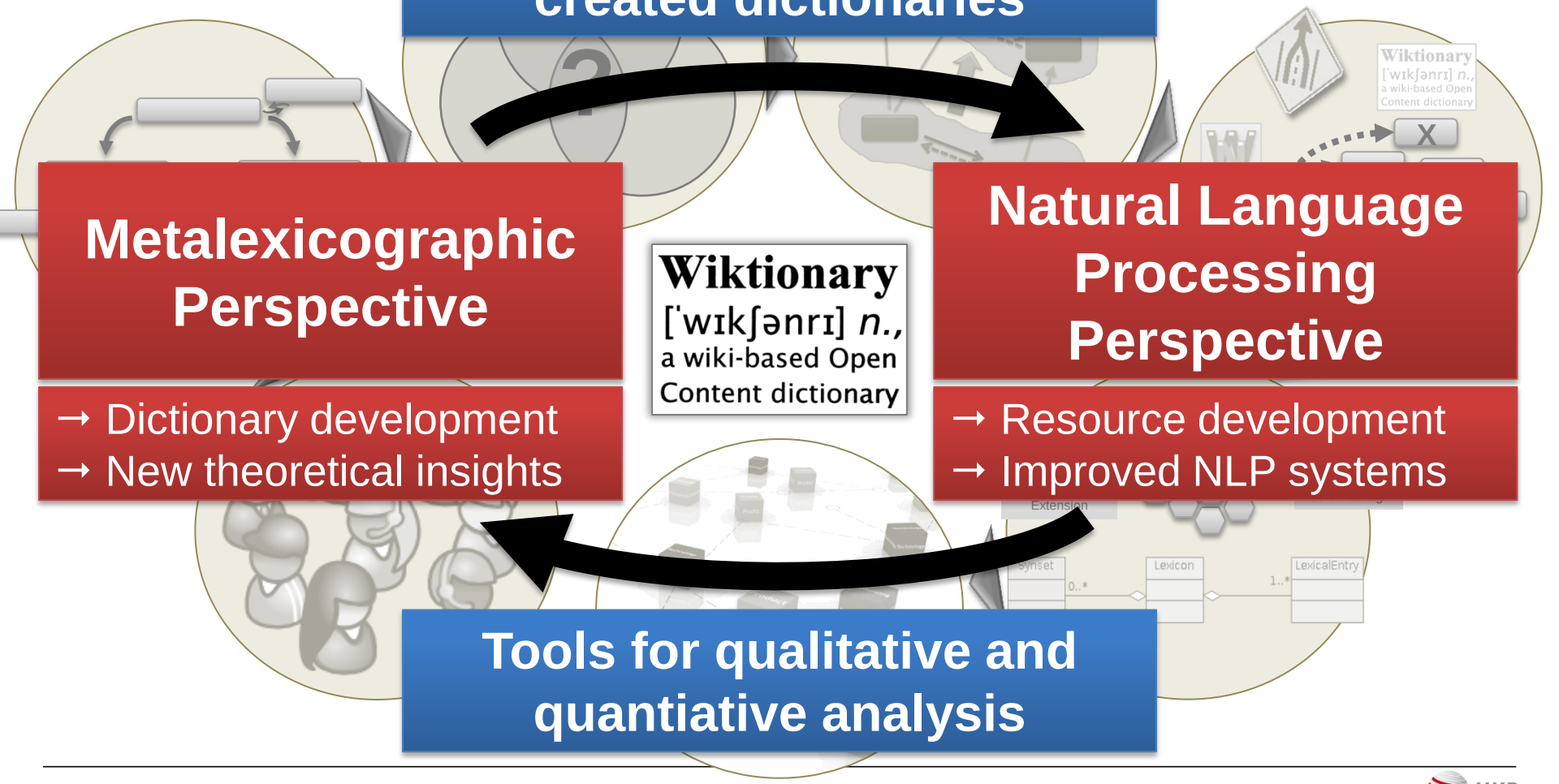
Potential of collaboratively created dictionaries

Metalexicographic Perspective

→ Dictionary development
→ New theoretical insights

Natural Language Processing Perspective

→ Resource development
→ Improved NLP systems



Tools for qualitative and quantiative analysis

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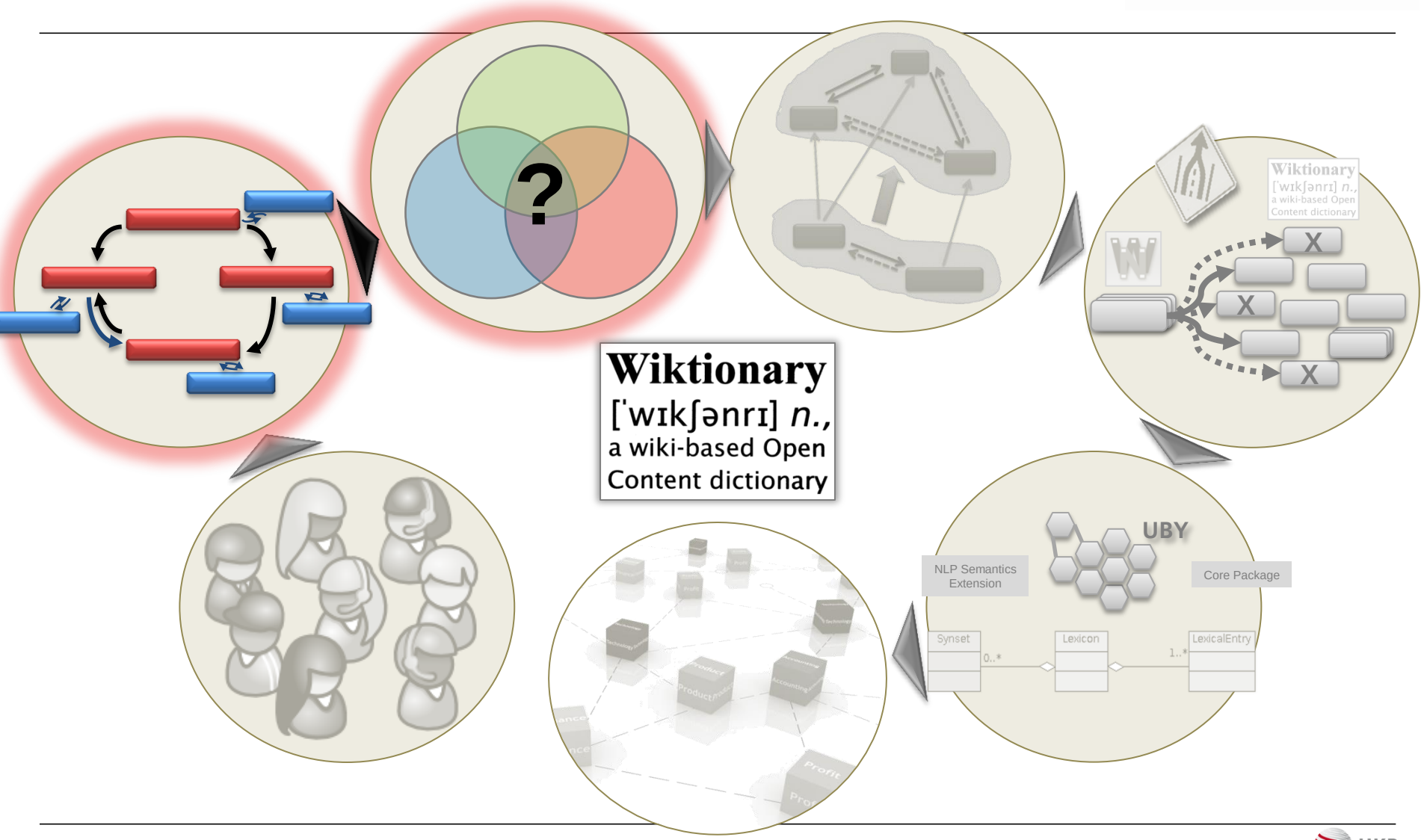
Agenda


?
Wiktionary
[ˈwɪkʃənrɪ] n.,
a wiki-based Open
Content dictionary
UBY
NLP Semantics Extension
Core Package
Synset
Lexicon
LexicalEntry
0..*
1..*

Dictionary Analysis and Comparison

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http://www.wordle.net – Font size represents article count (logarithmic scale)

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Dictionary Analysis and Comparison

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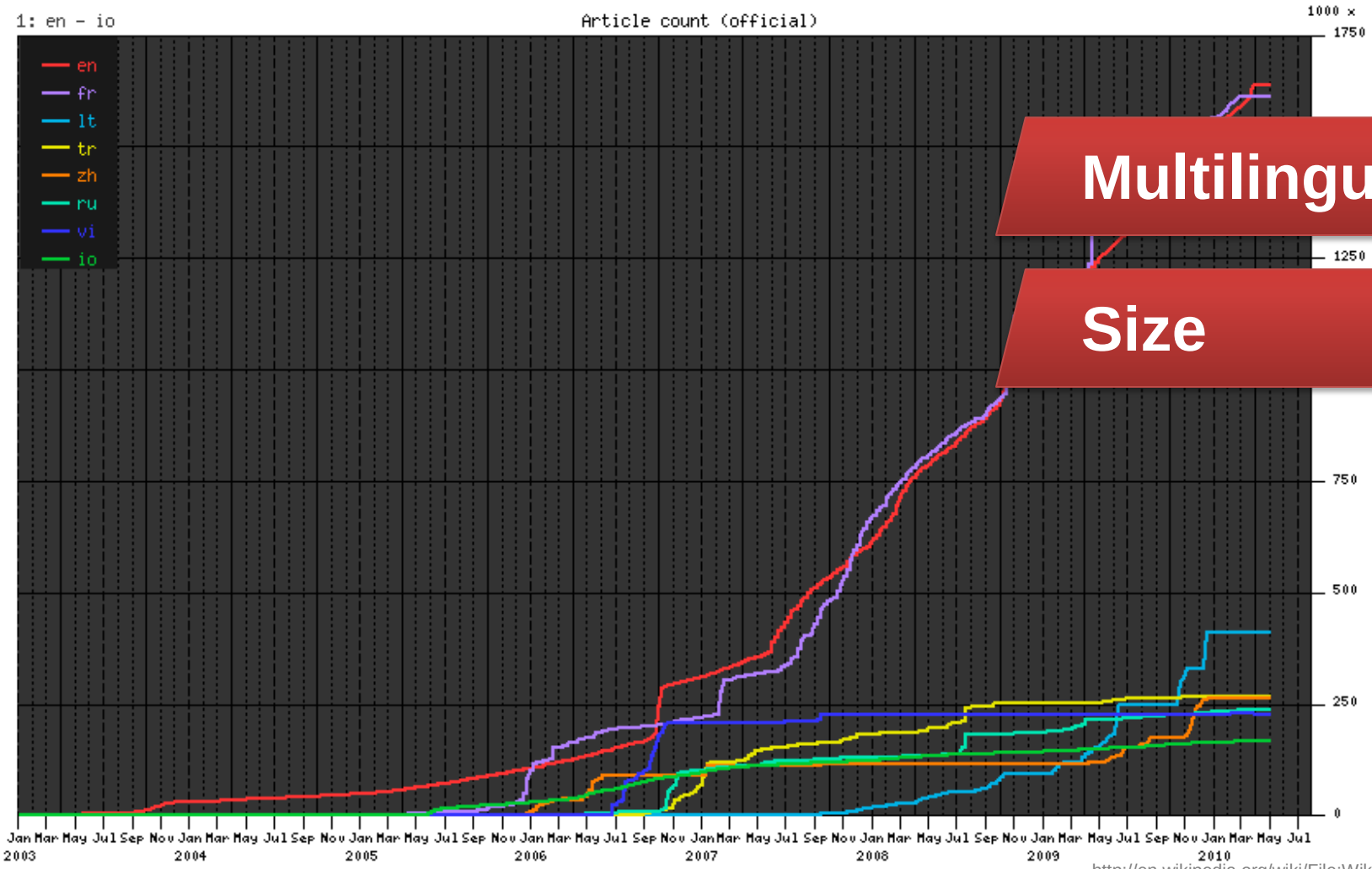

Multilingualism

Size

http://en.wikipedia.org/wiki/File:Wiktionary_growth.png

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Dictionary Analysis and Comparison

TECHNISCHE UNIVERSITÄT DARMSTADT

(diff | hist) . . తీర్థము; 14:51 . . (+109) . . Rajasekhar1961 (Talk | contribs) *(→Telugu)*
(diff | hist) . . horseshoe; 14:50 . . (+24) . . 115.132.182.28 (Talk) *(t+ms:ladam t-balance (Assisted))*
(diff | hist) . . **N** армада; 14:50 . . (+132) . . Stephen G. Brown (Talk | contribs) *(→Noun)*
(diff | hist) . . excite; 14:50 . . (+18) . . Jc86035 (Talk | contribs) *(+rhyme -aɪt)*
(diff | hist) . . **N** despellejar; 14:50 . . (+208) . . Ultimateria (Talk | contribs) *(Created page with "==*
*skin # to criticize ====Conjugation==== {{es-conj-ar|despellej}} ====Synonyms==== * {{l/es|des*
(diff | hist) . . **N** вооружение; 14:49 . . (+102) . . Stephen G. Brown (Talk | contribs) *(→Noun)*
(diff | hist) . . **N** तीर्थ; 14:49 . . **(+928)** . . Rajasekhar1961 (Talk | contribs) *(Created page with "==Sa*
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(diff | hist) . . **N** geschwommen; 14:47 . . (+80) . . Sae1962 (Talk | contribs) *(Added German entry)*
(diff | hist) . . **N** арность; 14:47 . . (+114) . . Stephen G. Brown (Talk | contribs) *(→Noun)*
(diff | hist) . . **m** gegangen; 14:47 . . (+5) . . Sae1962 (Talk | contribs)
(diff | hist) . . **N** pellejos; 14:47 . . (+99) . . Ultimateria (Talk | contribs) *(Creating plural form of pellejo (Accelerated))*
(diff | hist) . . **N** schwamm; 14:47 . . (+169) . . Sae1962 (Talk | contribs) *(Added German entry)*
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(diff | hist) . . **m** floated; 14:45 . . (+8) . . Sae1962 (Talk | contribs) *(→Verb: Added a template)*
(diff | hist) . . **m** basketeer; 14:44 . . (+37) . . Equinox (Talk | contribs) *(→English: ===Etymology=== {{suffix|basket|eer}})*
(diff | hist) . . **N** prašanu; 14:44 . . (+126) . . Pereru (Talk | contribs) *(Created page with "==Latvian== ===Noun=== {{head|lv|noun form|g=f}} #*
{{lv-inflection of|prašanalacc|s}} # {{lv-inflection of|prašanalins|s}}")

Multilingualism

Size

Up-to-dateness

UKP

Dictionary Analysis and Comparison

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Multilingualism

Size

Up-to-dateness

History

UKP

Dictionary Analysis and Comparison

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Sprachvarietäten

- Dialekte: Liste deutscher Dialekte • Hunsrücker Mundart • Kärnter Mundart • Wäller Platt
- Außereuropäische Varietäten: Außereuropäische Varietäten des Deutschen
- Fachsprache: Fliegersprache • Hip-Hop-Jargon • Jägersprache • Netzjargon Polizeijargon • Soldatensprache • Soldatensprache (Schweizer Armee) • Seemannssprache

Listen von Namen

- Liste von Staatennamen
- Liste der Männlichen Vornamen
- Liste der Weiblichen Vornamen
- Liste der häufigsten weiblichen Vornamen Deutschlands
- Liste der häufigsten männlichen Vornamen Deutschlands
- Liste geschlechtsneutraler Vornamen
- Liste der Kosenamen und Kosewörter
- Liste der häufigsten Nachnamen Deutschlands / Österreichs

Weitere Wortlisten

- Abkürzungen: Liste der Abkürzungen im Internet • ASCII-Smileys • Liste

und Übersichten: Liste der Wörter,

Bedeutung in verschiedenen

Wissenschaft

Astronomie • Geowissenschaften • Informatik • Linguistik • Mathematik • Medizin • Pharmazie • Philosophie • Philosophie • Physik • Psycholgie • Rechtswissenschaften

- *Biologie*: Ökologie • Zoologie • Zytologie und Genetik
- *Chemie*: Anorganische Stoffe • Organische Stoffe

Gesellschaft

Berufe • Politik

- *Essen und Trinken*: Getränke • Speisen • Tätigkeiten und Eigenschaften • Deutschsprachige Küchenbegriffe nach Regionen • Küche und Küchengeräte • Weinbau
- *Sport und Freizeit*: Sportarten • Fußball • Golf • Radsport • Schach • Tanzen

Eisenbahnwesen • Fahrzeugtechnik •

Multilingualism

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Up-to-dateness

History

Topic & Variety

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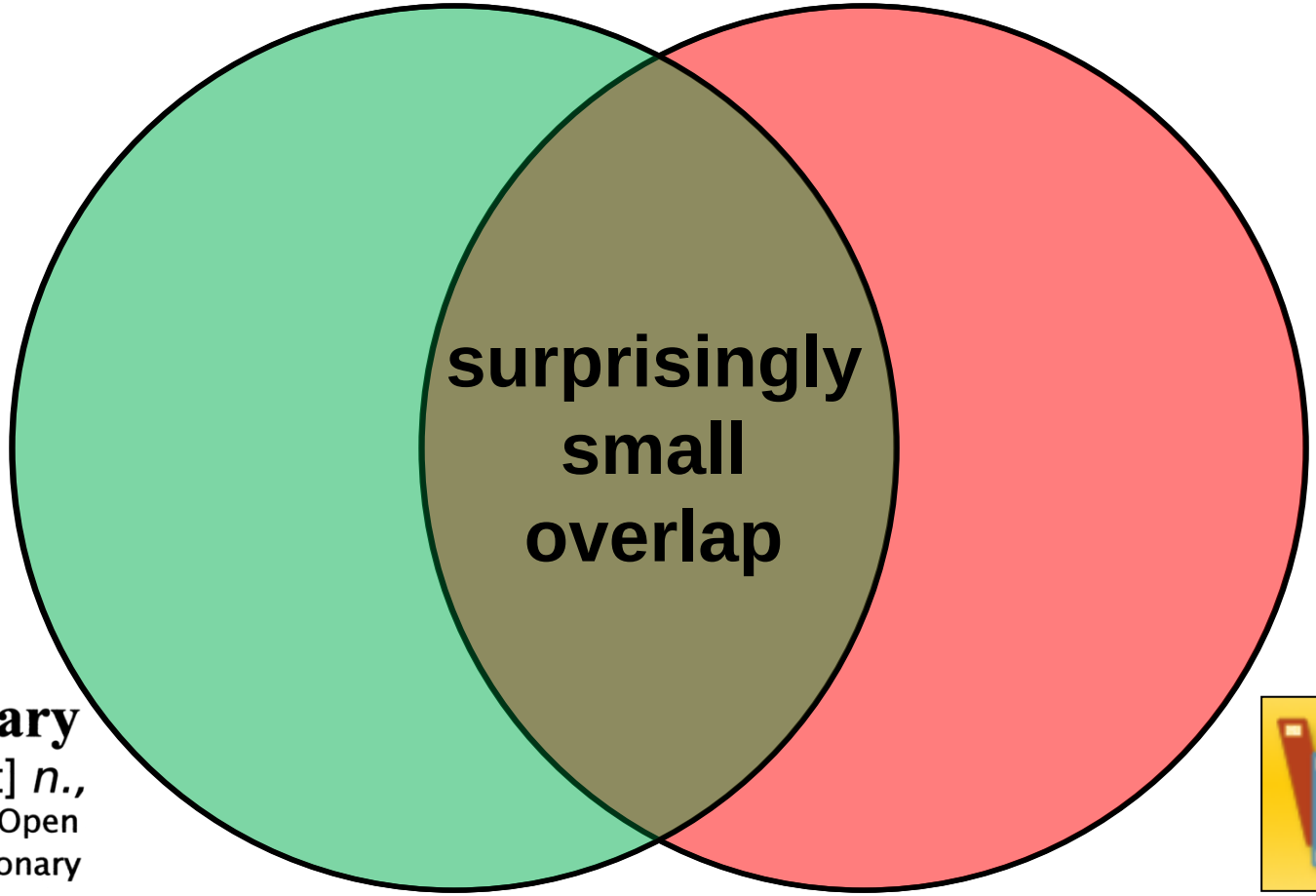
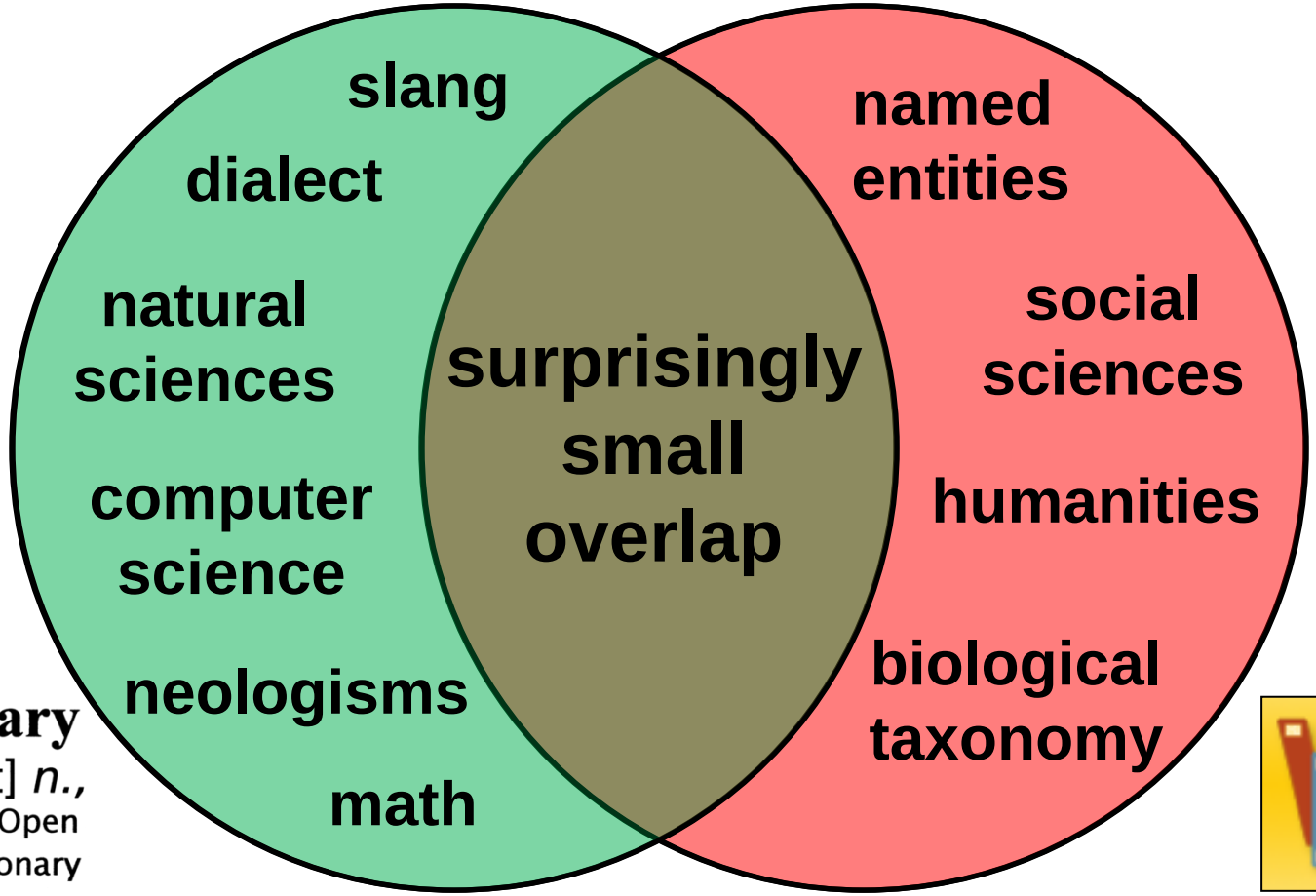
Overlap of Lexical Entries



Overlap of Lexical Entries



Wiktionary
[ˈwɪkʃənrɪ] *n.*,
a wiki-based Open Content dictionary

But…

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Wiktionary is far from being perfect

- Different developmental stages of articles
- Inconsistencies
- Spelling errors
- Old-fashioned and overly general definitions

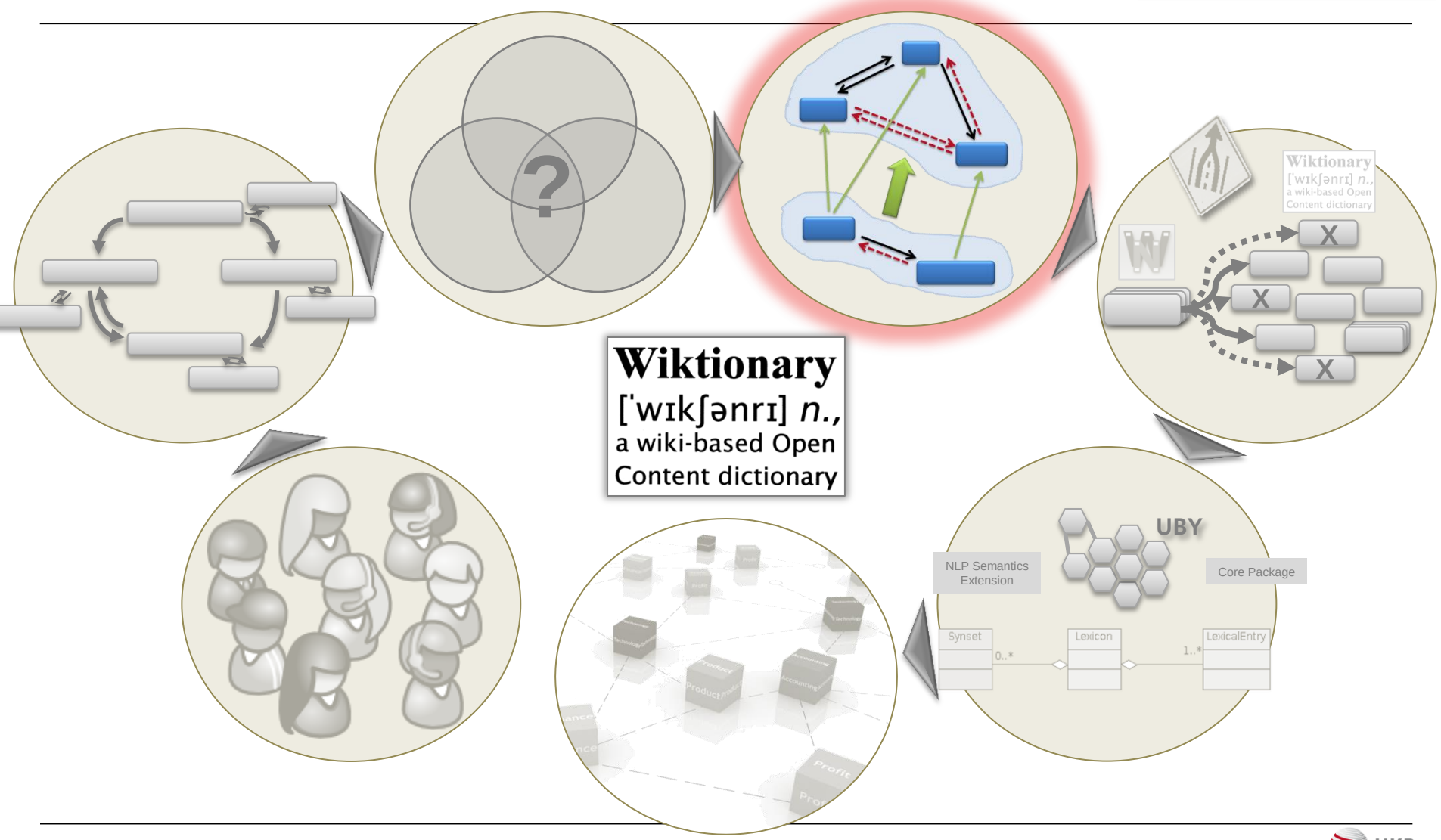
No systematic corpus analysis

- Many references to expert-built dictionaries
- Sum of subjective opinions of the authors

A user suggests that this entry be cleaned up, giving the reason: "clean up music definitions".

Please see the discussion on **Requests for cleanup**(+) or the talk page for more information and remove this template after the problem has been dealt with.

Agenda


Wiktionary
[ˈwɪkʃənrɪ] n.,
a wiki-based Open
Content dictionary
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[ˈwɪkʃənrɪ] n.,
a wiki-based Open
Content dictionary
UBY
NLP Semantics Extension
Core Package
Synset
Lexicon
LexicalEntry
0..*
1..*

Harvesting Linguistic Knowledge from…

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Machine-readable Dictionaries?

- Usually high quality
- Weakly structured; often not freely available

Wordnets?

- Commonly used; well-structured
- Small coverage, in particular multilingual ones

http://www.flickr.com/photos/jwyg/3746351826/ (CC BY-SA 2.0 by Flickr user jwyg)

Harvesting Linguistic Knowledge from…

TECHNISCHE UNIVERSITÄT DARMSTADT

Machine-readable Dictionaries?

- Usually high quality
- Weakly structured; often not freely available

Wordnets?

- Commonly used; well-structured
- Small coverage, in particular multilingual ones

EuroWordNet

Wikipedia?

- High coverage of factual knowledge
- No linguistic knowledge (word usage, verbs,…)

WIKIPEDIA
The Free Encyclopedia

Wiktionary!

- Freely available, high coverage, all parts of speech

Wiktionary
[ˈwɪkʃənrɪ] *n.*,
a wiki-based Open Content dictionary

http://www.flickr.com/photos/jwyg/3746351826/ (CC BY-SA 2.0 by Flickr user jwyg)

Adding Structure to Wiktionary

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Structure

Dictionary → **Ontology**

puppy

Contents [show]

English

Pronunciation

- Audio (US) ▶ 0:00 CC MENU
- Rhymes: -ʌpi

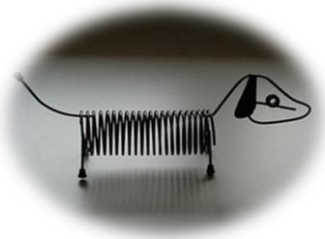
Noun

puppy (*plural* **puppies**)

1. A young dog.
2. A young rat.
3. A young seal.
4. (*slang, usually in the plural*) A woman's breast.
5. (*informal*) A (generic) thing; particularly something that

*I have another two dozen of these **puppies** to finish*

{dog$_1$, hound$_1$, canine$_1$}



Concepts

IS-A

Relation

{puppy$_1$, juvenile dog$_1$}

http://www.flickr.com/photos/sillydog/6546575/ (CC BY-SA 2.0 by Flickr user sillydog)
http://www.flickr.com/photos/7946788@N08/5126883524/ (CC BY-SA 2.0 by Flickr user filmismylove)

OntoWiktionary

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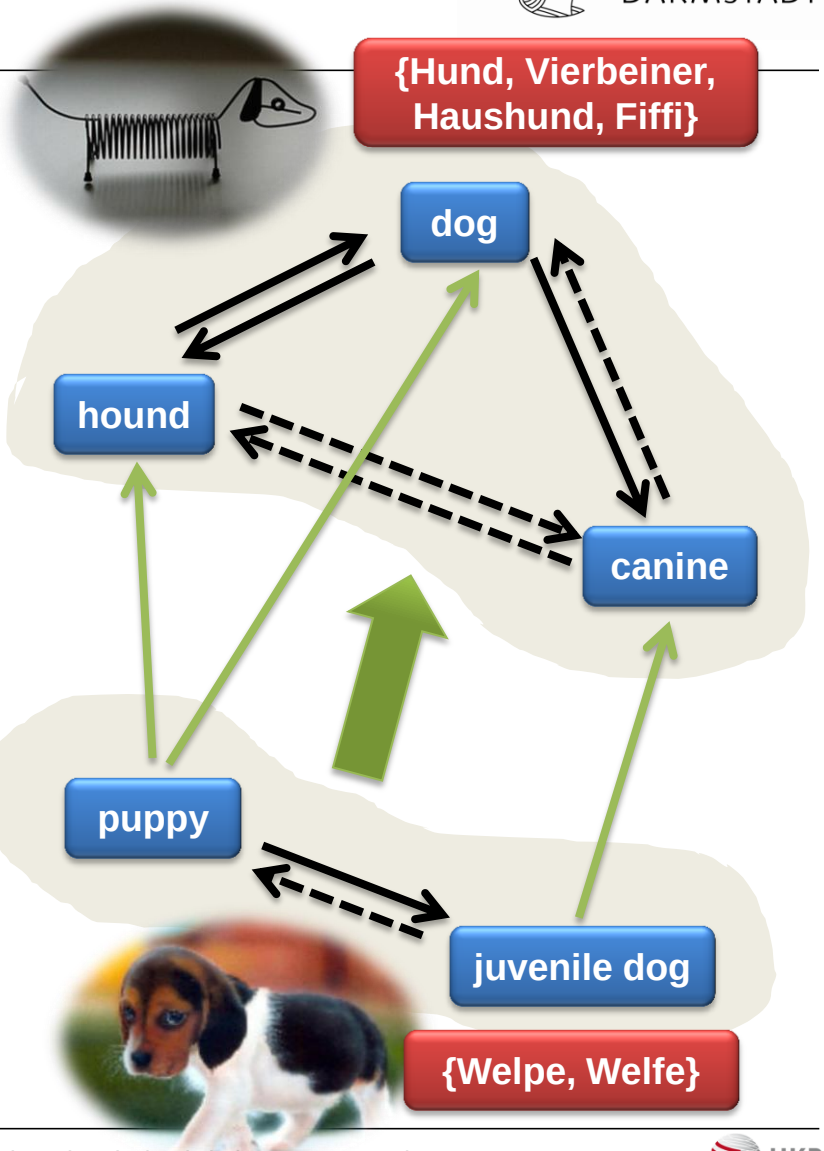
1. Concept formation

- Start with Wiktionary senses
- Create synonymy graph
- Calculate the transitive hull
- Synsets → concepts

2. Conceptual relations

- From lexical relations to conceptual relations

3. Multilingual Lexicalizations



http://www.flickr.com/photos/sillydog/6546575/ (CC BY-SA 2.0 by Flickr user sillydog)
http://www.flickr.com/photos/7946788@N08/5126883524/ (CC BY-SA 2.0 by Flickr user filmismylove)

Disambiguation of Relations and Translations

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boat (*plural* **boats**)

1. A craft used for transportation of goods, fishing, racing, recreational cruising, or military use on or in the water, propelled by oars or outboard motor or inboard motor or by wind.
2. (*poker slang*) A full house.
3. A vehicle, utensil, or dish somewhat resembling a boat in shape.

   *a stone **boat**; a gravy **boat***

4. (*chemistry*) One of two possible conformations of cyclohexane rings (the other being chair), shaped roughly like a boat.
5. (*Australia*, *politics*, *informal*) The refugee boats arriving in Australian waters, and by extension, refugees generally.

Synonyms

- (*craft on or in water*): craft, ship, vessel

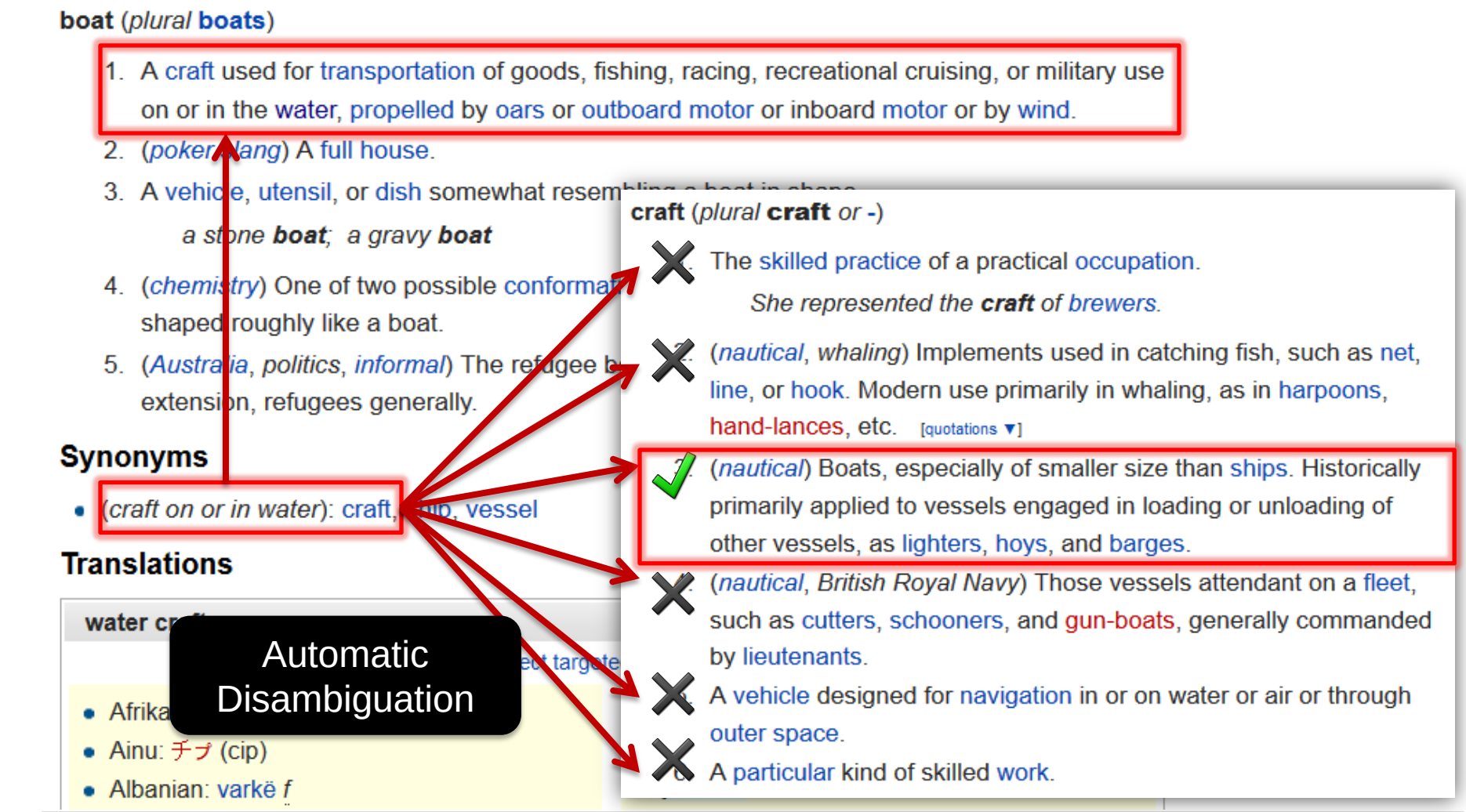
Translations

water craft [hide ▲]

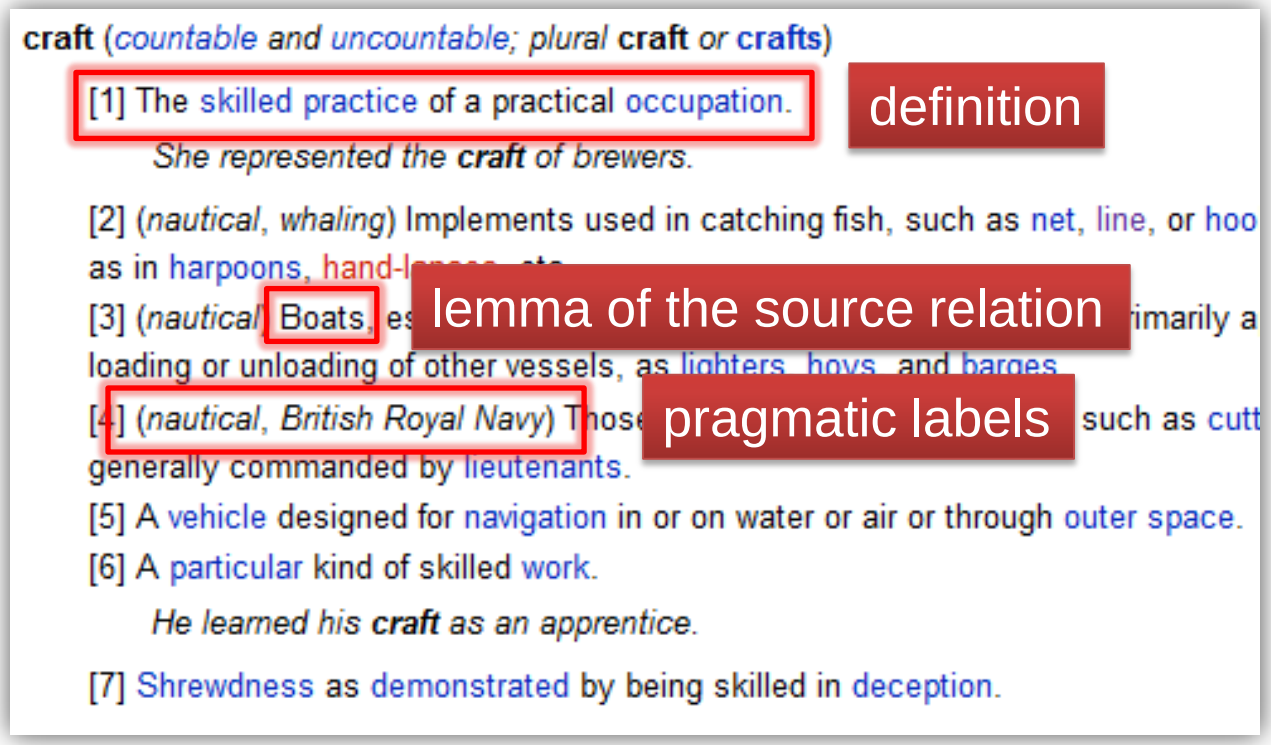
Select targeted languages

- Afrikaans: boot
- Ainu: チプ (cip)
- Albanian: varkë *f*
- Lojban: bloti
- Luxembourgish: *please add this translation if you can*

Disambiguation of Relations and Translations



Disambiguation Features (Selection)



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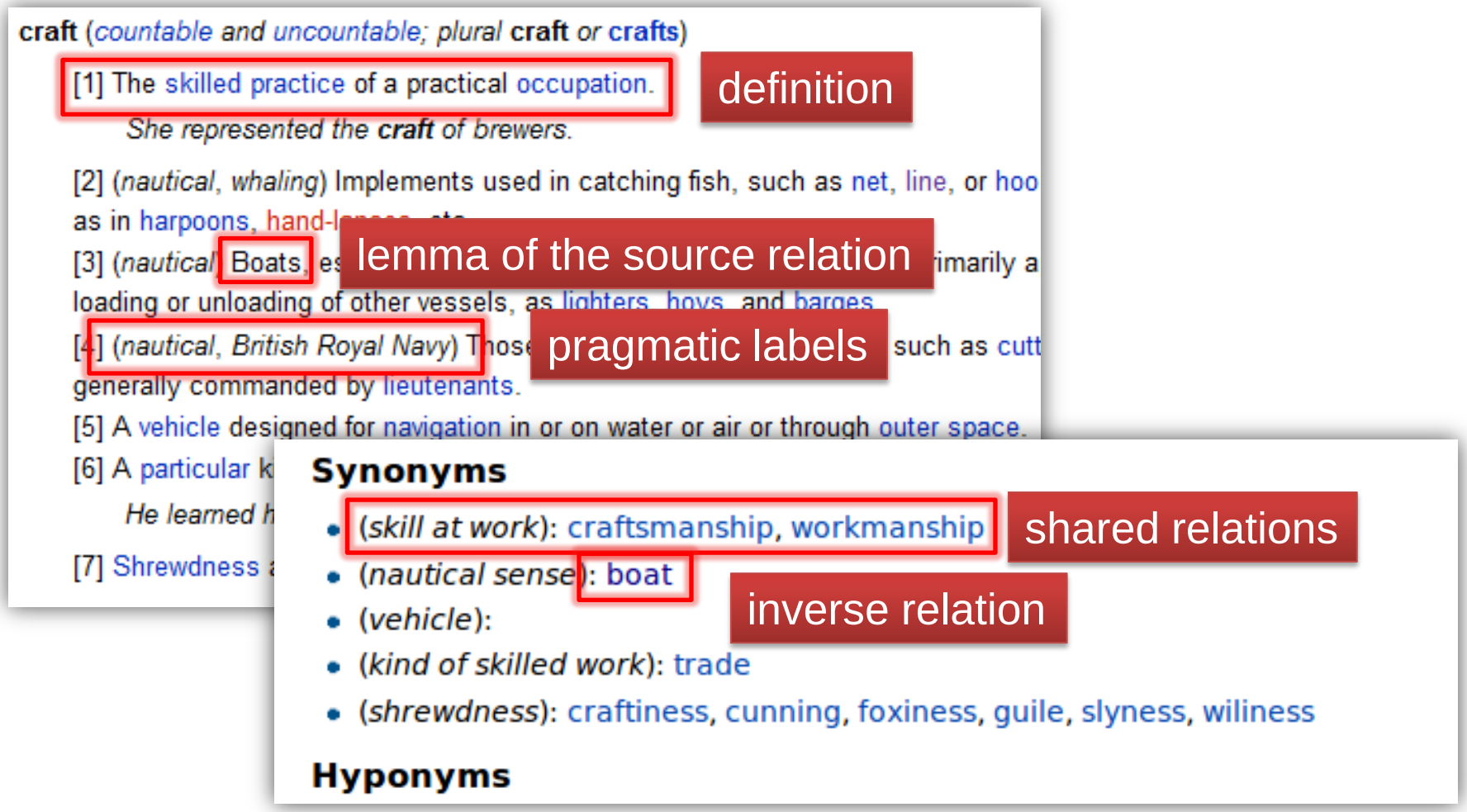
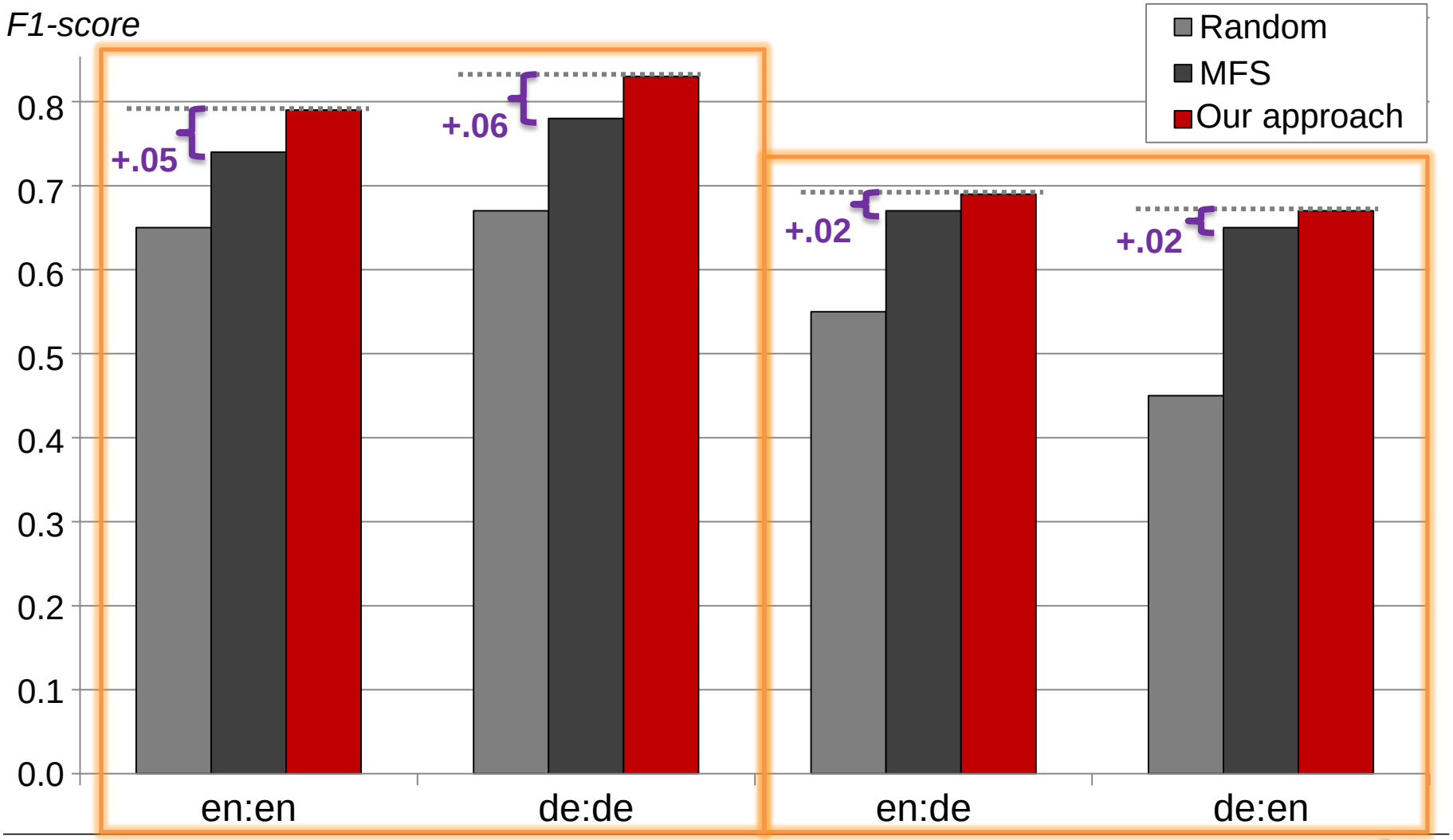
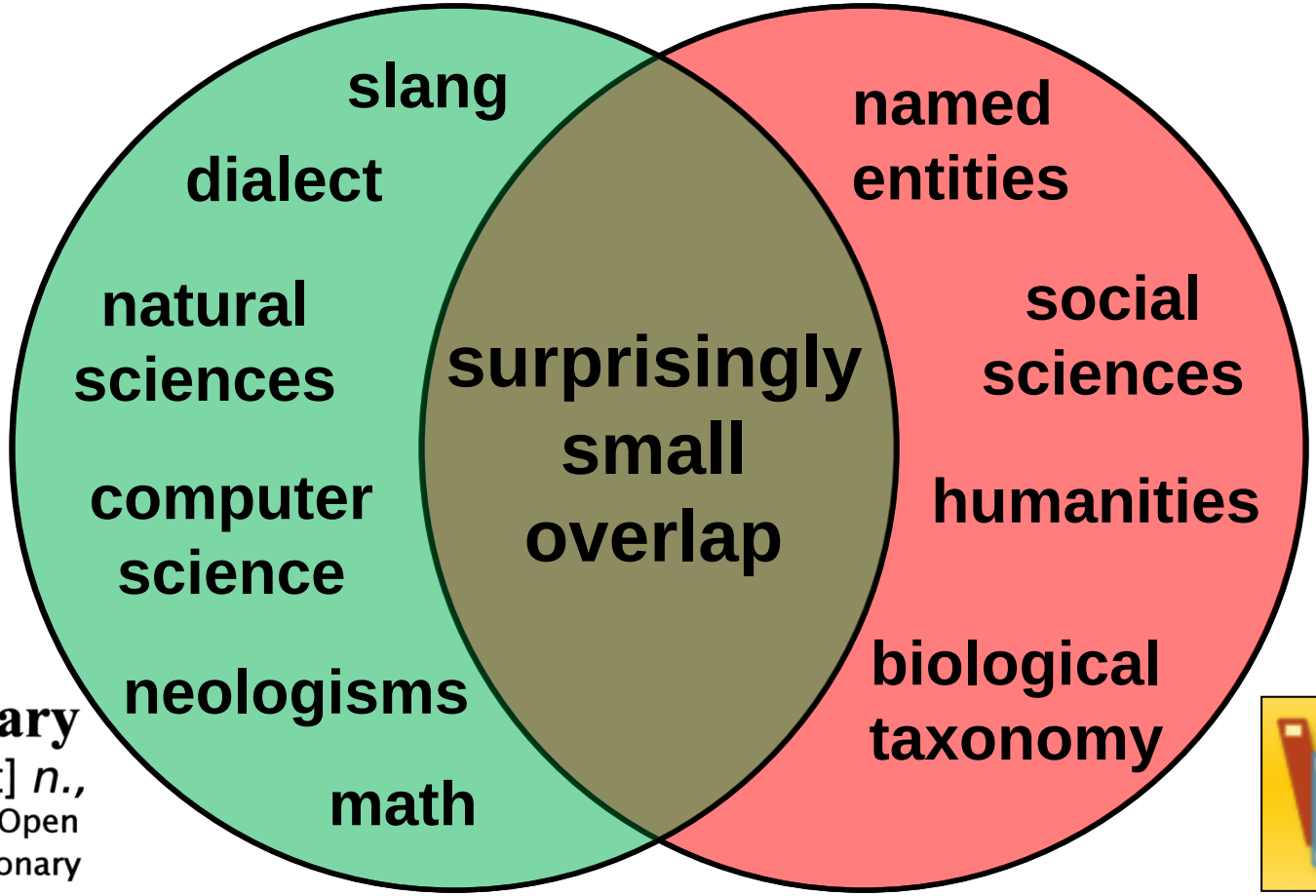


Evaluation Results

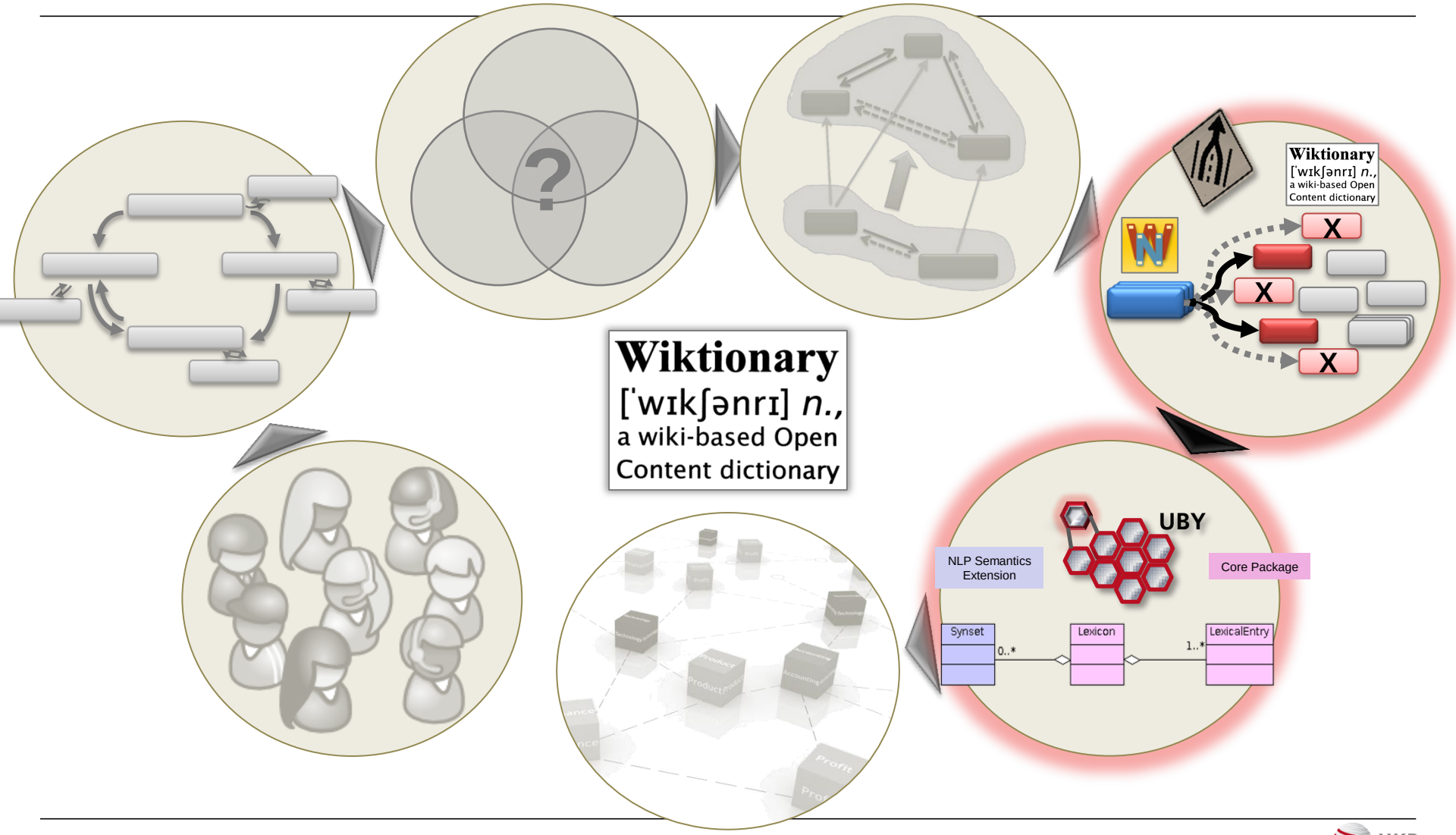


Overlap of Lexical Entries – Revisited



Wiktionary
[ˈwɪkʃənrɪ] *n.*,
a wiki-based Open Content dictionary

Agenda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UBY
NLP Semantics Extension
Core Package
Synset
Lexicon
LexicalEntry
0..*
1..*

Word Sense Alignment

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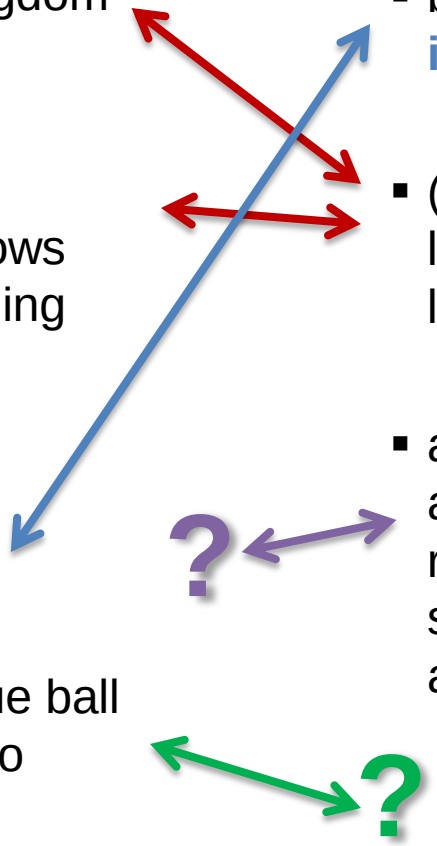
plant in Wiktionary

- (**botany**) An organism of the kingdom Plantae […]
- (proscribed as **biologically** inaccurate) Any creature that grows on soil or similar surfaces, including plants and fungi.
- A **factory** or other industrial or institutional building or facility.
- (**snooker**) A play in which the cue ball knocks one (usually red) ball onto another […]



plant in WordNet

- buildings for carrying on **industrial labor**
- (**botany**) a living organism lacking the power of locomotion
- an **actor** situated in the audience whose acting is rehearsed but seems spontaneous to the audience

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Aligning Wiktionary and WordNet

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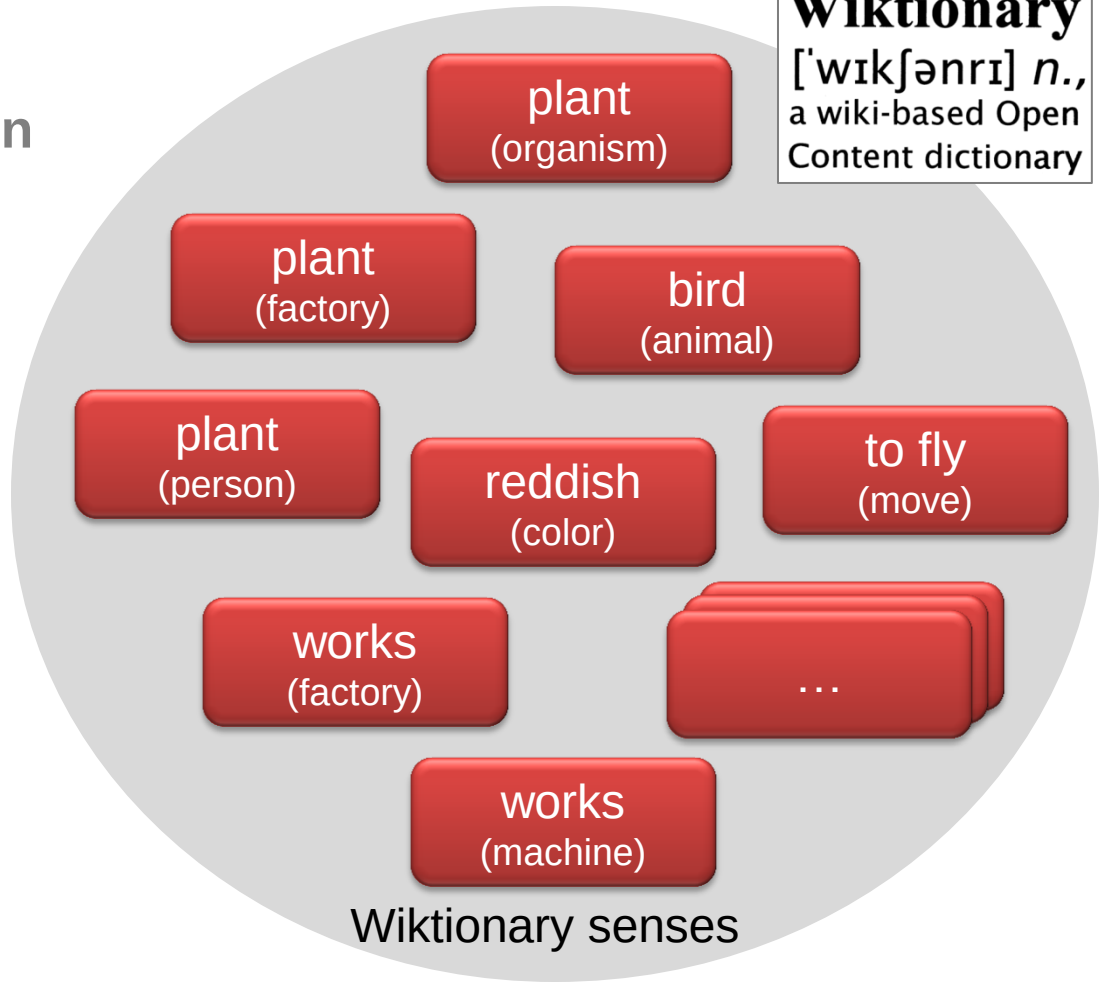
A two-step approach:

1. Candidate extraction
2. Candidate disambiguation

WordNet synsets



Wiktionary senses

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Aligning Wiktionary and WordNet

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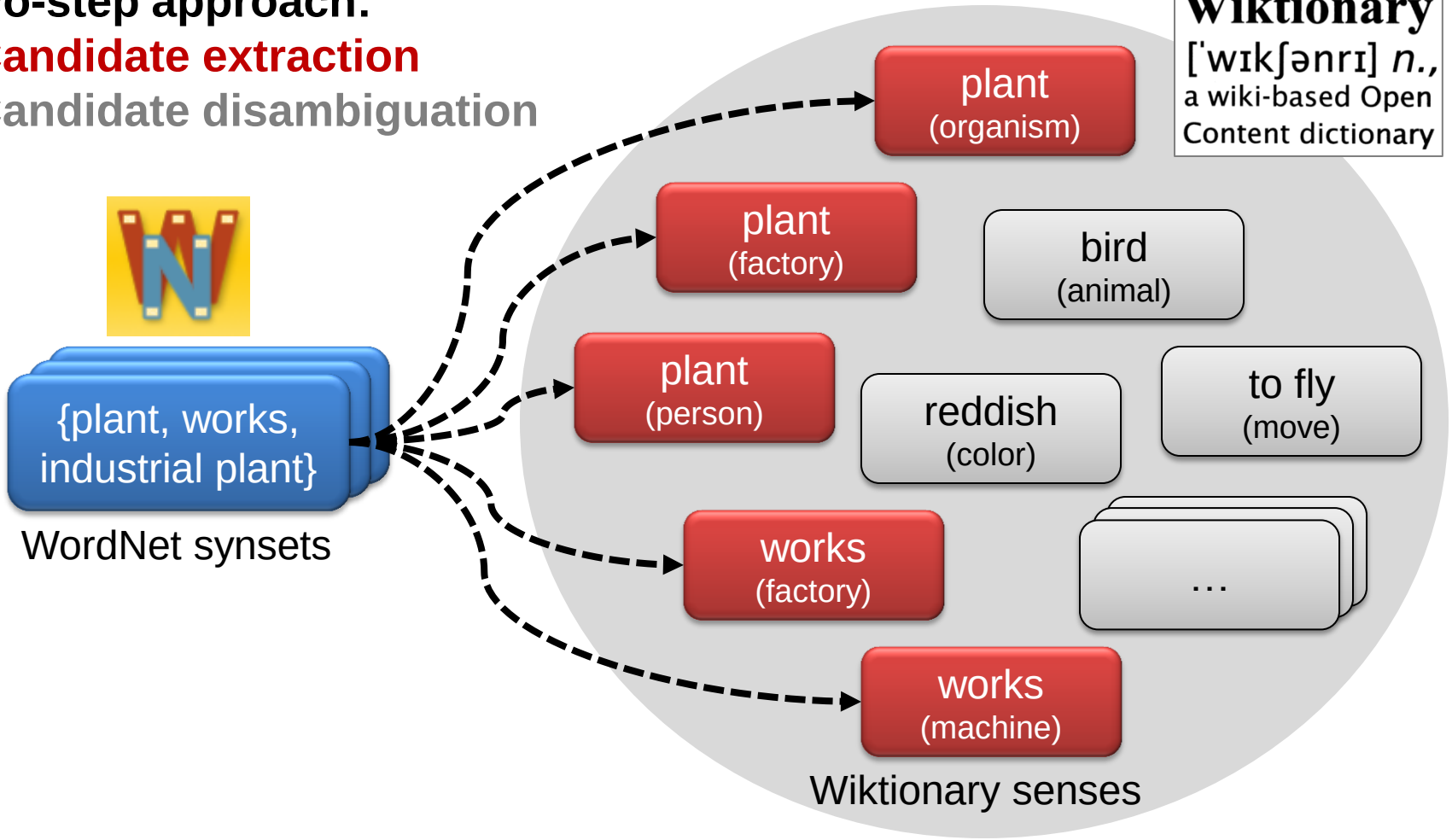
2. **Candidate disambiguation**



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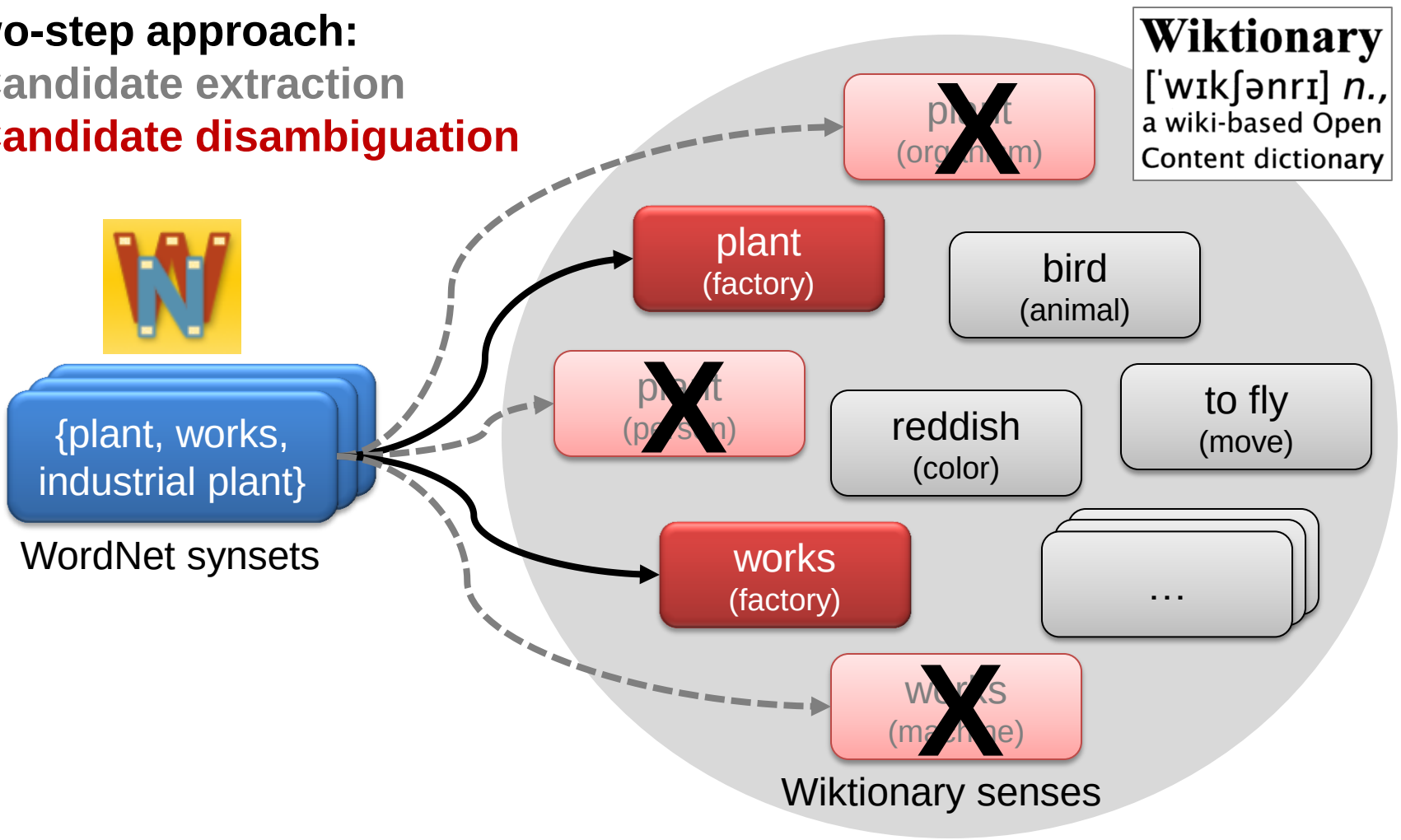

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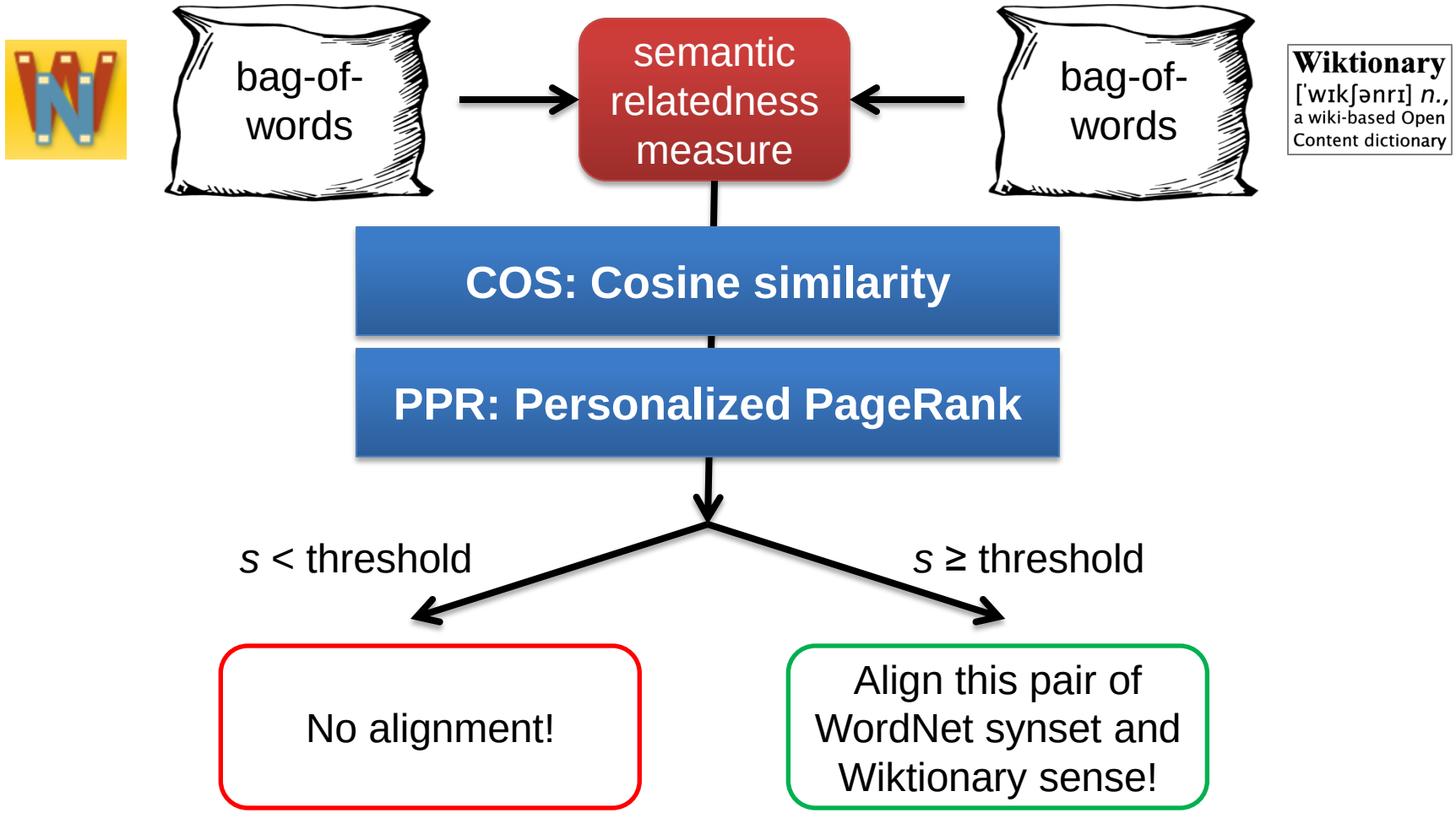
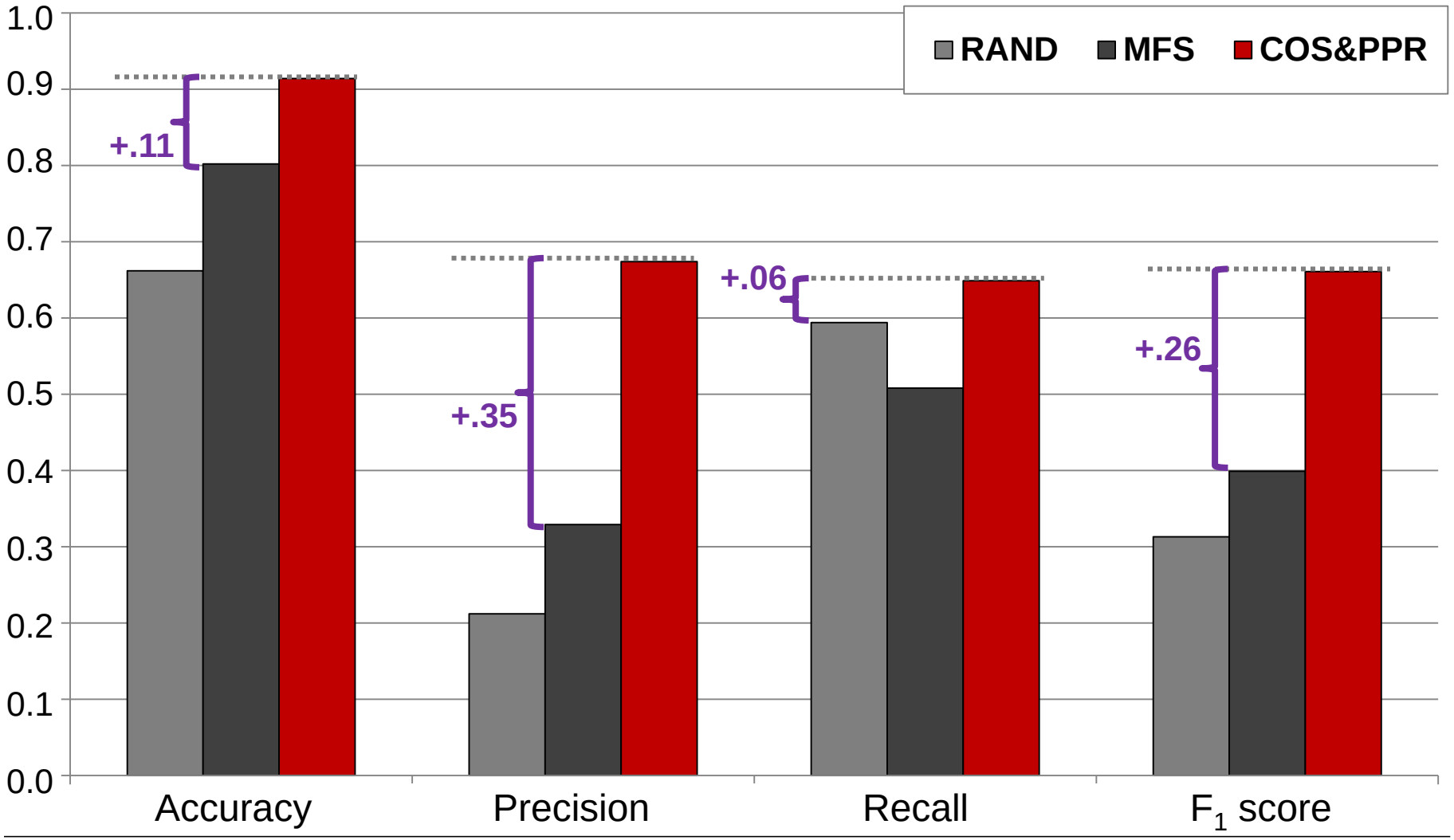
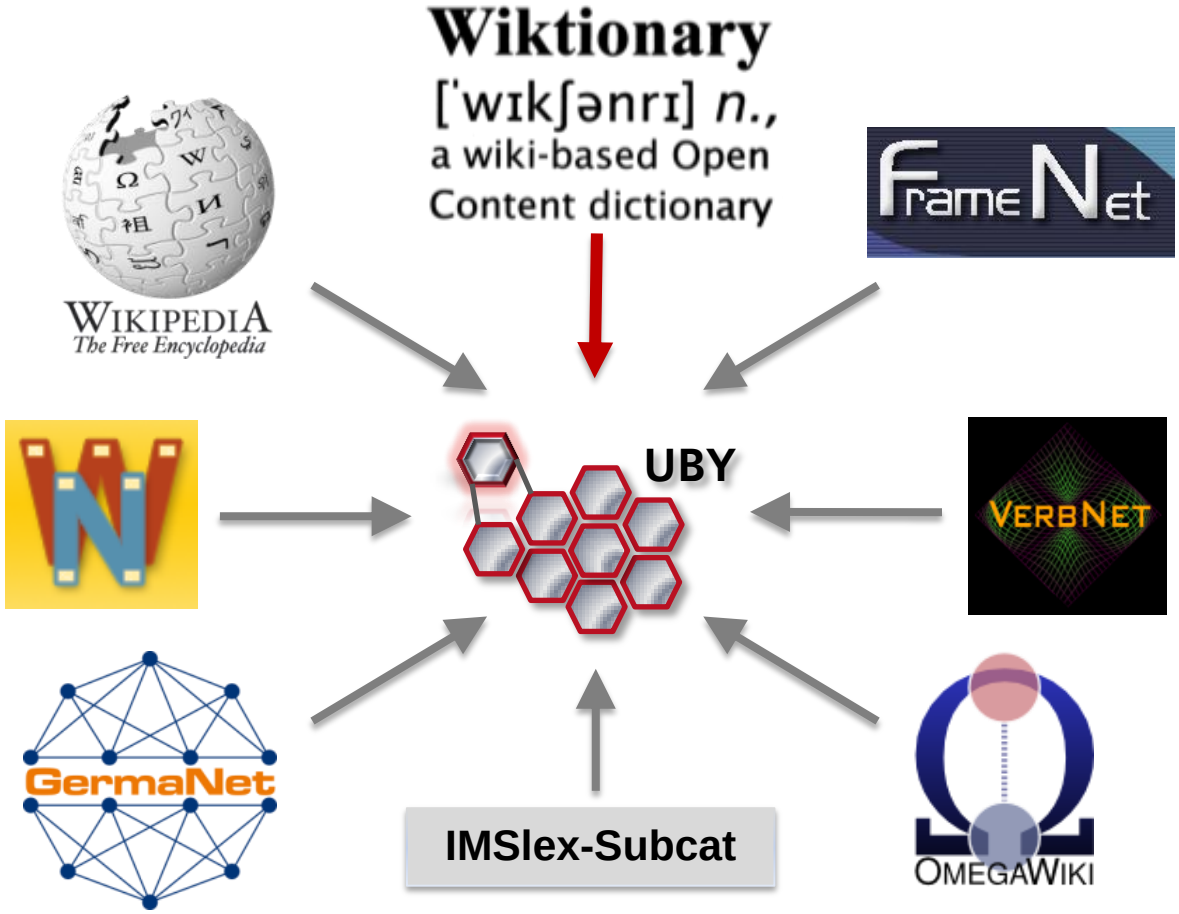
Candidate Disambiguation



Alignment Evaluation

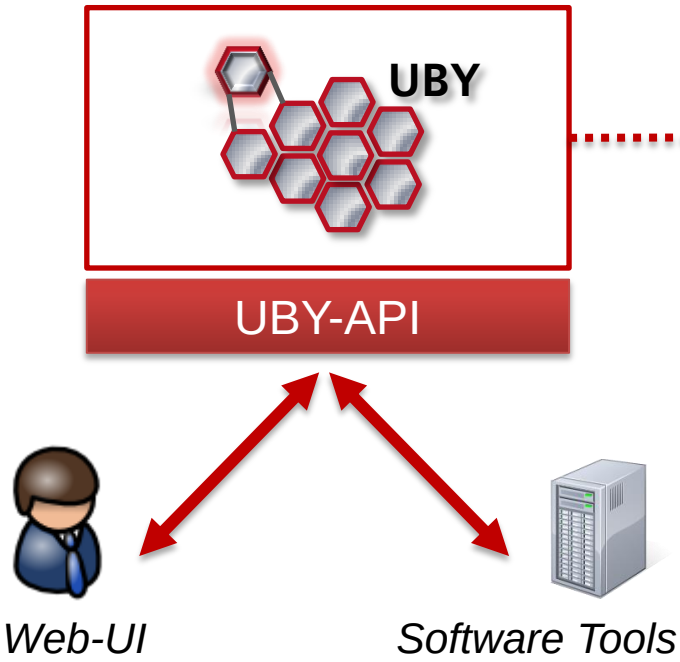


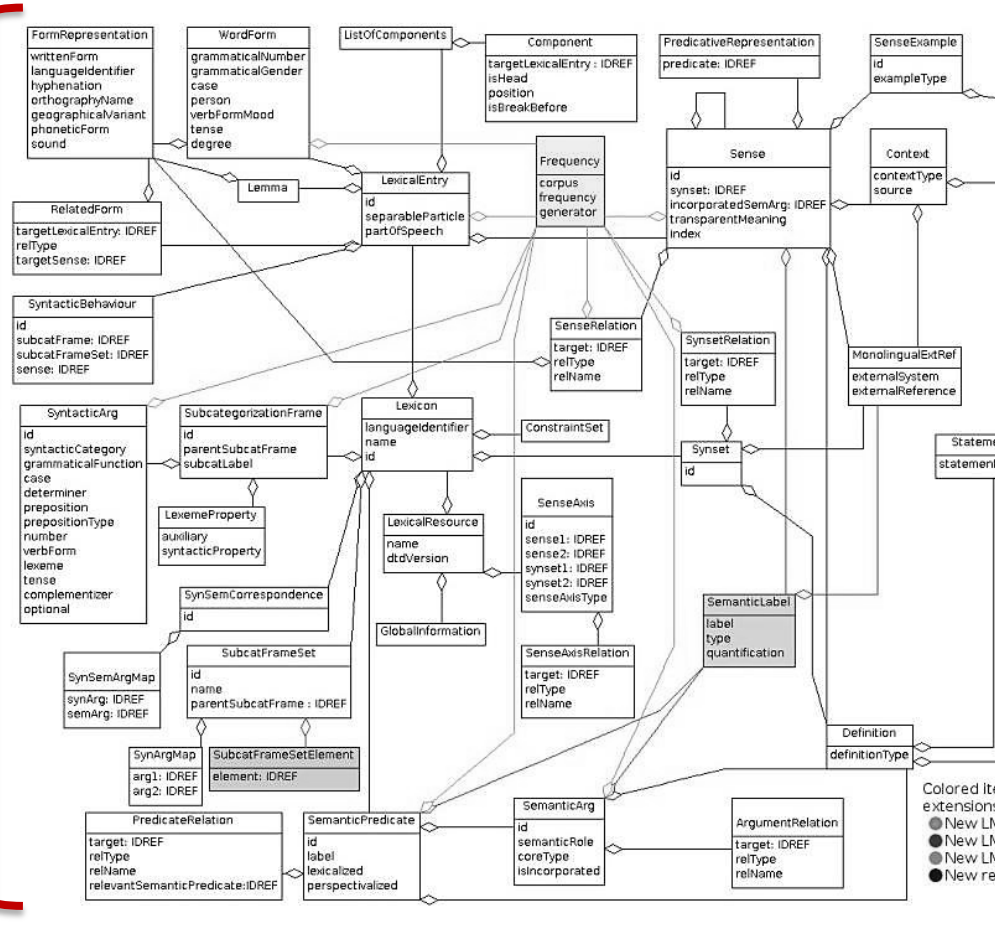
Integrated Resource UBY



Joint work of Judith Eckle-Kohler, Iryna Gurevych, Silvana Hartmann, Michael Matuschek, Christian M. Meyer, Tri-Duc Nghiem

Integrated Resource UBY





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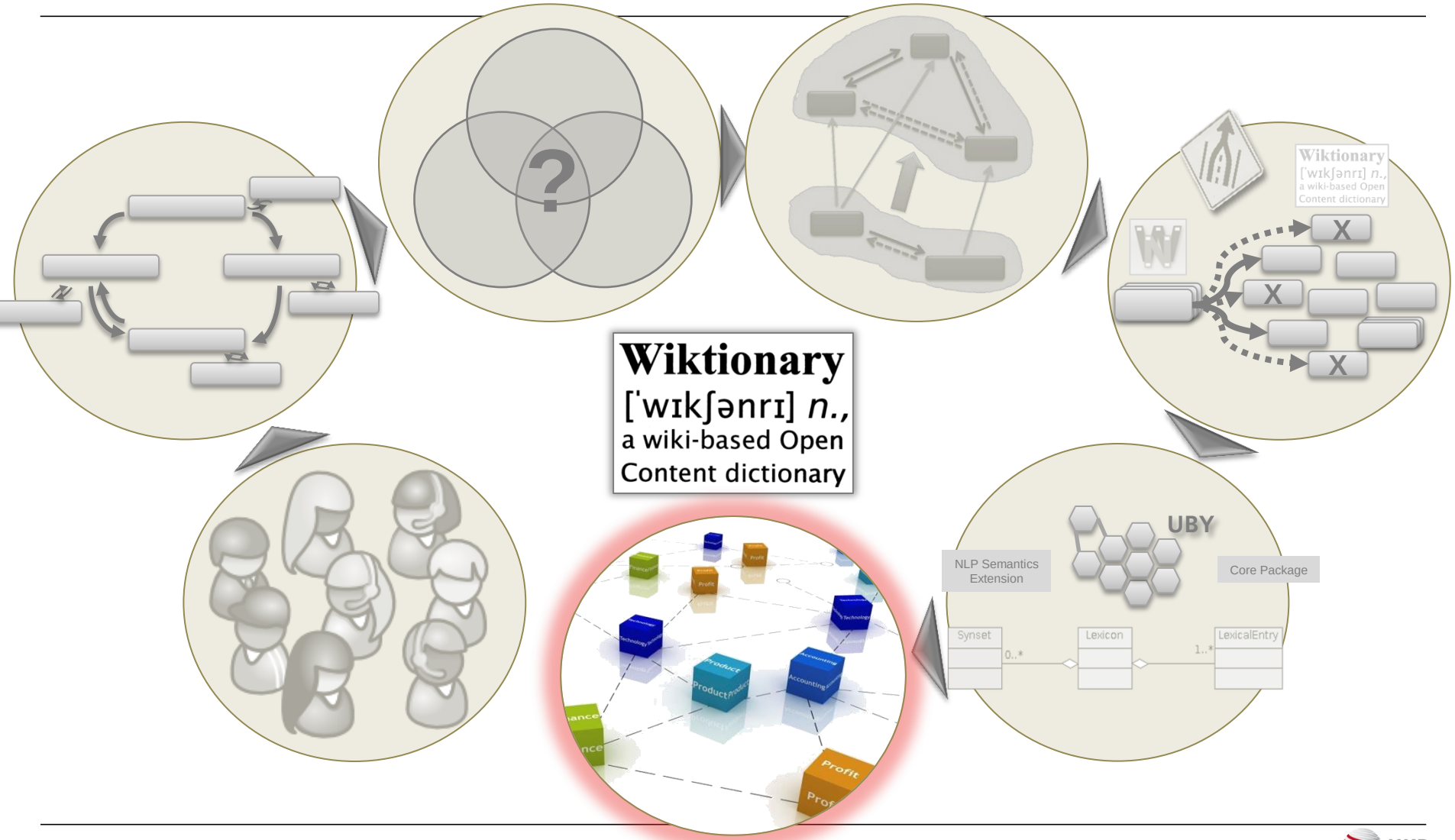
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Case Study: Detecting Marketing Blunders

http://commons.wikimedia.org/wiki/File:Rolls_Royce_Silver_Shadow_I,_Bj._1967_(2005-09-17_Sp)-2.jpg
(CC BY-SA 2.0 by Wikipedia users Lothar Spurzem and Sir James)

Case Study: Detecting Marketing Blunders

Internationally advertised as “Silver Mist”
But: “Mist” means dung/manure in German!

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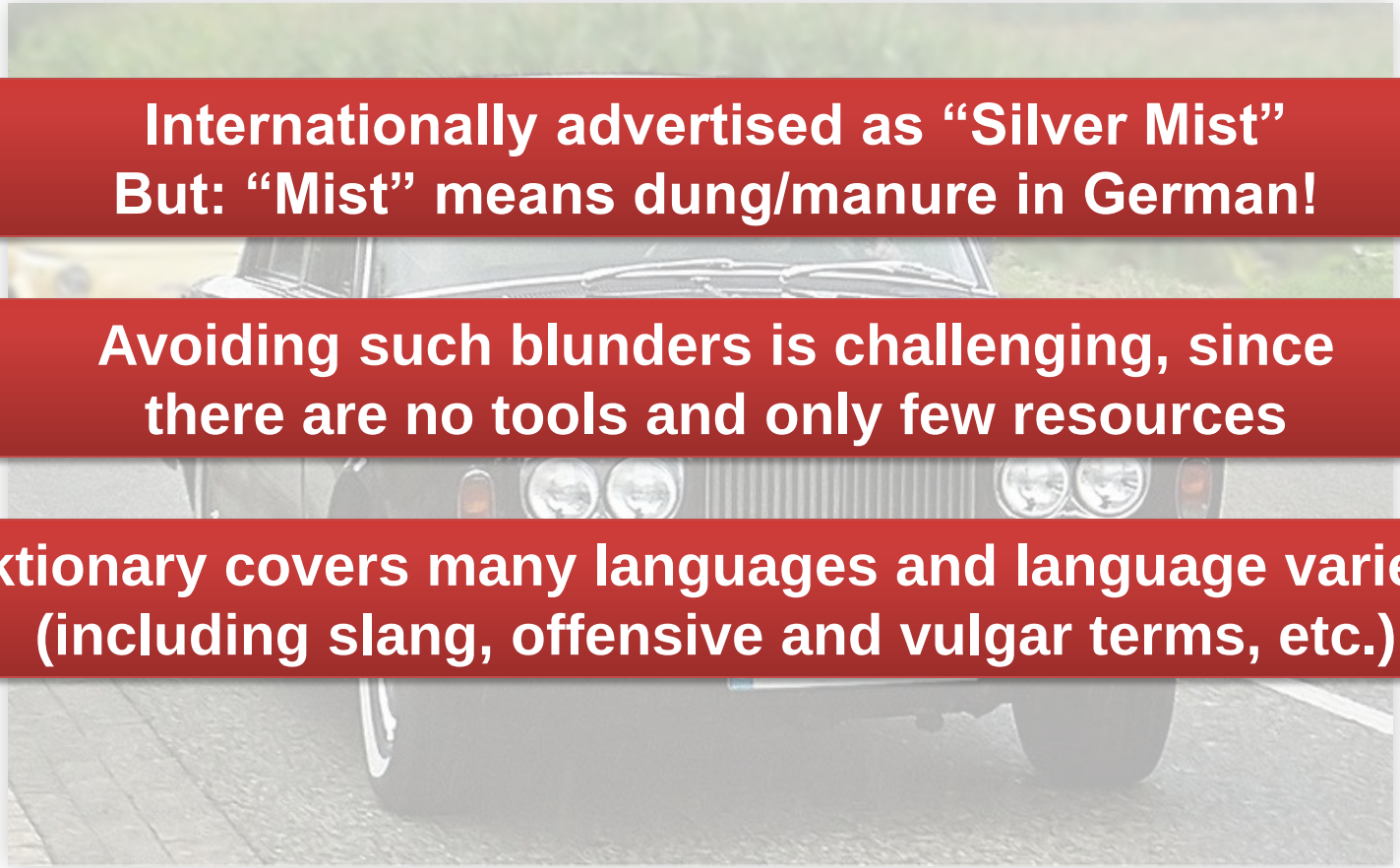

Internationally advertised as “Silver Mist”
But: “Mist” means dung/manure in German!

Avoiding such blunders is challenging, since there are no tools and only few resources

Wiktionary covers many languages and language varieties (including slang, offensive and vulgar terms, etc.)

http://commons.wikimedia.org/wiki/File:Rolls_Royce_Silver_Shadow_-_BJ_1967_(2005-09-17_Sp)-2.jpg
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Case Study: Detecting Marketing Blunders

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Approach:

- Index translations and pragmatic labels from OntoWiktionary
- Lookup word forms for carrying a problematic meaning in any language

Mist		Animal excrement, especially that of common domestic farm animals […]
Mist		(uncountable) Manure; animal excrement.
Mist		(mildly vulgar, slang, in the plural) Nonsense.
mist		(uncountable) A thick cloud that forms near the ground [..]
mist		(countable) A layer of fine droplets or particles.
…	…	…

Case Study: Detecting Marketing Blunders

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…	…	…

Evaluation:

- Copywriters become able to detect **35 out of the 45 marketing blunders** → Recall 0.78 (primary goal)
- They need to check **on average 12 clues per blunder**, of which 5 are relevant → Precision 0.41 (secondary goal)

Conclusion

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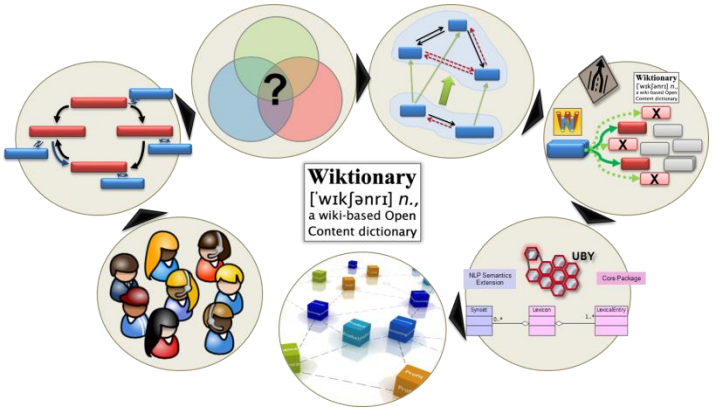
Analyzing Wiktionary's potential

- neologisms, translations, language varieties, language feeling
- subjective opinions rather than corpus evidence



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Conclusion

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Analyzing Wiktionary's potential

- neologisms, translations, language varieties, language feeling
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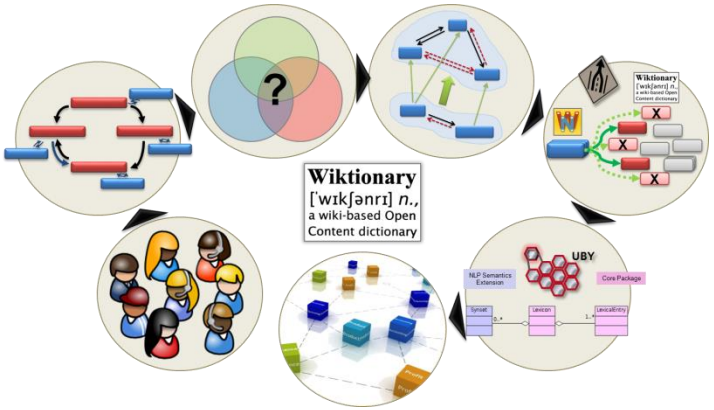
Creating OntoWiktionary

- Automatic disambiguation of relations

Integrating language resources

- Aligning Wiktionary and WordNet
- Standardized representation

Detecting marketing blunders



Publicly available data and software:

- http://www.ukp.tu-darmstadt.de/data/lexical-resources/wiktionary/
- http://www.christian-meyer.org/research/publications/dissertation/data/

Future Outlook

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Joint forces: experts and collaborative authors

Relation disambiguation:

- graph-based methods
- crowd-sourced disambiguation based on Wikidata

Word sense alignment:

- other information types
- more than two resources

Much potential for further NLP applications

Thank you for your attention!

Questions?

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Ubiquitous Knowledge Processing Lab

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