Diachronic and areal patterns: New applications of the semantic map model in lexical typology

Stéphane Polis
(F.R.S.-FNRS / ULiège)

(resorting to joint work with Thanasis Georgakopoulos, ULiège;
E. Grossman & D. Nikolaev, Jerusalem)

LE DIASEMA
LEXICAL DIACHRONIC SEMANTIC MAPS

16.04.2018
National Research University Higher School of Economics - Moscow

LIÈGE université

Outline of the talk

- Semantic maps
  - Background information: Different types of maps
  - Principles of the classical model
    - Connectivity hypothesis
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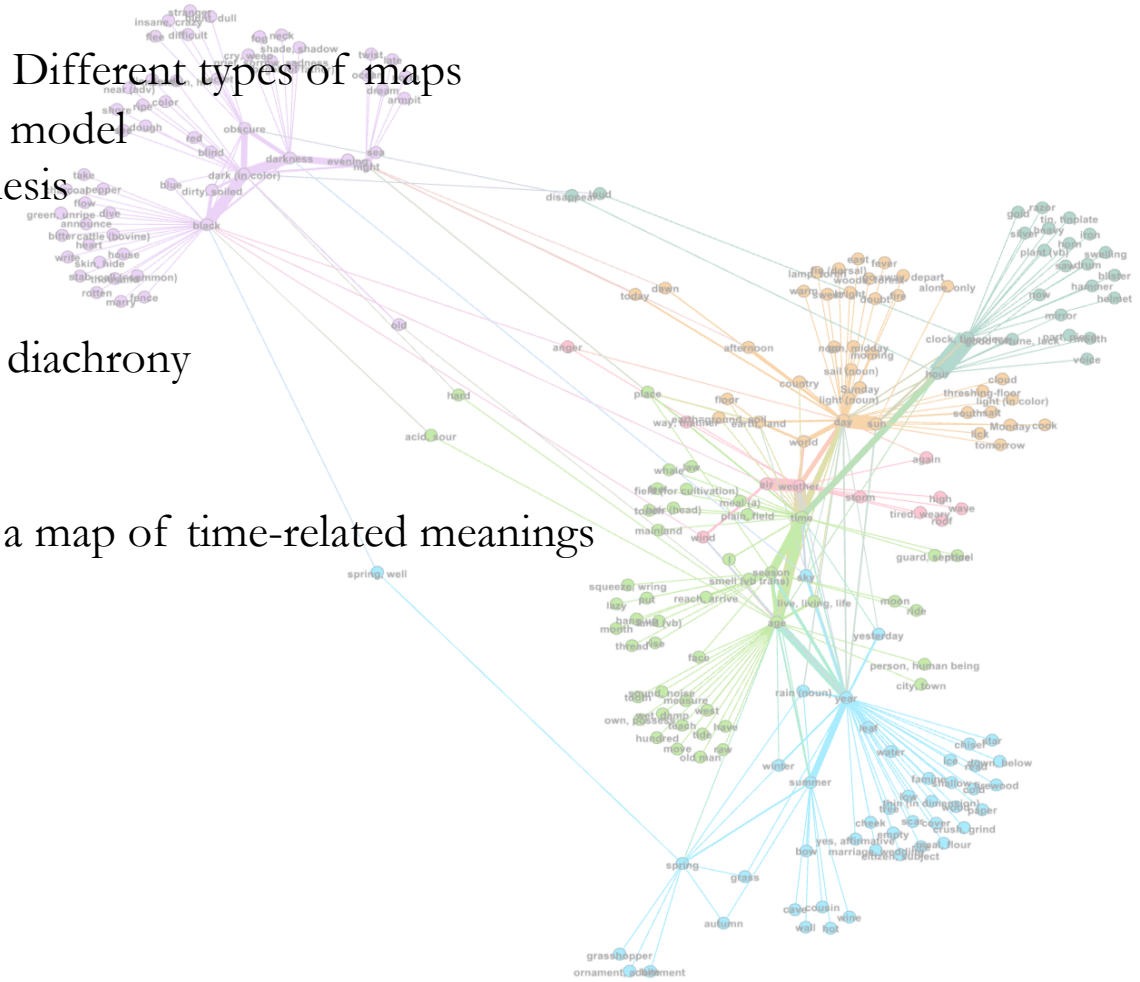
- Two case-studies
  - Diachrony: dynamicizing a map of time-related meanings



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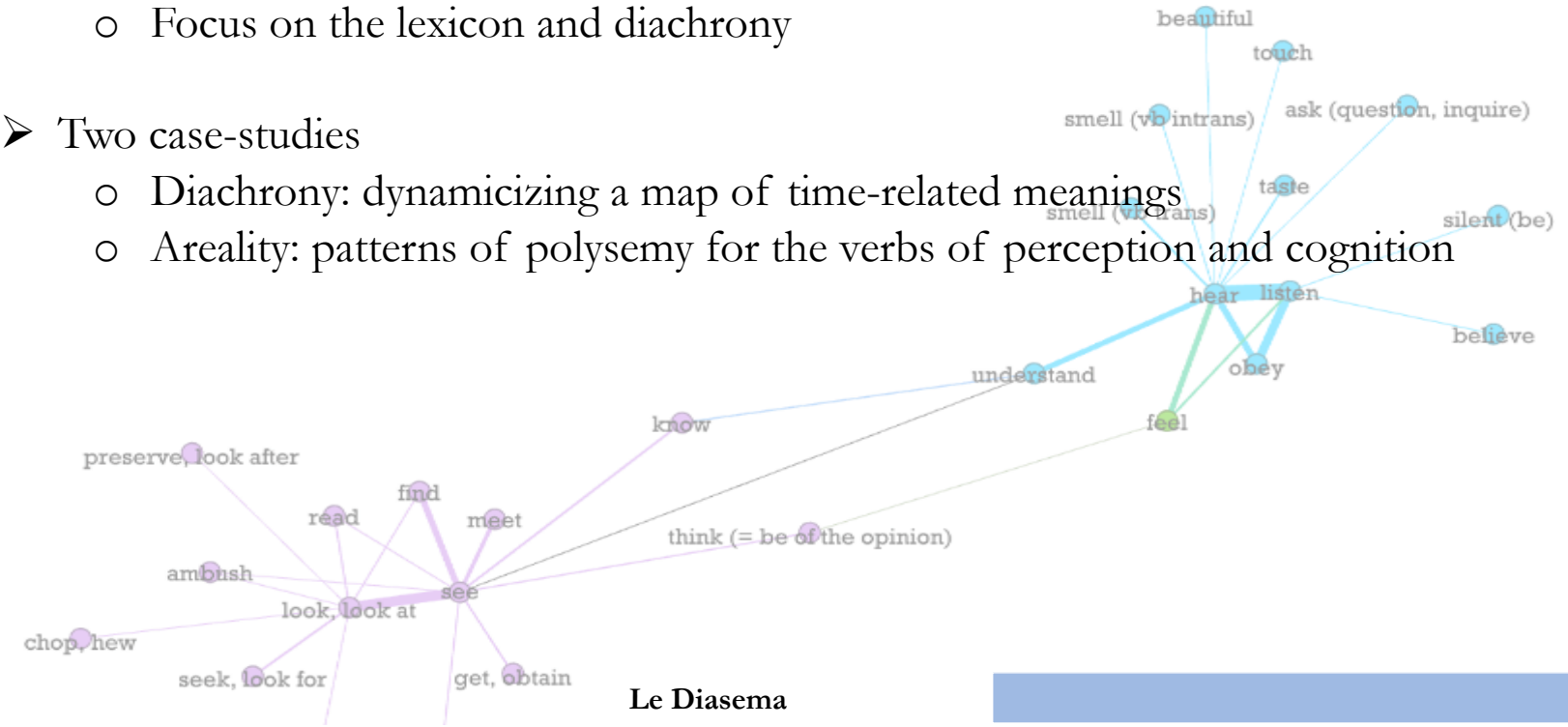
  - Areality: patterns of polysemy for the verbs of perception and cognition



Semantic maps

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  - Co-expressions (aka, polyfunctionality, polysemy, colexification patterns, etc.) point to recurrent relationships between meanings across languages

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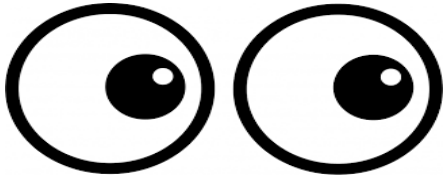

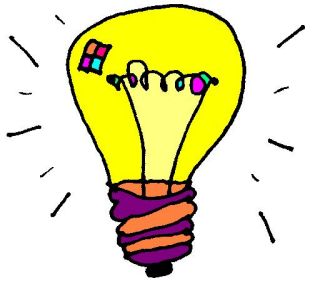

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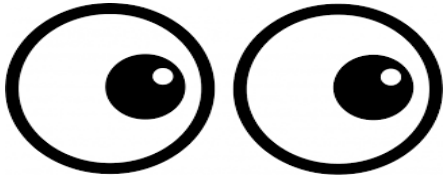
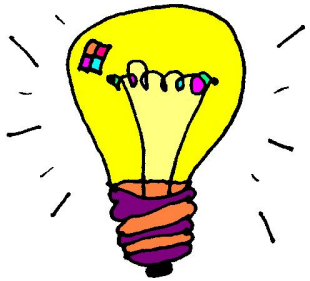
VISION



KNOWING



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Found 7 colexifications for "see" and "know". ?
Note that the number of attested colexifications may differ from the number of languages in which the colexifications were attested.

Nr.	Language	ISO	Family	Source	Form
1	Araona	aro	Tacanan	IDS	ba
2	Ayoreo	ayo	Zamucoan	IDS	iˈmo?
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5	Maori	mri	Austronesian	IDS	kitea
6	Telugu	tel	Dravidian	SPRÅKBANKEN	aarayu
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(CLICs; http://clics.lingpy.org/direct.php; List et al. 2014)

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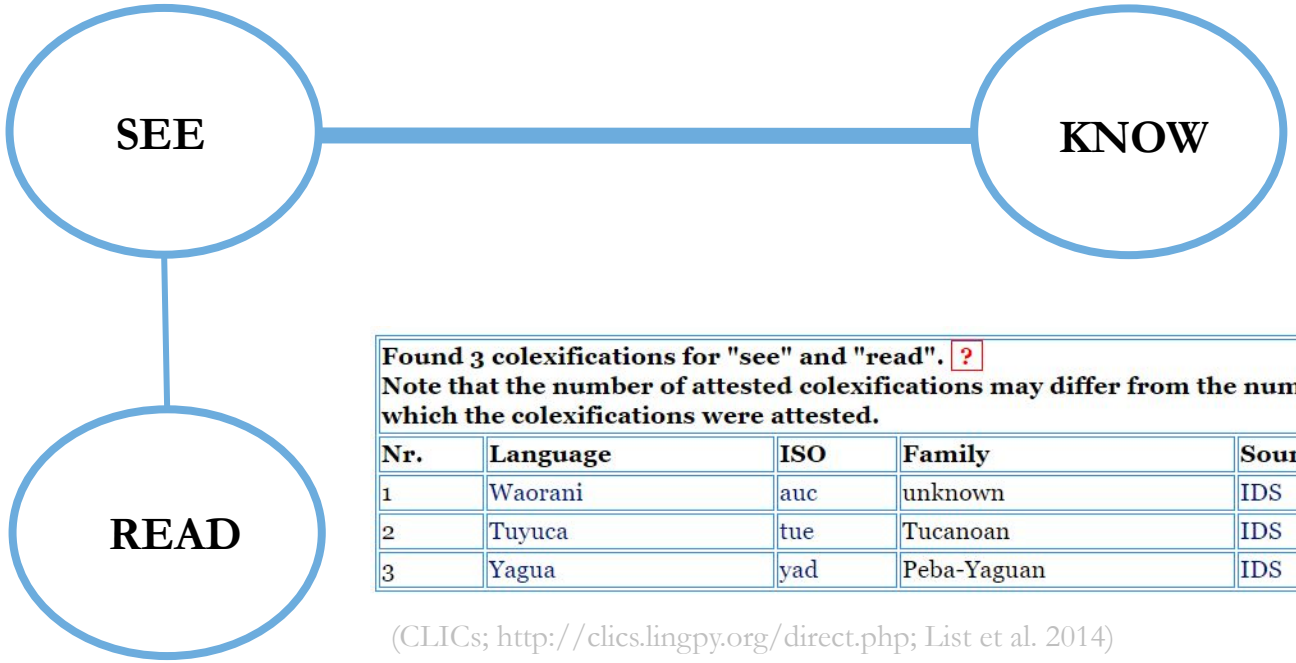

Found 3 colexifications for "see" and "read". ?
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Nr.	Language	ISO	Family	Source	Form
1	Waorani	auc	unknown	IDS	a
2	Tuyuca	tue	Tucanoan	IDS	ĩ'yã
3	Yagua	yad	Peba-Yaguan	IDS	hũnũy

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Semantic maps

- Two main types
  - Connectivity maps
  - Proximity maps


ARTICLE

WILEY

The semantic map model: State of the art and future avenues for linguistic research

Thanasis Georgakopoulos[1] | Stéphane Polis[2]

Language and Linguistics Compass

Semantic maps

- Two main types
  - **Connectivity maps (= classical maps)**
  - Proximity maps

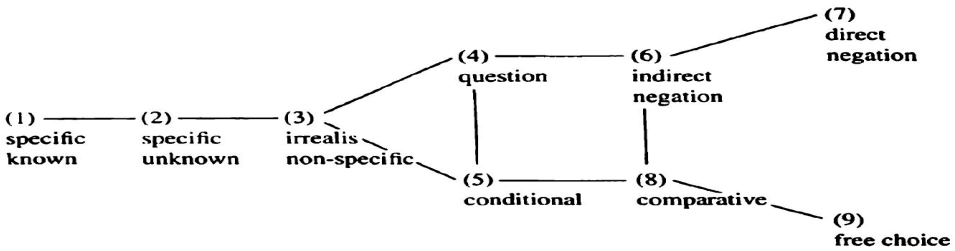

Figure 1a. Haspelmath's (1997: 4) original semantic map of the indefinite pronouns functions

- Graph
  - Nodes = meanings
  - Edges = relationships between meanings

Semantic maps

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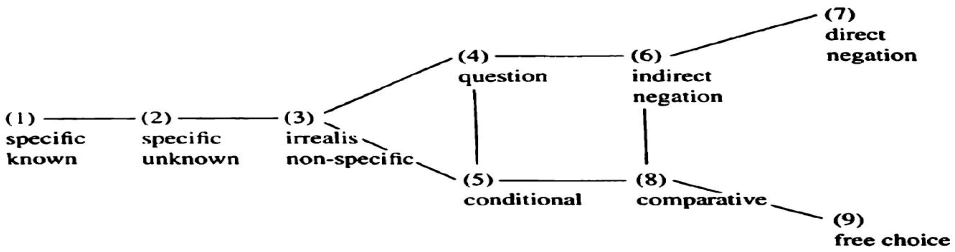
  - Connectivity maps
  - **Proximity maps (= MDS maps)**



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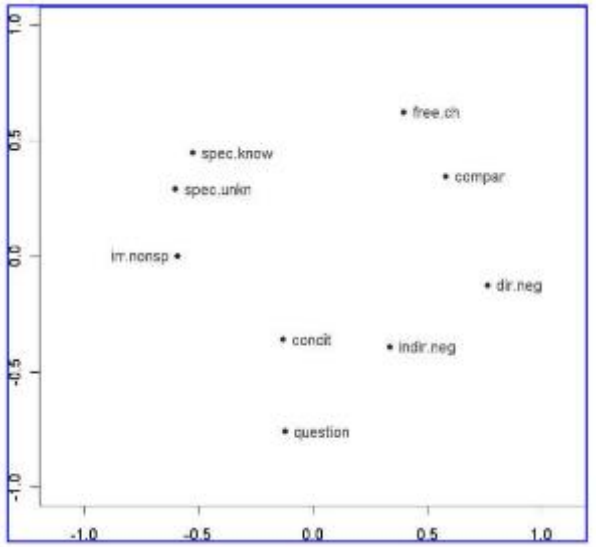

Figure 1b. MDS analysis of Haspelmath's (1997) data on indefinite pronouns (Croft & Poole 2008: 15)

- Graph
  - Nodes = meanings
  - Edges = relationships between meanings

- Two-dimensional space
  - Points = meanings (or contexts)
  - Proximity = similarity between meanings (or contexts)

Semantic maps

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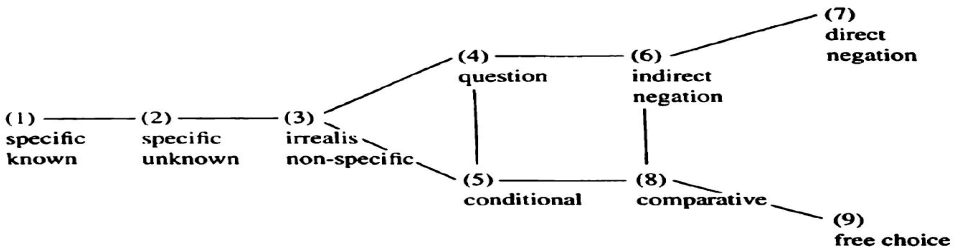

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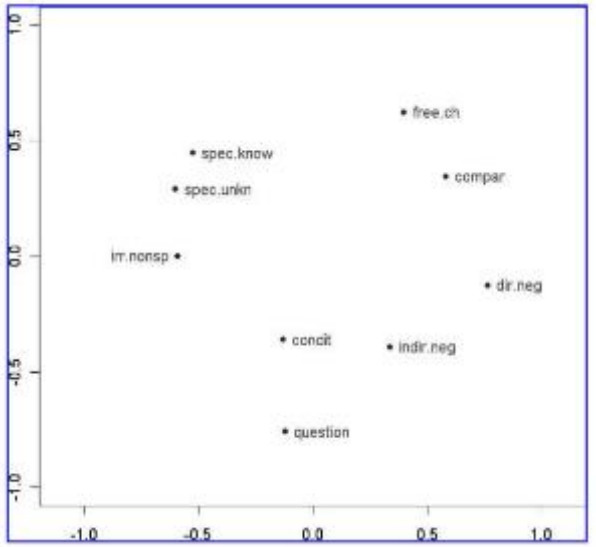

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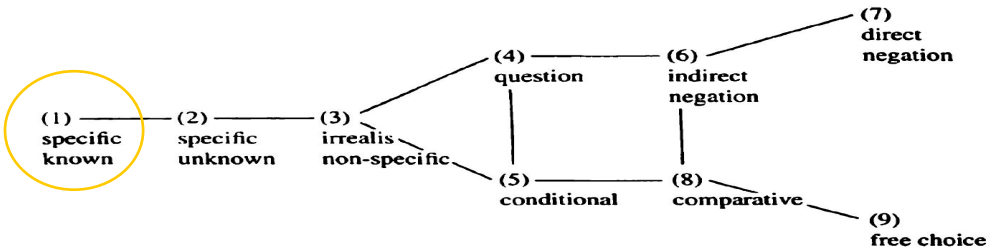

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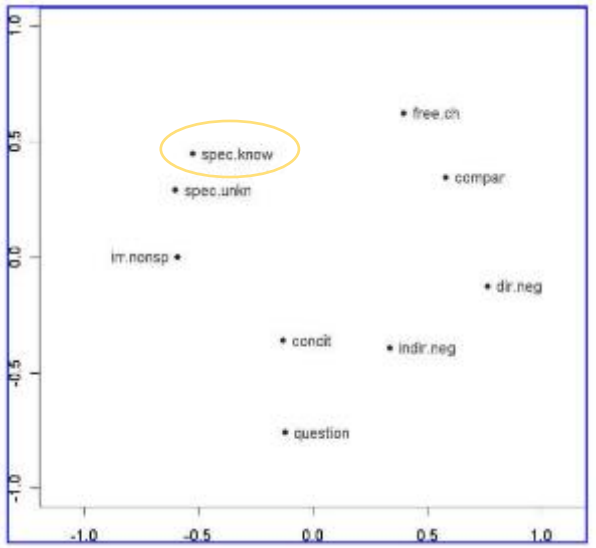

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1. **Specific known**
   Somebody called you, guess who

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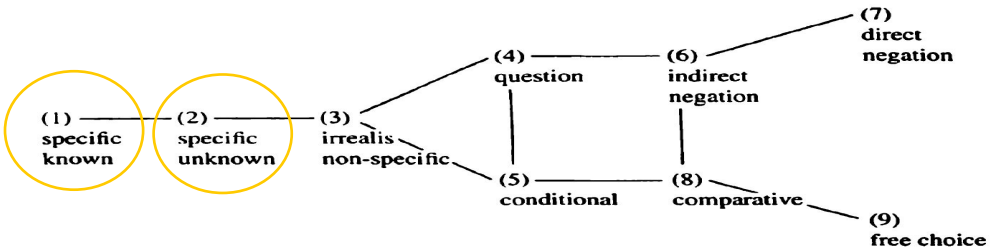

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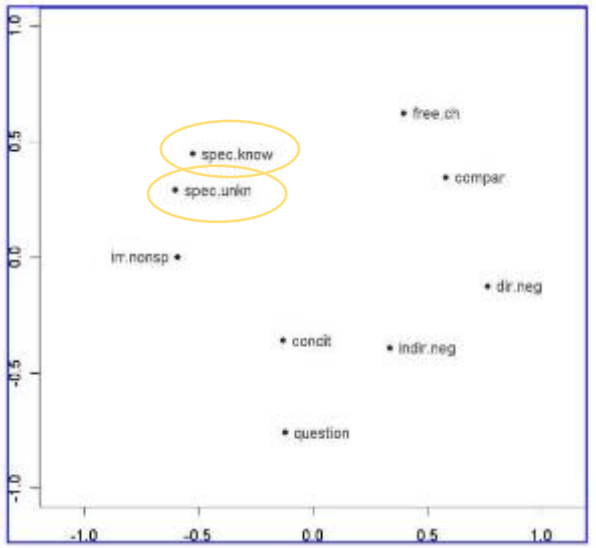

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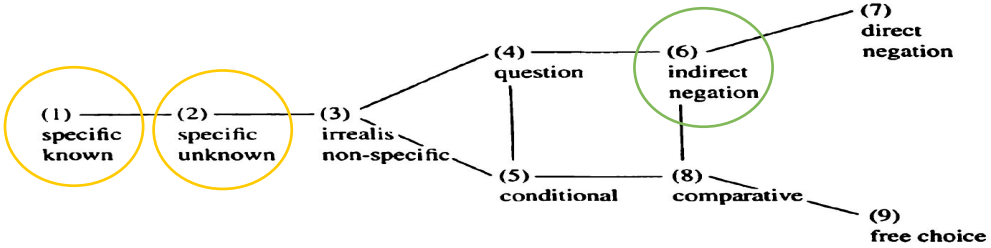

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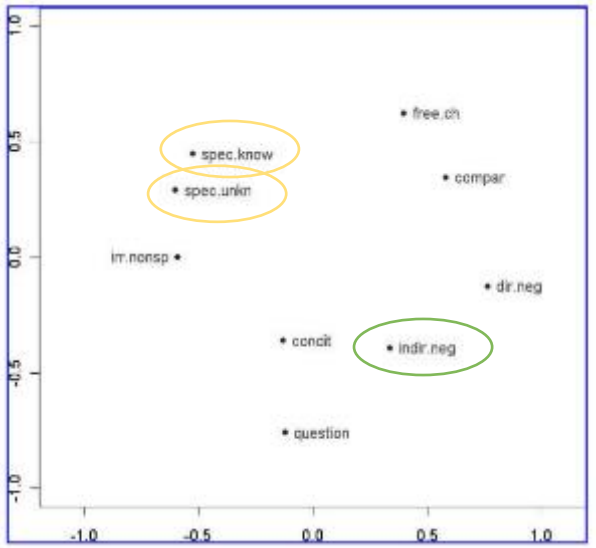

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1. **Specific known**
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2. **Specific unknown:**
   Somebody called you, but I don't know who

6. **Indirect negation:**
   I don't think that anybody called

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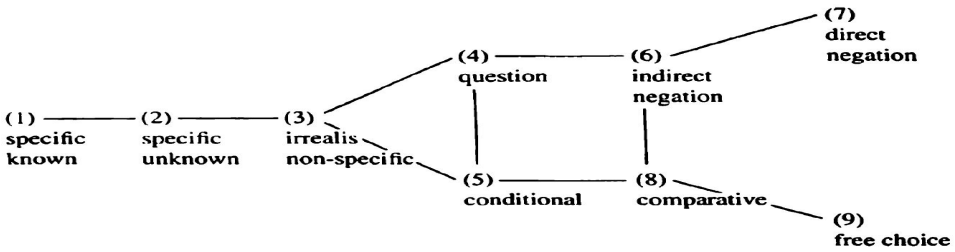

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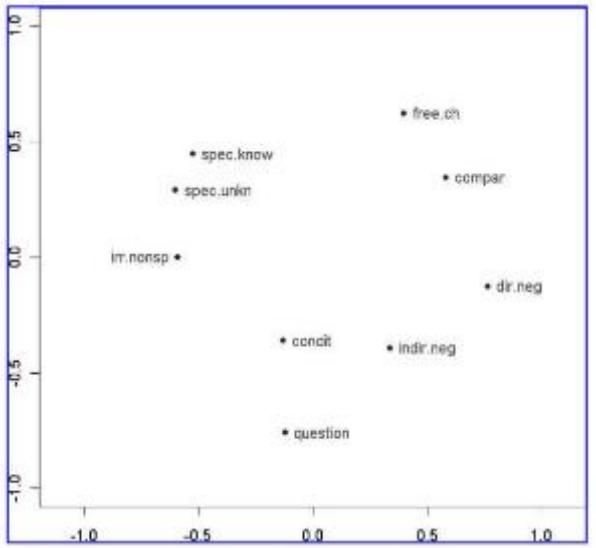

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Other application: 'Typology without types'

- Points = contexts
- Shape of the points = lexical items
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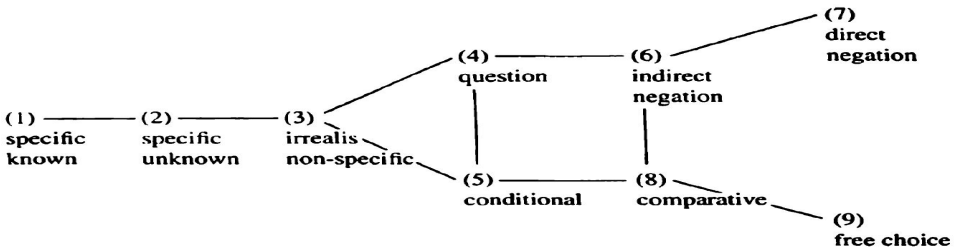

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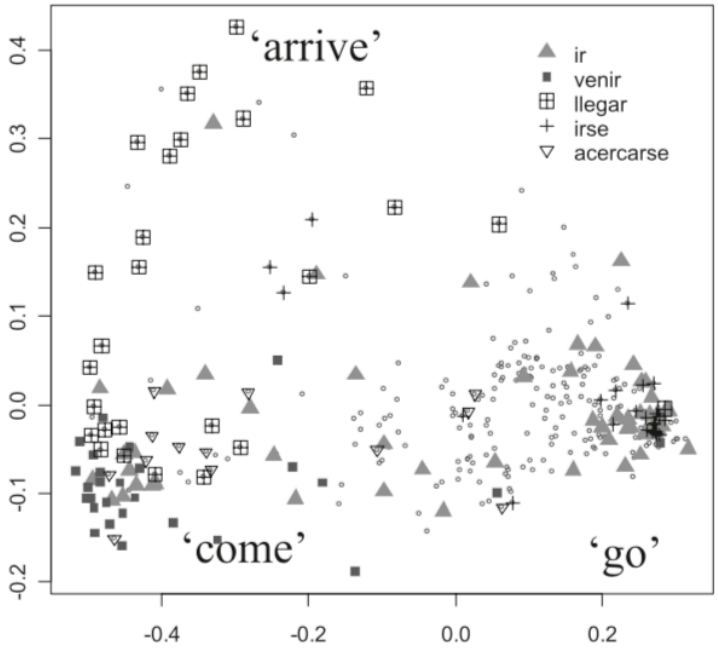

Figure 2. A MDS map of 'go', 'come', and 'arrive' in Spanish (Wälchli & Cysouw 2012: 692)

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Semantic maps

- Two main types
  - **Connectivity maps**
  - Proximity maps

Semantic maps

- Two main types
  - **Connectivity maps**
    - Classical maps (= simple graphs)
    - Lattices (= 'hierarchical' graphs)

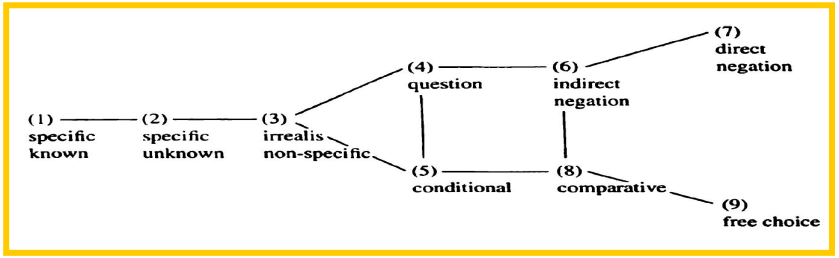
Formal Concept Lattices as Semantic Maps

Daria Ryzhova and Sergei Obiedkov

National Research University Higher School of Economics,
Moscow, Russia
daria.ryzhova@mail.ru sergei.obj@gmail.com

2017

Semantic maps



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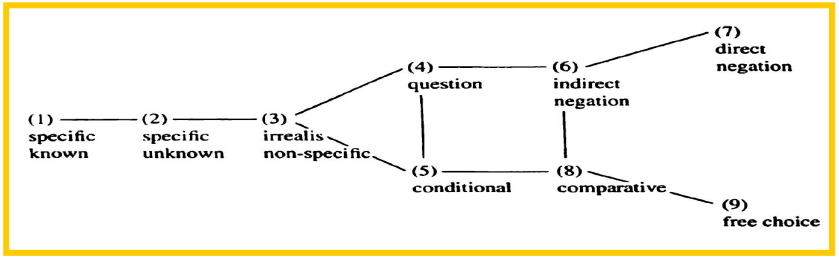


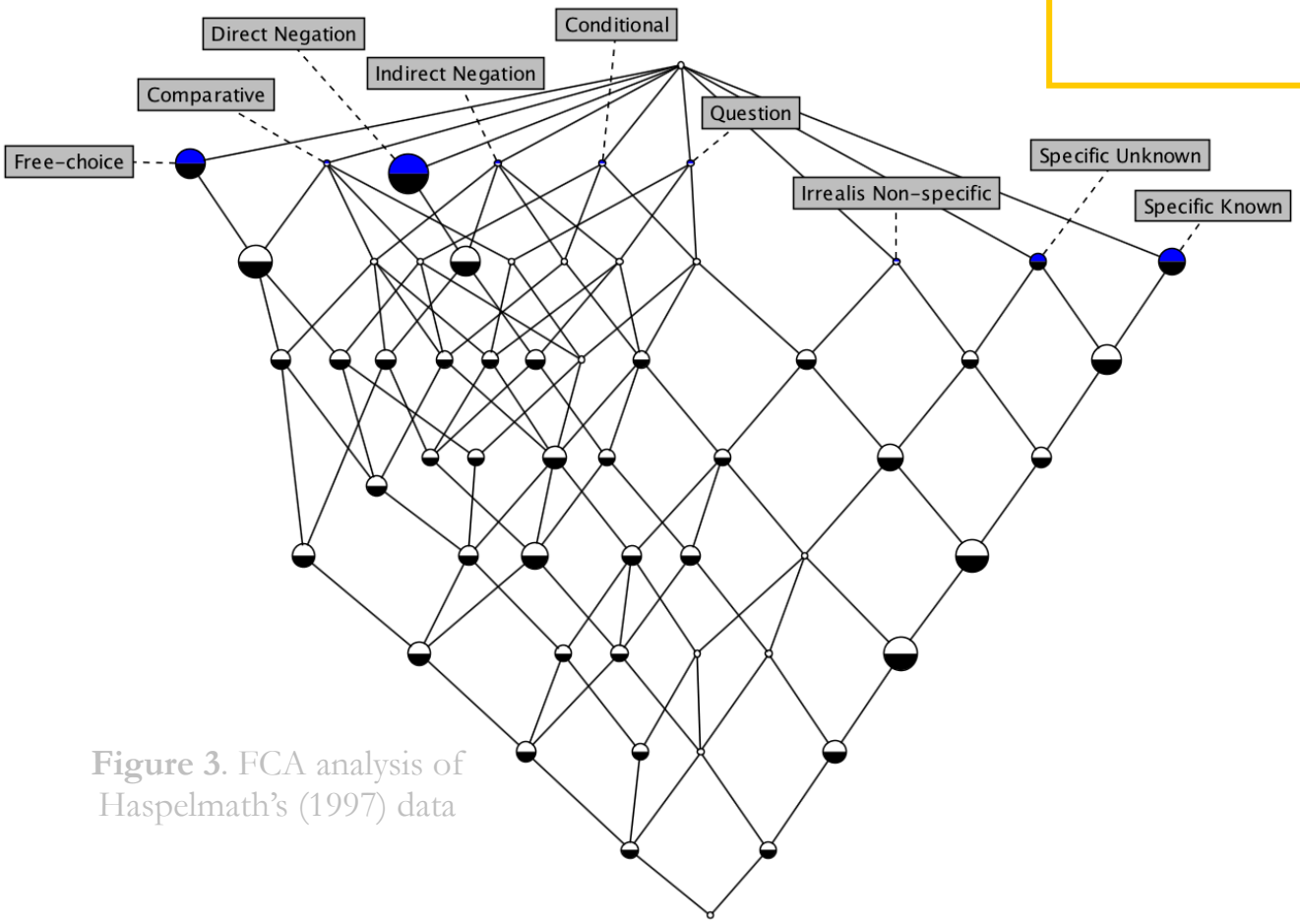
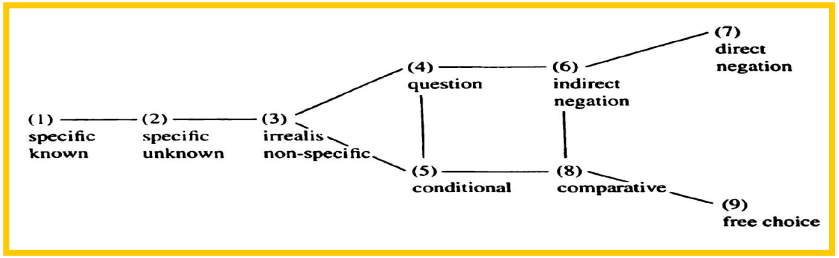
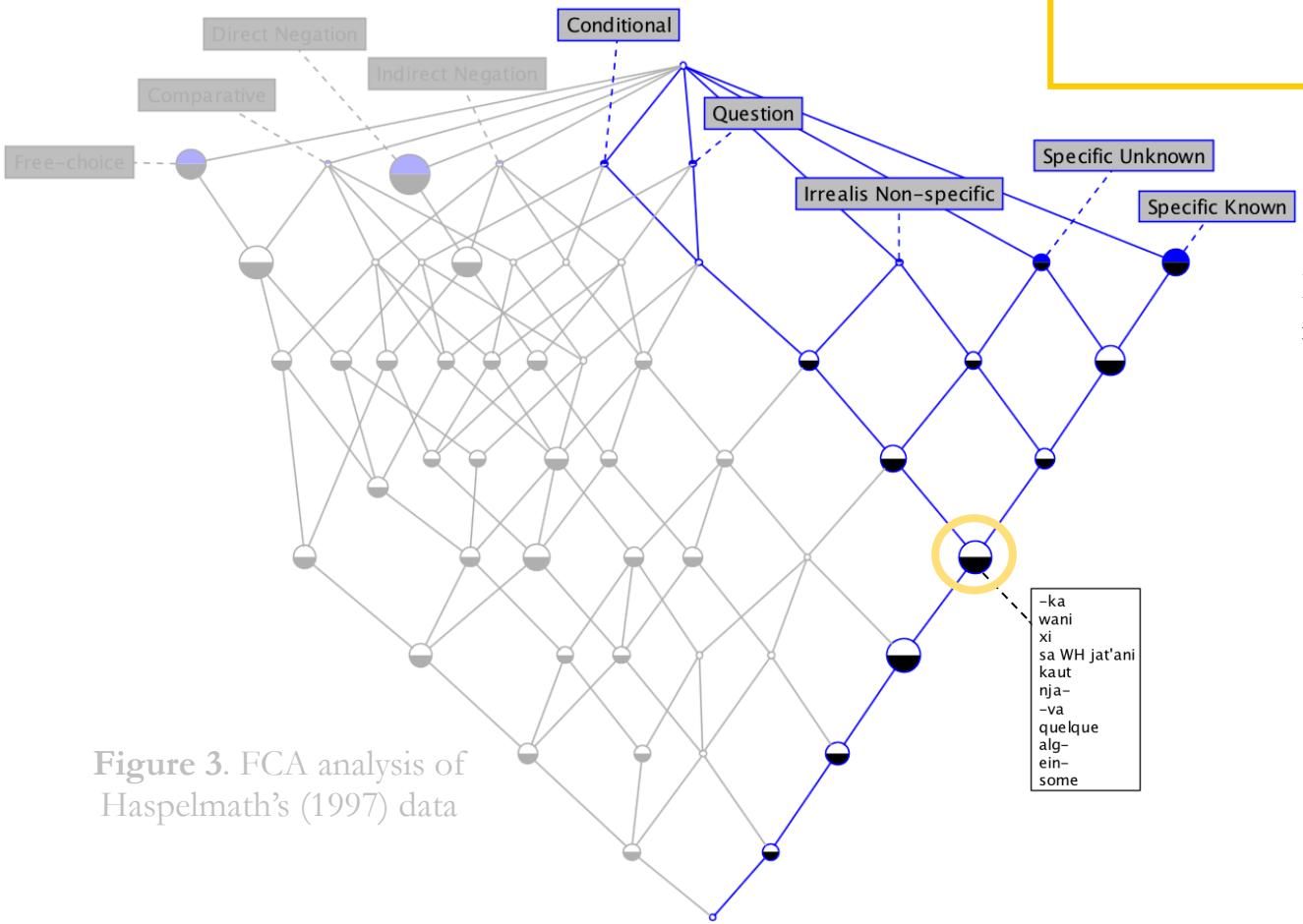


Figure 3. FCA analysis of Haspelmath's (1997) data

FCA solves the problem of form/ meaning mapping

Semantic maps





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FCA solves the problem of form/ meaning mapping, since it shows:

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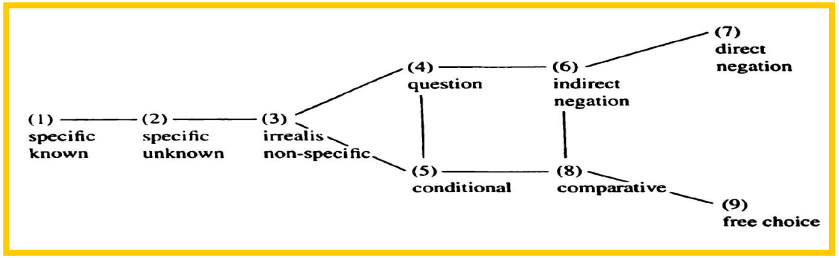

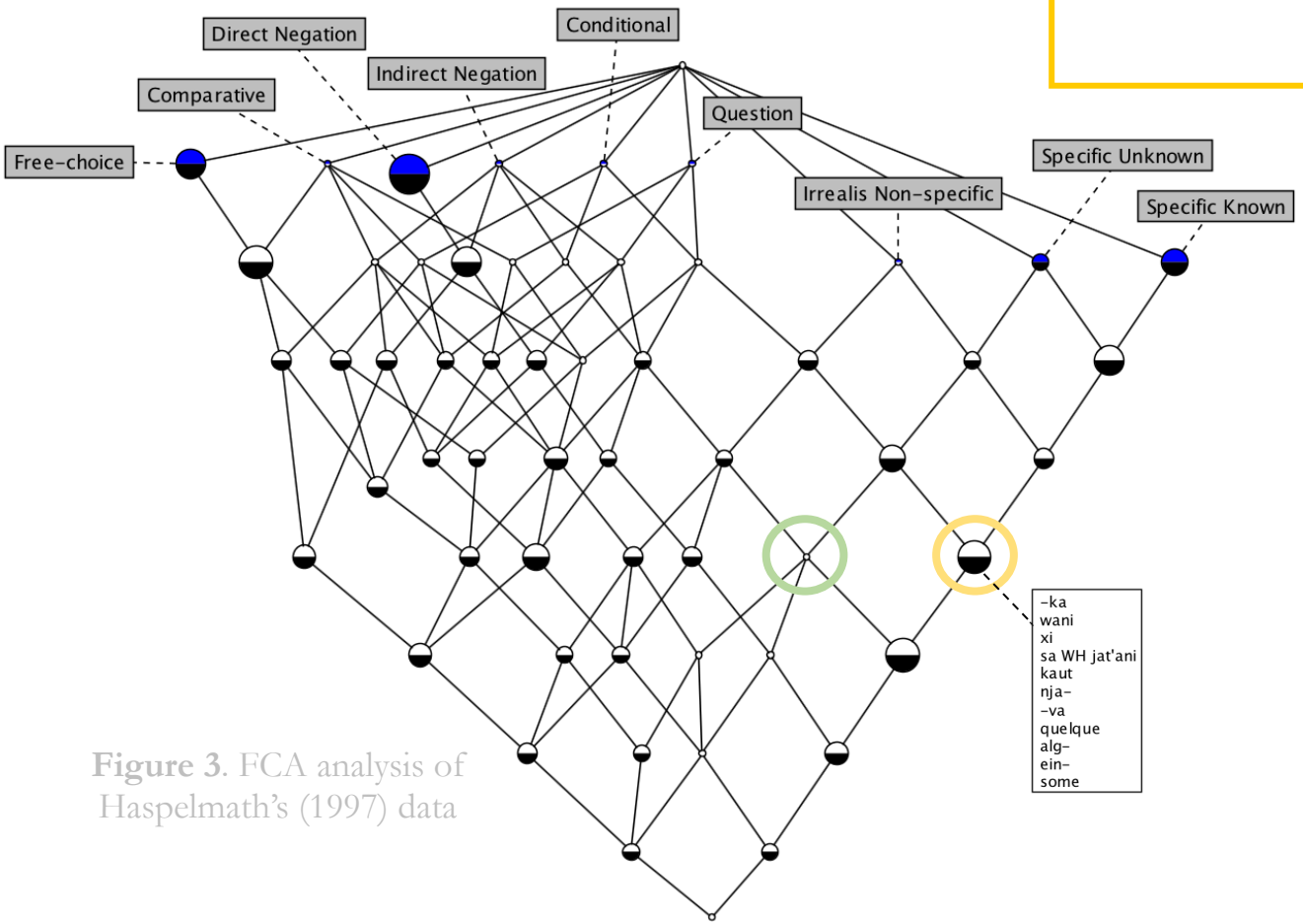

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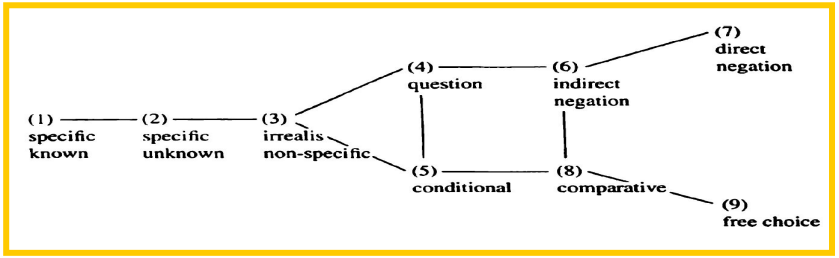

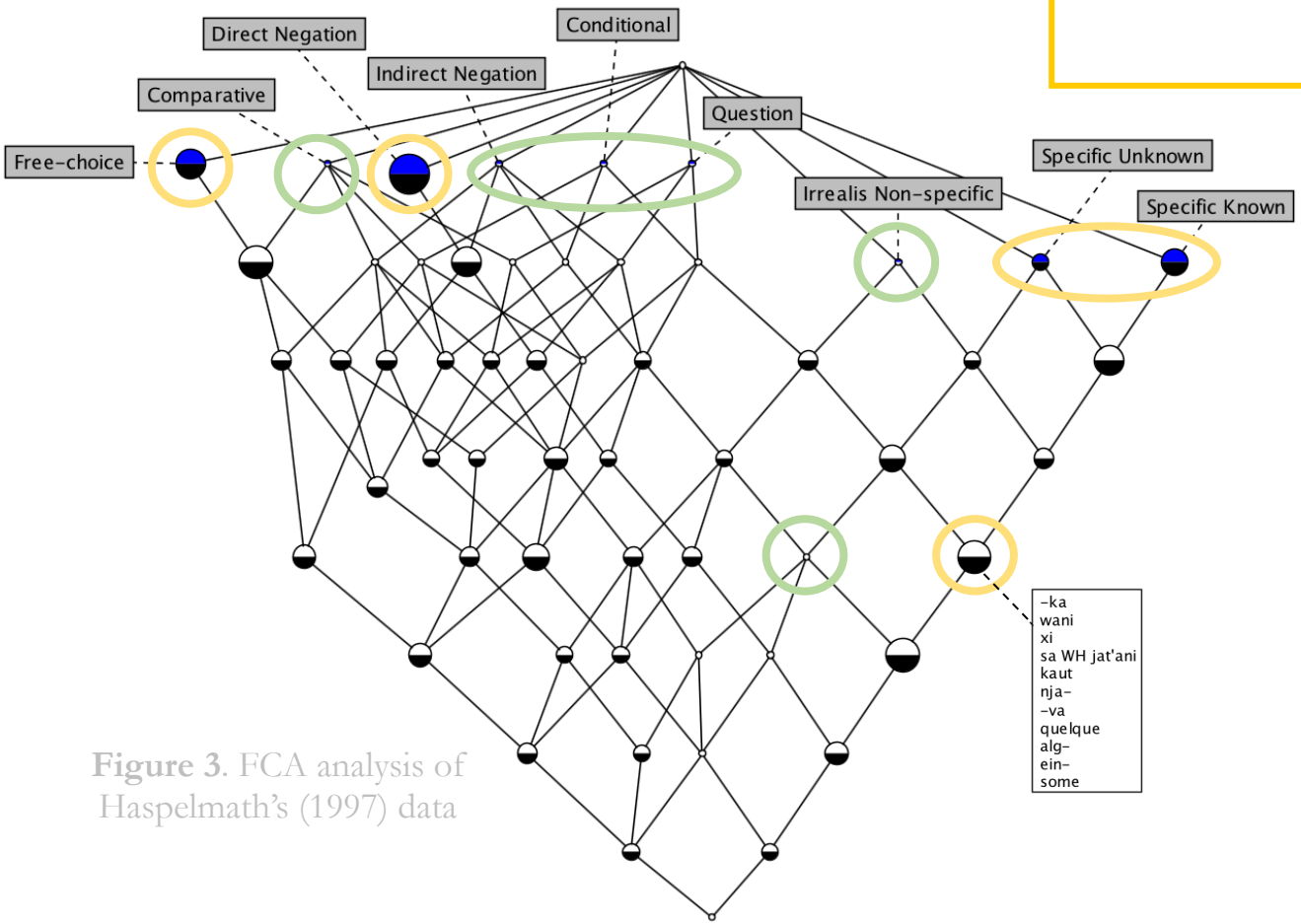

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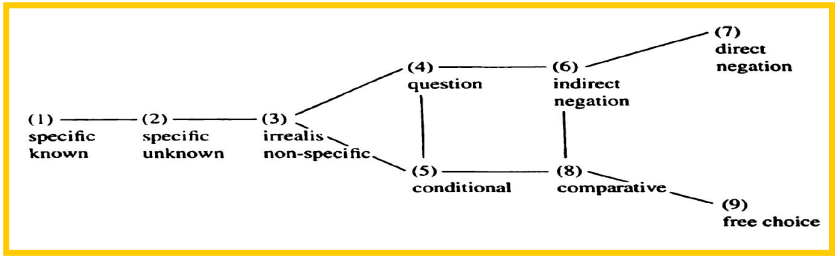

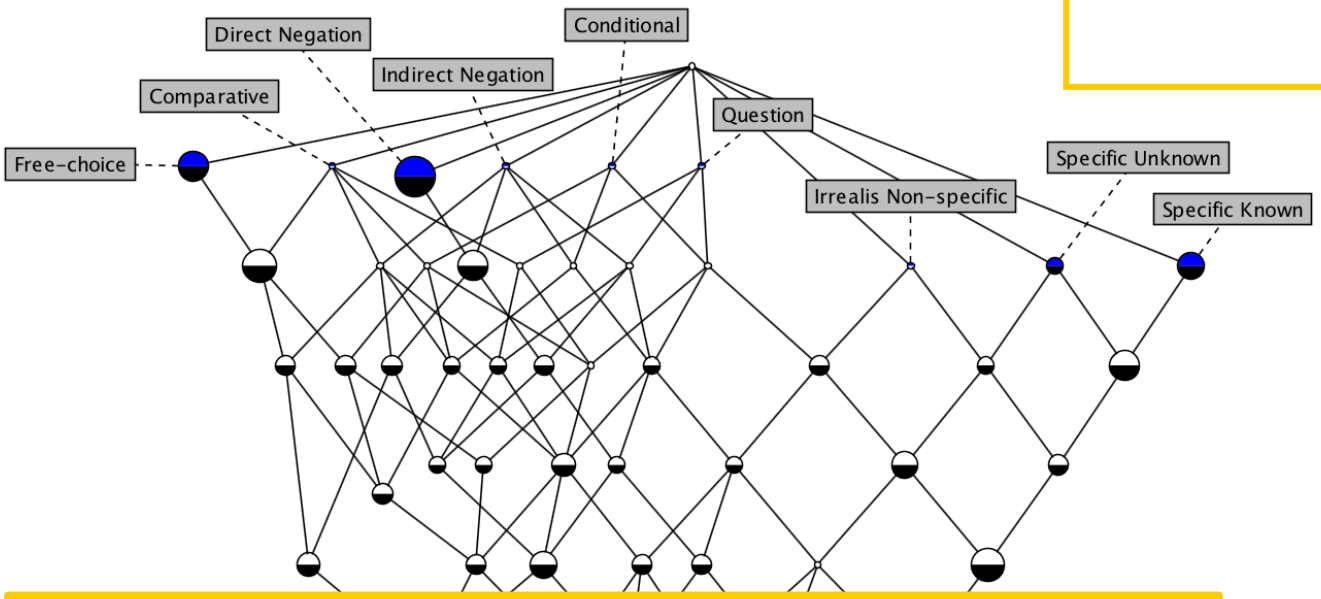

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8 < 14 > Specific Known Indirect Negation ==> Specific Unknown Irrealis Non-specific Question Conditional;
9 < 16 > Specific Unknown Indirect Negation ==> Irrealis Non-specific Question Conditional;
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14 < 5 > Specific Known Direct Negation ==> Specific Unknown Irrealis Non-specific Question Conditional Indirect Negation;
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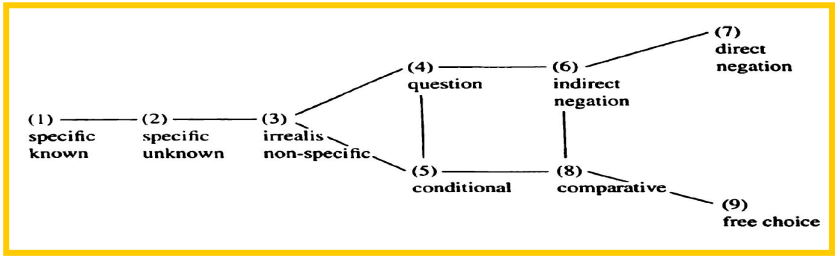
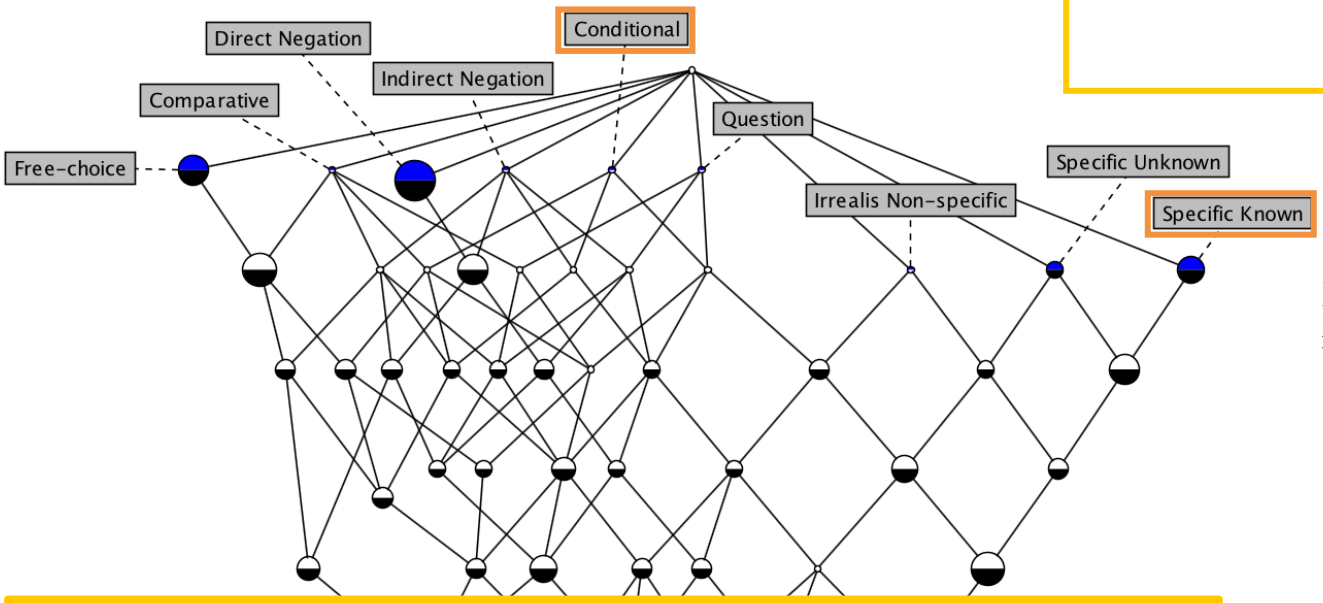
Semantic maps





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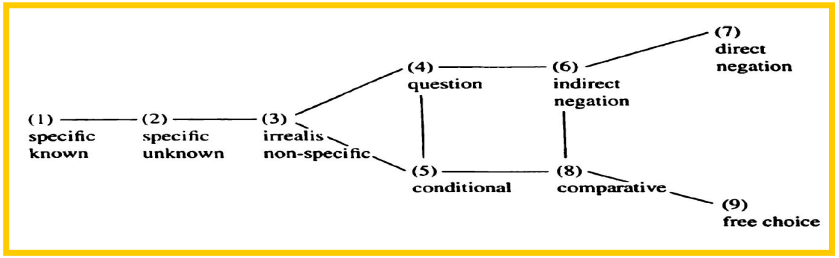

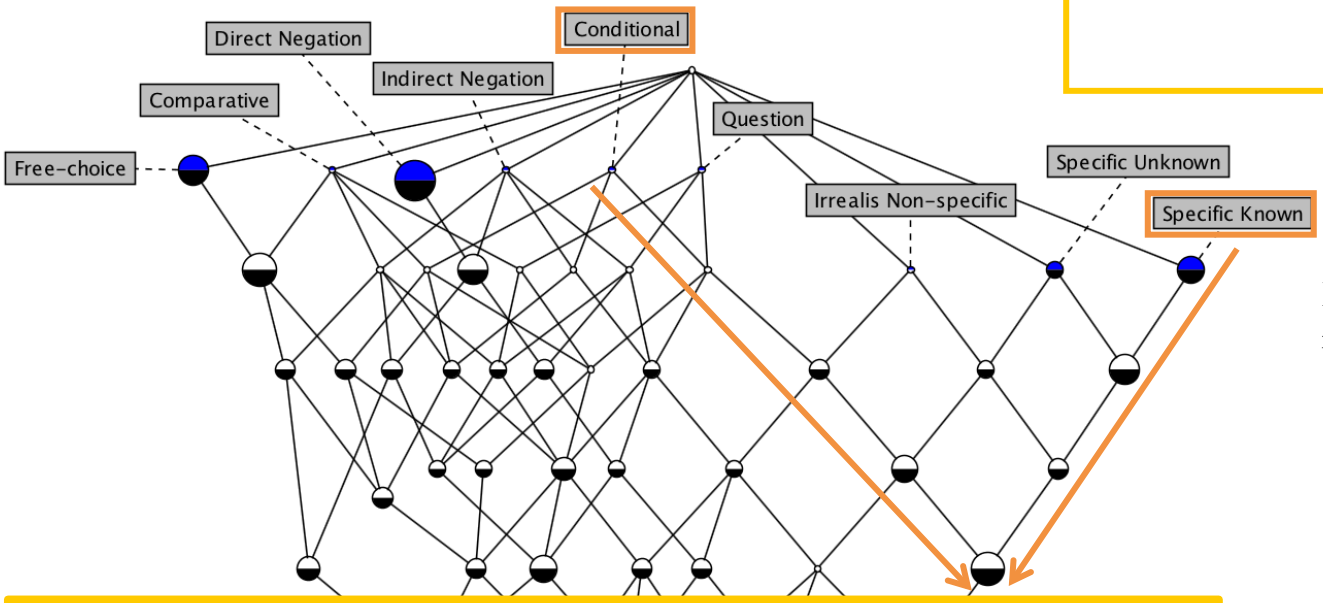

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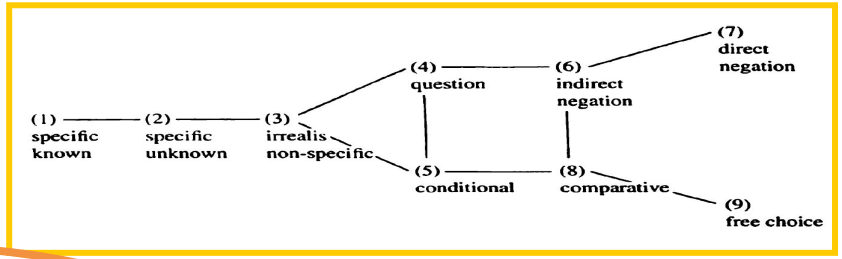

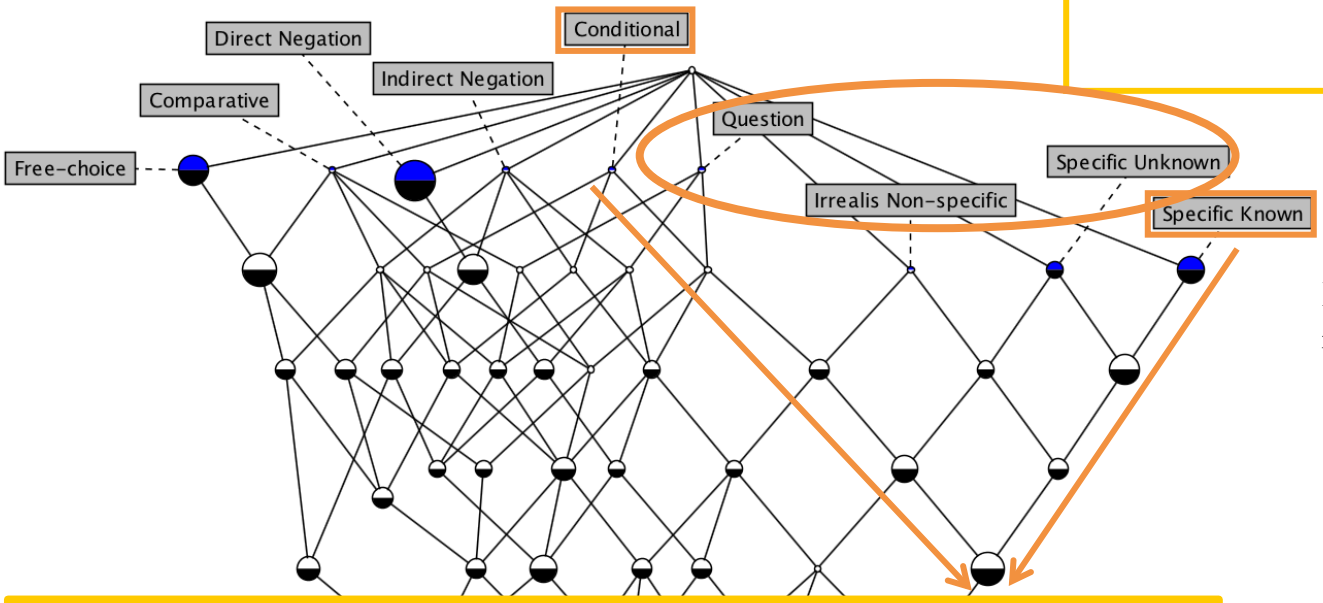

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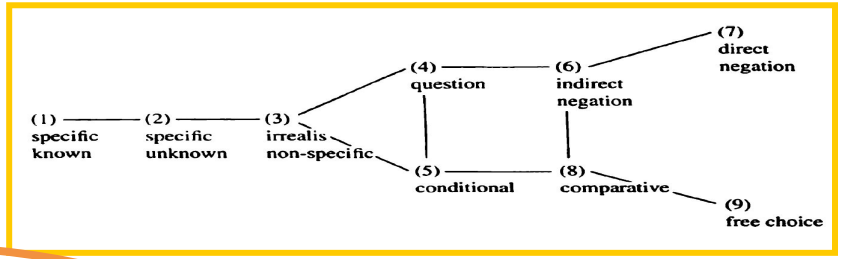

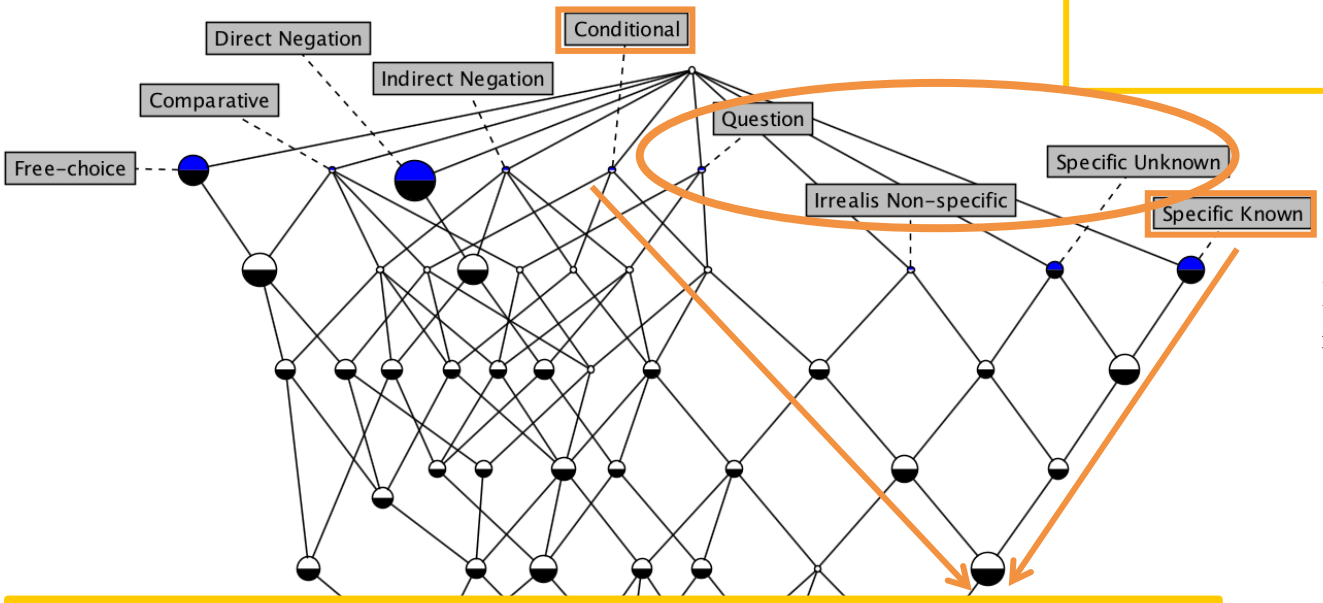

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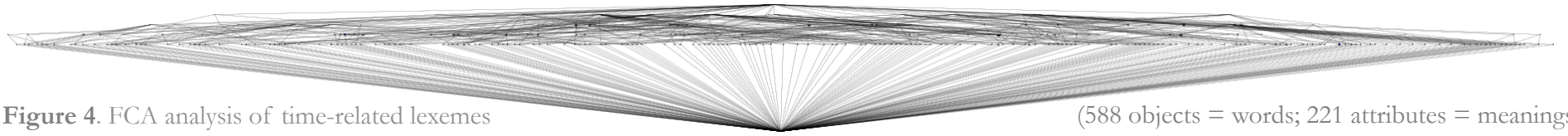
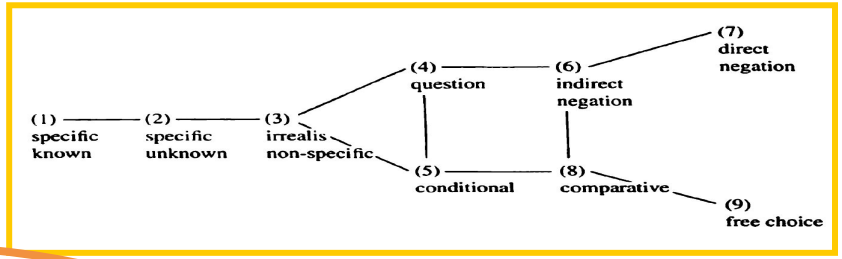
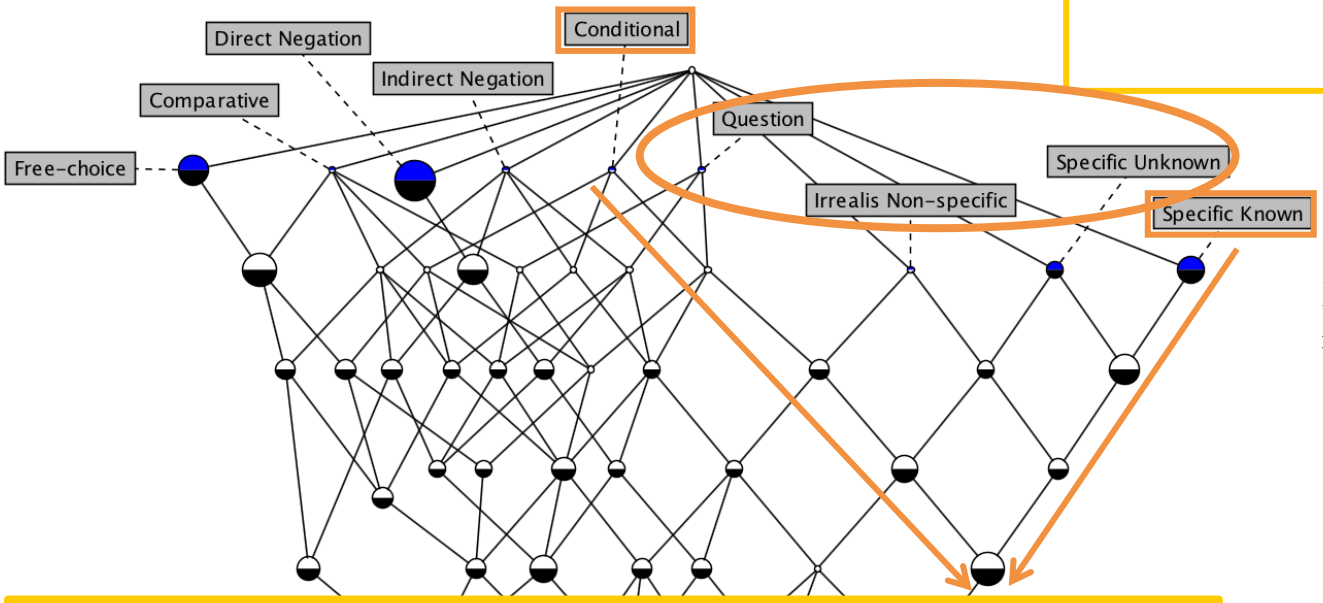


Figure 4. FCA analysis of time-related lexemes (588 objects = words; 221 attributes = meanings)





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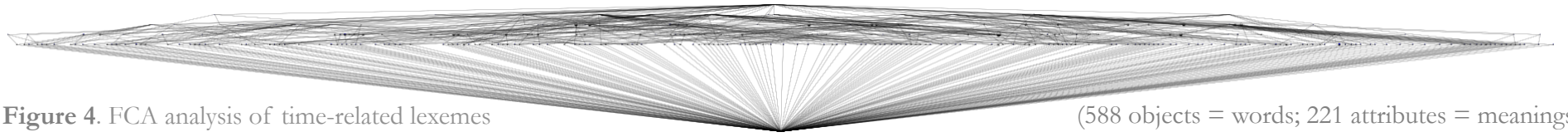

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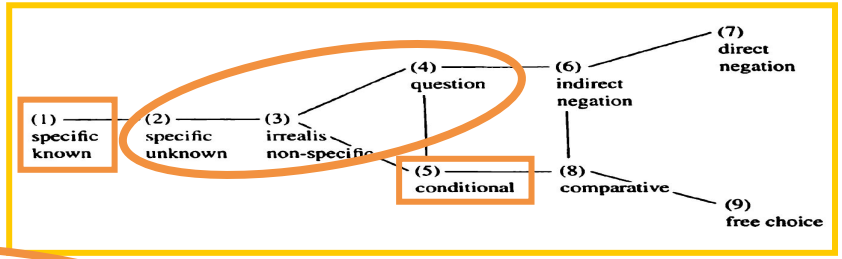


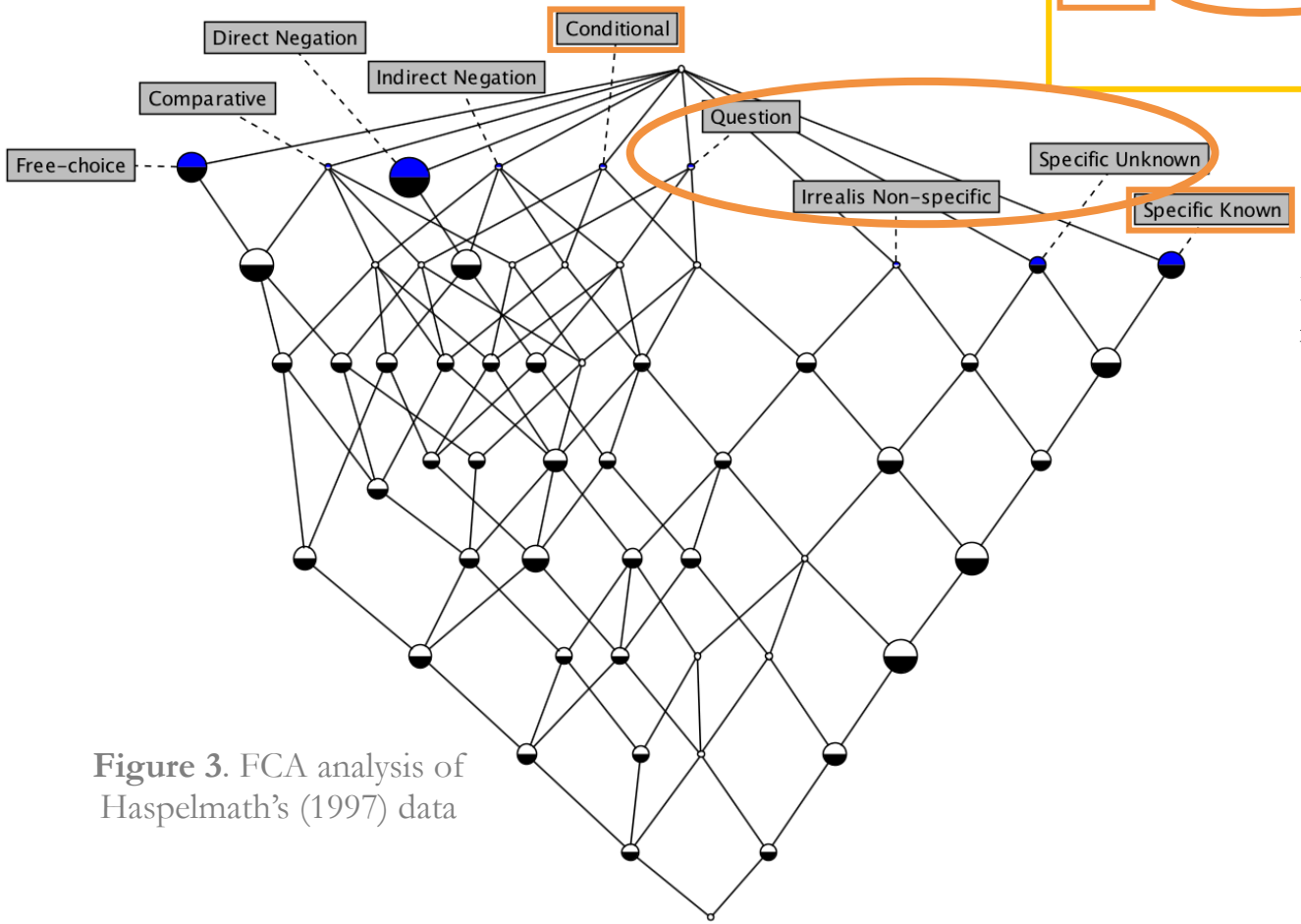


Figure 3. FCA analysis of Haspelmath's (1997) data

FCA solves the problem of form/meaning mapping, since it shows:

- ✓ How forms maps onto meanings
- ✓ Which concepts are lexicalized and which are not
- ✓ Implication sets can be computed automatically

- ◆ But, less 'reader-friendly' (especially with many meanings = attributes)
- ◆ Complementarity between the two approaches

Semantic maps

- Semantic maps
  - Background information: Different types of maps
  - Principles of the classical model

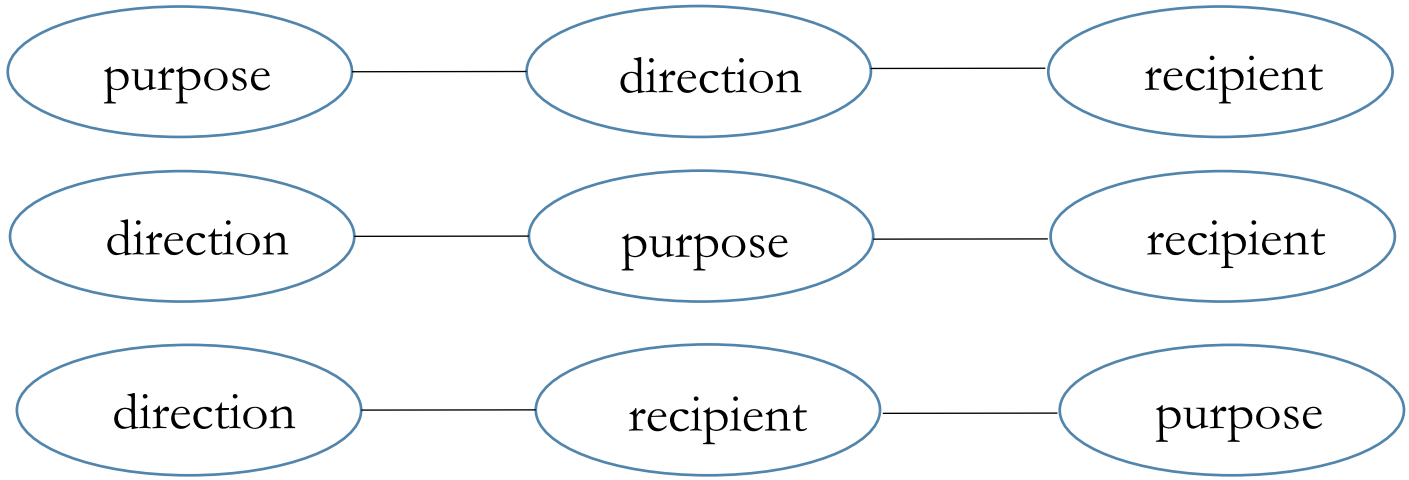
Semantic maps

- Semantic maps
  - Background information: Different types of maps
  - Principles of the classical model
    - *Connectivity hypothesis* (Croft 2001): any language-specific item should map on a connected region of the graph
    - *Economy principle* (Georgakopoulos & Polis 2018): given three meanings (Meaning_1, Meaning_2, Meaning_3), if the linguistic items expressing Meaning_1 and Meaning_3 always express Meaning_2, there is no need to draw an edge between Meaning_1 and Meaning_3

Semantic maps

English:

- 'Direction': The teacher is going *to* the school
- 'Purpose': The lifeguard ran *to* rescue the child
- 'Recipient': The teacher gave the book *to* the student



(Haspelmath 2003)

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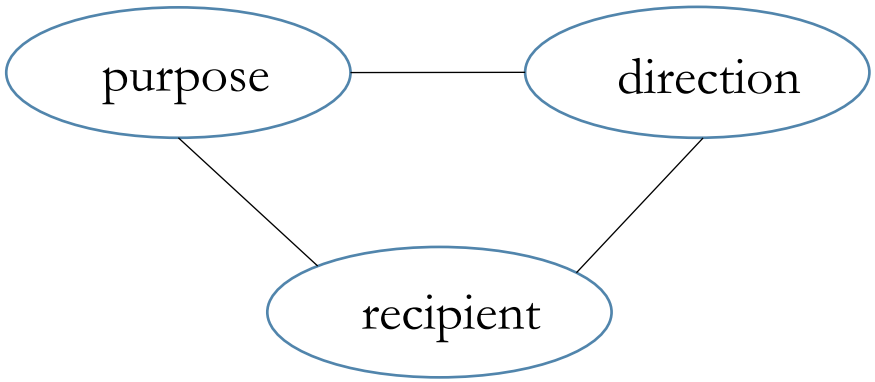

(Haspelmath 2003)

Semantic maps

German:

- 'Purpose': Anna ging *zum* Spielen in den Garten
- 'Direction': Ich gehe *zu* Anna

  ≠

- 'Recipient': Ich gebe *dir* das Buch

Semantic maps

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Semantic maps

French:

- 'Purpose': Je donne la balle *pour* jouer dans le jardin

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- 'Direction': Je vais *à* Moscou
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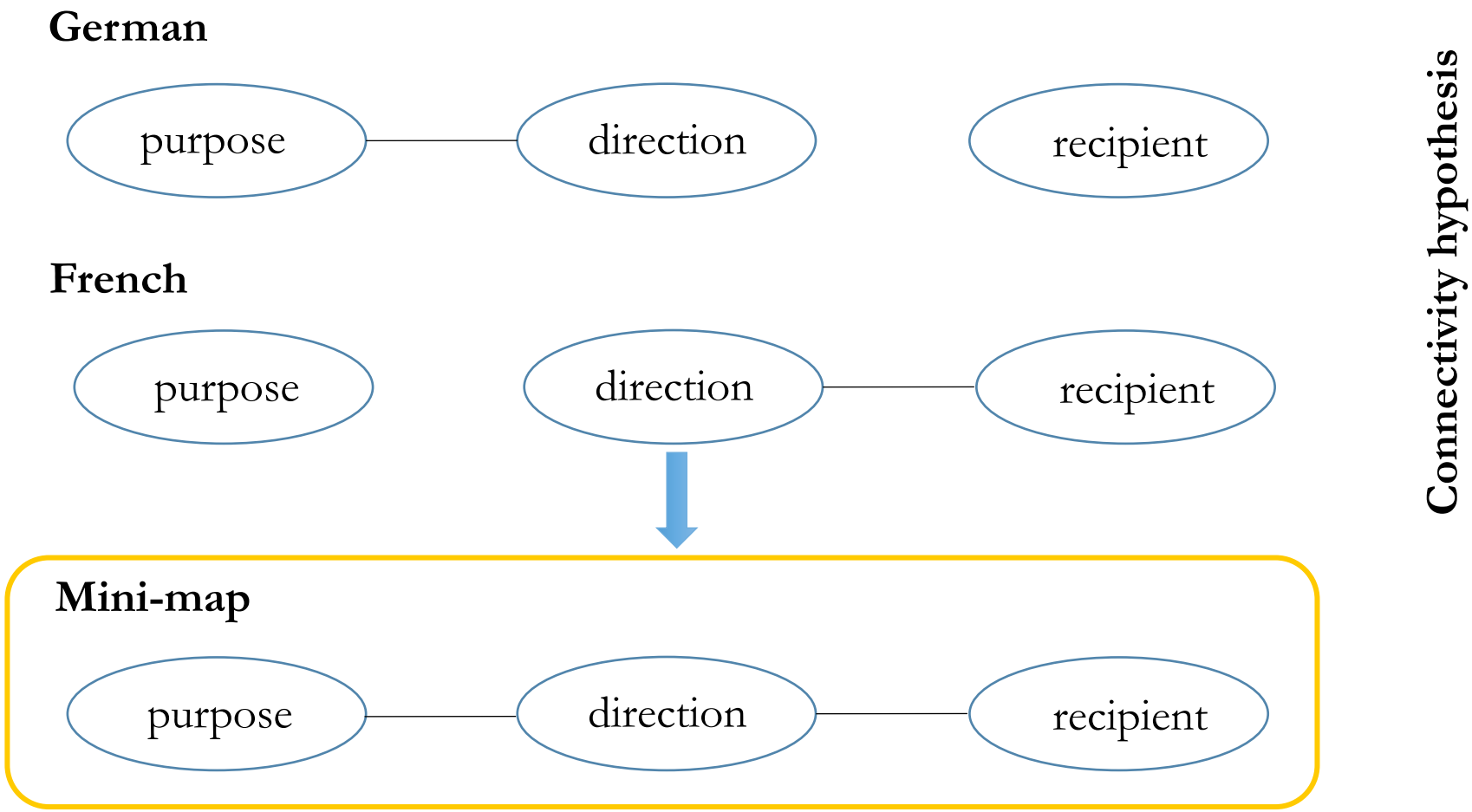
Semantic maps

German

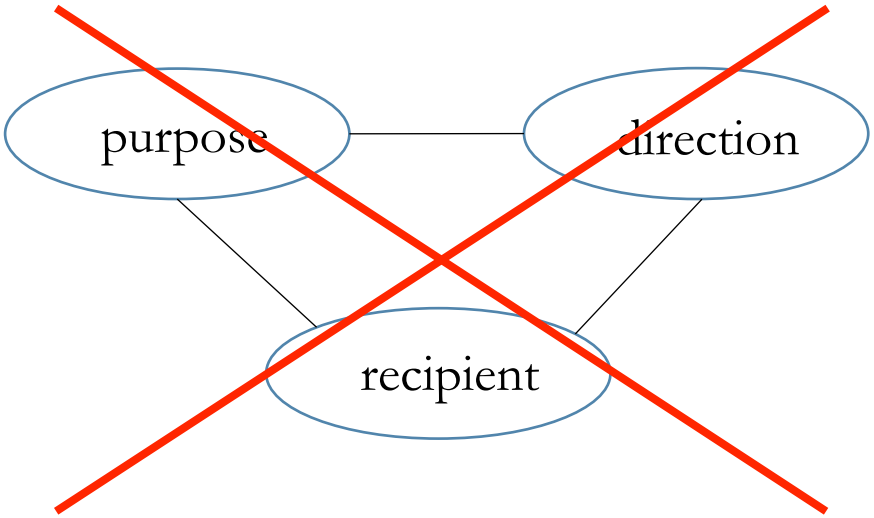
French

Connectivity hypothesis

Semantic maps



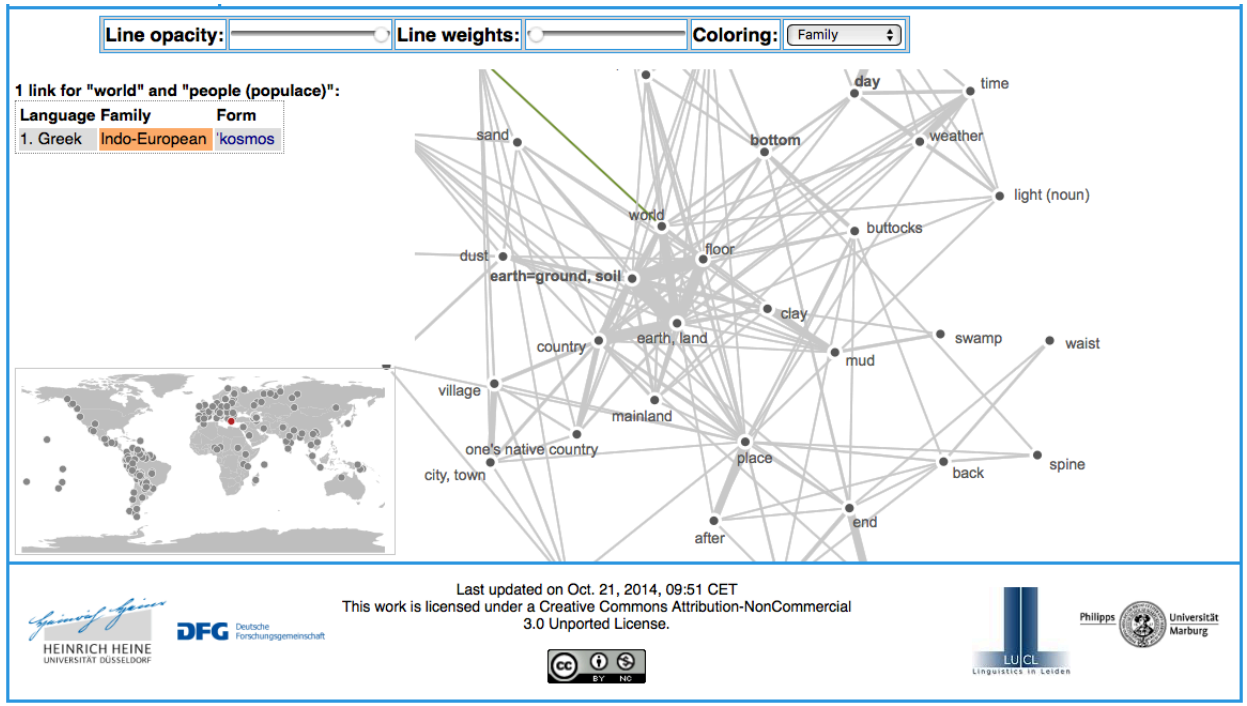
Semantic maps



Economy principle

Mini-map

Semantic maps



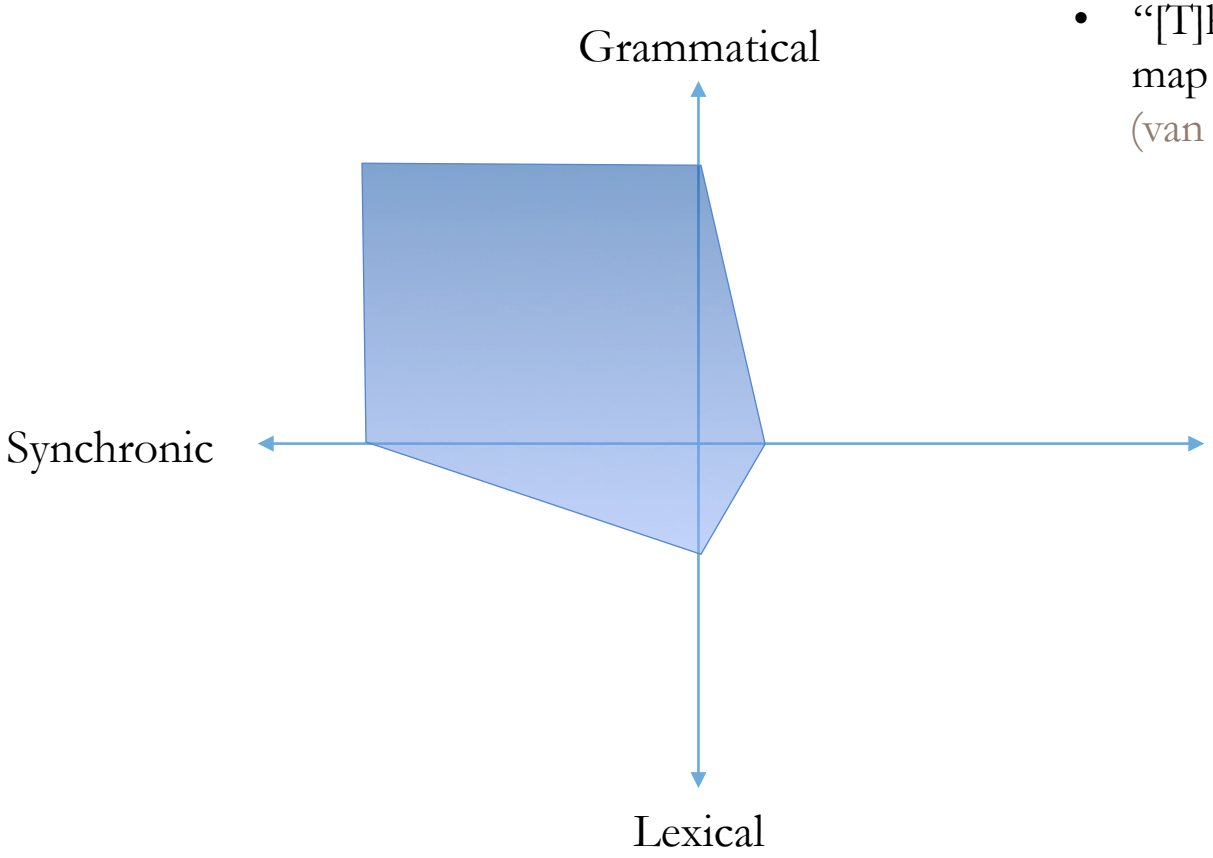
Economy principle

Mini-map

Le Diasema

Le Diasema

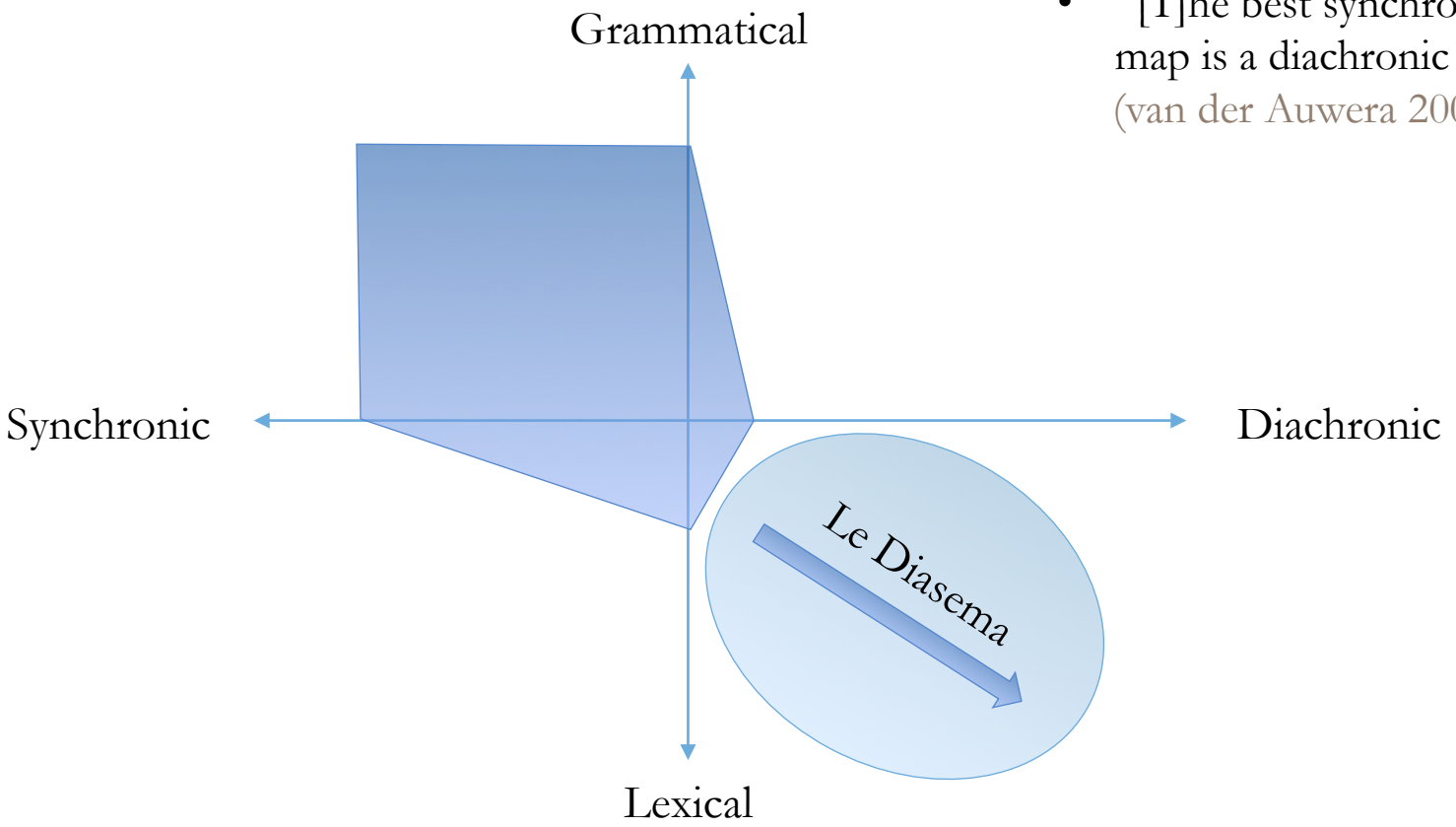
- Adding the diachronic dimension to semantic maps of content words



- "[T]he best synchronic semantic map is a diachronic one" (van der Auwera 2008: 43)

Le Diasema

- Adding the diachronic dimension to semantic maps of content words



- "[T]he best synchronic semantic map is a diachronic one" (van der Auwera 2008: 43)

Le Diasema

http://web.philo.ulg.ac.be/lediasema/

Le Diasema

Objectives

- To plot automatically *weighted* and *diachronic* semantic maps (tomorrow 9AM)

- To incorporate the *diachronic* dimension into *semantic maps of content words* and to provide information about the cognitive and cultural factors behind the development of the various meanings (today)
  - Protocol to construct lexical diachronic semantic maps
  - Case-study: The semantic extension of time-related lexemes

- To investigate *areal patterns* of polysemy with semantic maps (today)
  - Case-study: The verbs of perception and cognition in typological perspective

Case-study 1
Lexical diachronic semantic maps

The semantic extension of time-related lexemes

Protocol to construct a (lexical) diachronic semantic map

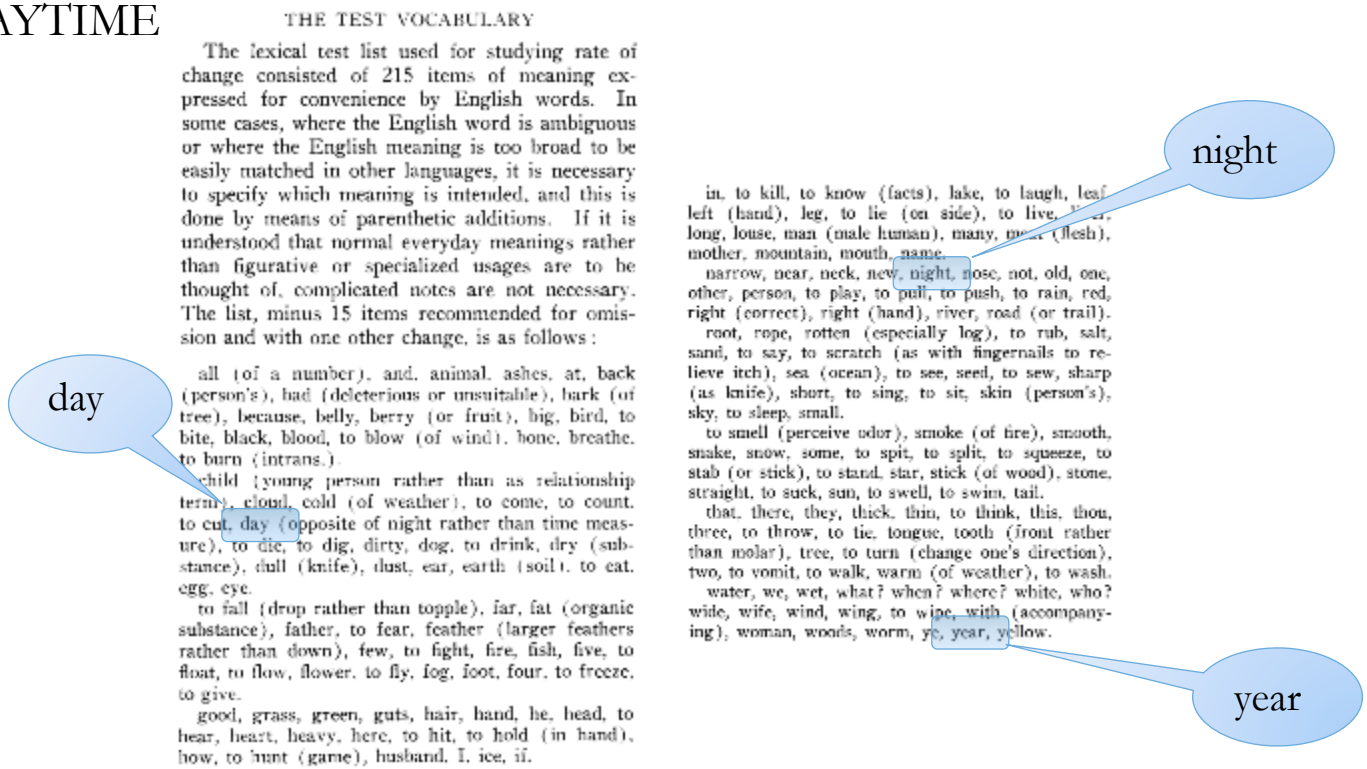
1. Choose the concepts/ domains
2. Identify cross-linguistic polysemy patterns
3. Build a lexical matrix
4. Plot a weighted semantic map
5. Remove infrequent polysemy patterns
6. Select languages with diachronic data
7. Add diachronic information

Protocol to construct a (lexical) diachronic semantic map

Choice of concepts

- For the purpose of universality and stability, we chose the entries for time-related concepts in the Swadesh 200-word list (Swadesh 1952: 456-457)

  - DAY/DAYTIME
  - NIGHT
  - YEAR



THE TEST VOCABULARY

The lexical test list used for studying rate of change consisted of 215 items of meaning expressed for convenience by English words. In some cases, where the English word is ambiguous or where the English meaning is too broad to be easily matched in other languages, it is necessary to specify which meaning is intended, and this is done by means of parenthetic additions. If it is understood that normal everyday meanings rather than figurative or specialized usages are to be thought of, complicated notes are not necessary. The list, minus 15 items recommended for omission and with one other change, is as follows:

all (of a number), and, animal, ashes, at, back (person's), bad (deleterious or unsuitable), bark (of tree), because, belly, berry (or fruit), big, bird, to bite, black, blood, to blow (of wind), bone, breathe, to burn (intrans.),
child (young person rather than as relationship term), cloud, cold (of weather), to come, to count, to cut, day (opposite of night rather than time measure), to die, to dig, dirty, dog, to drink, dry (substance), dull (knife), dust, ear, earth (soil), to eat, egg, eye,
to fall (drop rather than topple), far, fat (organic substance), father, to fear, feather (larger feathers rather than down), few, to fight, fire, fish, five, to float, to flow, flower, to fly, fog, foot, four, to freeze, to give,
good, grass, green, guts, hair, hand, he, head, to hear, heart, heavy, here, to hit, to hold (in hand), how, to hunt (game), husband, I, ice, if,

in, to kill, to know (facts), lake, to laugh, leaf, left (hand), leg, to lie (on side), to live, liver, long, louse, man (male human), many, meat (flesh), mother, mountain, mouth, name,
narrow, near, neck, new, night, nose, not, old, one, other, person, to play, to pull, to push, to rain, red, right (correct), right (hand), river, road (or trail),
root, rope, rotten (especially log), to rub, salt, sand, to say, to scratch (as with fingernails to relieve itch), sea (ocean), to see, seed, to sew, sharp (as knife), short, to sing, to sit, skin (person's), sky, to sleep, small,
to smell (perceive odor), smoke (of fire), smooth, snake, snow, some, to spit, to split, to squeeze, to stab (or stick), to stand, star, stick (of wood), stone, straight, to suck, sun, to swell, to swim, tail,
that, there, they, thick, thin, to think, this, thou, three, to throw, to tie, tongue, tooth (front rather than molar), tree, to turn (change one's direction), two, to vomit, to walk, warm (of weather), to wash,
water, we, wet, what? when? where? white, who? wide, wife, wind, wing, to wipe, with (accompanying), woman, woods, worm, ye, year, yellow.

day

night

year

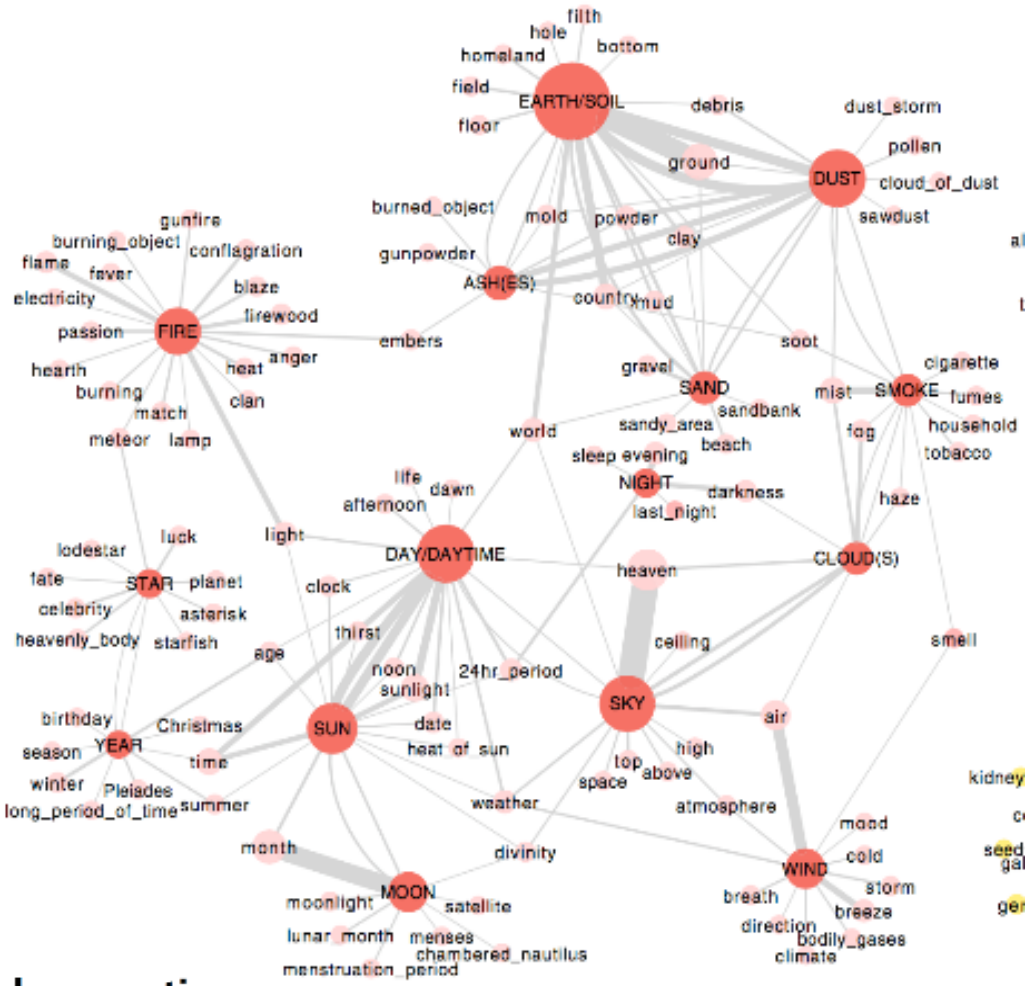
Le Diasema

Protocol to construct a (lexical) diachronic semantic map

Choice of concepts

- We chose the entries for time-related concepts also for the sake of comparability

  (see, e.g. , Youn et al. 2016)

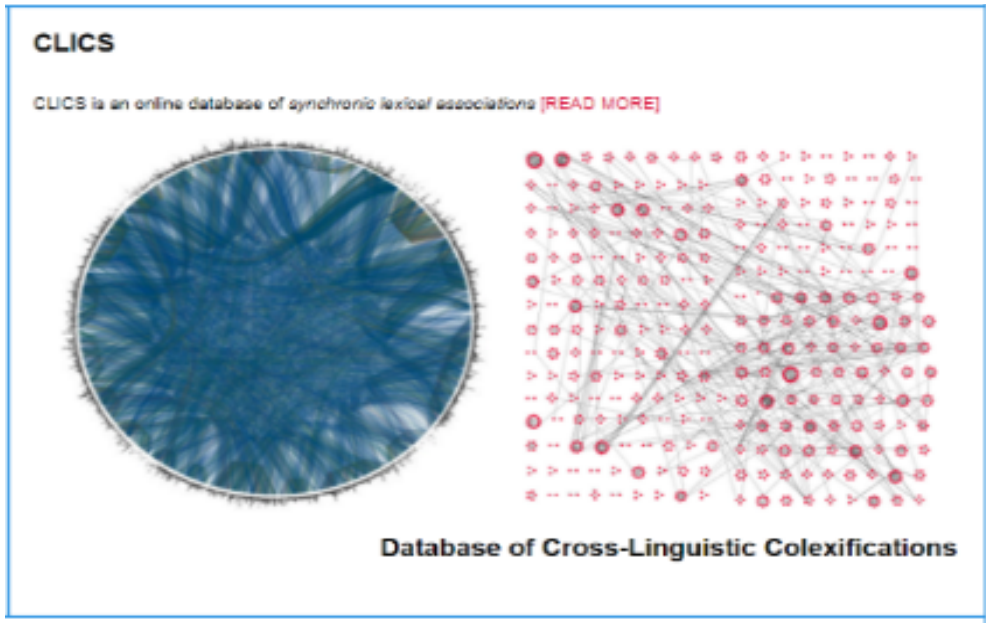


On the universal structure of human lexical semantics

Hyejin Youn[a,b,c,1], Logan Sutton[d], Eric Smith[c,e], Cristopher Moore[c], Jon F. Wilkins[c,f], Ian Maddieson[g,h], William Croft[g], and Tanmoy Bhattacharya[c,i,1]

Protocol to construct a (lexical) diachronic semantic map

Identify cross-linguistic polysemy patterns



- *N* of lgs: 221
- *N* of lg families: 64
- *N* of concepts: 1280

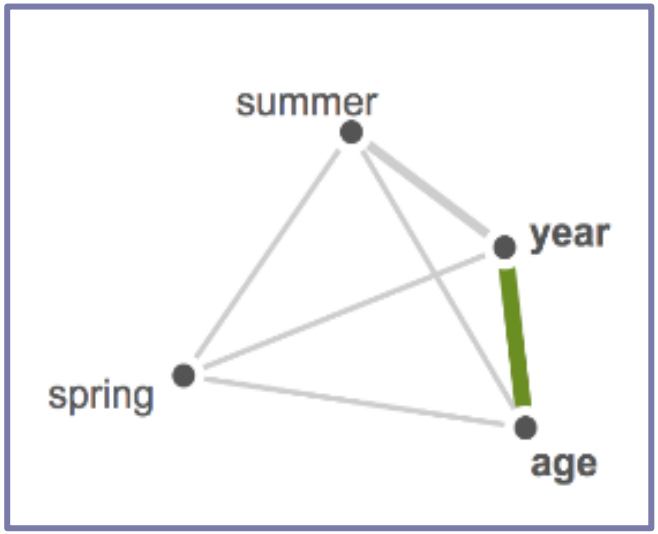
- Identify in CLICS (List et al. 2014) the main polysemy patterns attested for these three meanings (subgraph approach) [16 meanings]

Protocol to construct a (lexical) diachronic semantic map

Identify cross-linguistic polysemy patterns

- Identify in CLICS (List et al. 2014) the main polysemy patterns attested for these three meanings (subgraph approach) [16 meanings]

    - **DAY/DAYTIME**: CLOCK/TIMEPIECE, HOUR, SEASON, SUN, TIME, WEATHER
    - **NIGHT**: DARK (in color), DARKNESS, BLACK, OBSCURE
    - **YEAR**: AGE, SPRING, SUMMER



Protocol to construct a (lexical) diachronic semantic map

Identify cross-linguistic polysemy patterns

- All the colexification patterns attested for these 16 meanings were gathered from the CLICs source files (http://clics.lingpy.org/download.php):

➡ **381 colexification patterns**

	A	B	C
119	day	afternoon	hau_std:rana//ket_std:i?//plj_std:piidi//rus_std:den//tli_std:yakyee
120	day	again	kha_std:sngi
121	day	age	gui_std:ˈara//yad_std:hnda
122	day	anger	tzz_std:k'ak'al
123	day	bright	tzz_std:k'ak'al
124	day	clock, timepiece	gue_std:wurlngarn//sei_std:šā?
125	day	cloud	haw_std:ao
126	day	country	cbr_std:niti//shp_std:niti
127	day	dawn	haw_std:ao//waw_std:enmari
128	day	doubt	haw_std:lā
129	day	earth, land	cag_std:nalu//haw_std:ao//mri_std:ao//tzz_std:osil
130	day	east	tob_std:na?a?k
131	day	fever	tzz_std:k'ak'al
132	day	fin (dorsal)	haw_std:lā
133	day	fire	jpn_std:hi
134	day	go	ote_std:pa//oym_std:aa
135	day	go away, depart	ote_std:pa
136	day	hour	sap_Standard:aknim//shb_std:thəm
137	day	lamp, torch	ito_std:uwayo
138	day	lick	cmn_std:tian
139	day	light (in color)	mri_std:ao
140	day	light (noun)	con_std:a?ta//crt_std:xloma//haw_std:ao//hdn_Northern:ʔkatʰkáa//ito_std:uwayo//mzh
141	day	live, living, life	shp_std:niti

Protocol to construct a (lexical) diachronic semantic map

Convert the polysemy patterns into a lexical matrix

```
Tmap = [Tsenses]
for t in Tclean:
        split_langWord = t[2].split('//')
        for couple in split_langWord:
                langWord = couple.split(':')
                line = [langWord[0], langWord[1]]
                for i in range (2,len(Tsenses)):
                        line.append('0')
                line[Tsenses.index(t[0])] = '1'
                line[Tsenses.index(t[1])] = '1'
                Tmap.append(line)
```

Python script α

Languages Forms Meanings

	A	B	C	D	E	F
1			age	acid, sour	city, town	day
2	yad_std	hnda	1	1	0	1
3	vec_std	edat	1	0	0	0
4	jpn_std	toshi	1	0	1	0
5	gui_std	ˈara	1	0	0	1
6	ncg_std	йуэ	1	0	0	0
7	mri_std	pakeke	1	0	0	0
8	pbb_std	hiʔph	1	0	0	0
9	khv_Khvarshi	замана	1	0	0	0

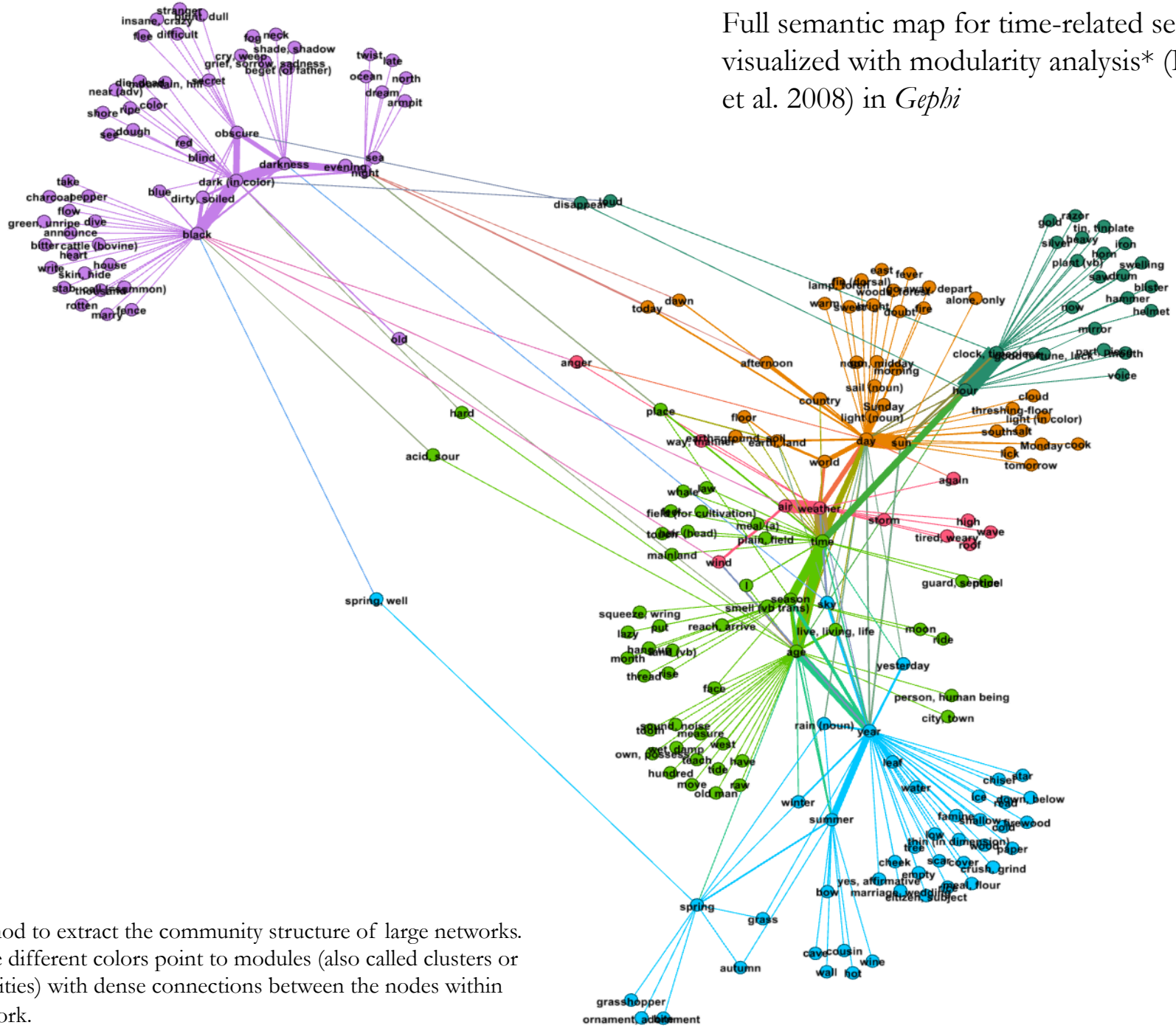
1 when a meaning is attested for one form

Lexical matrix

Protocol to construct a (lexical) diachronic semantic map

Plot a weighted semantic map

Tomorrow 9AM



Full semantic map for time-related senses, visualized with modularity analysis* (Blondel et al. 2008) in *Gephi*

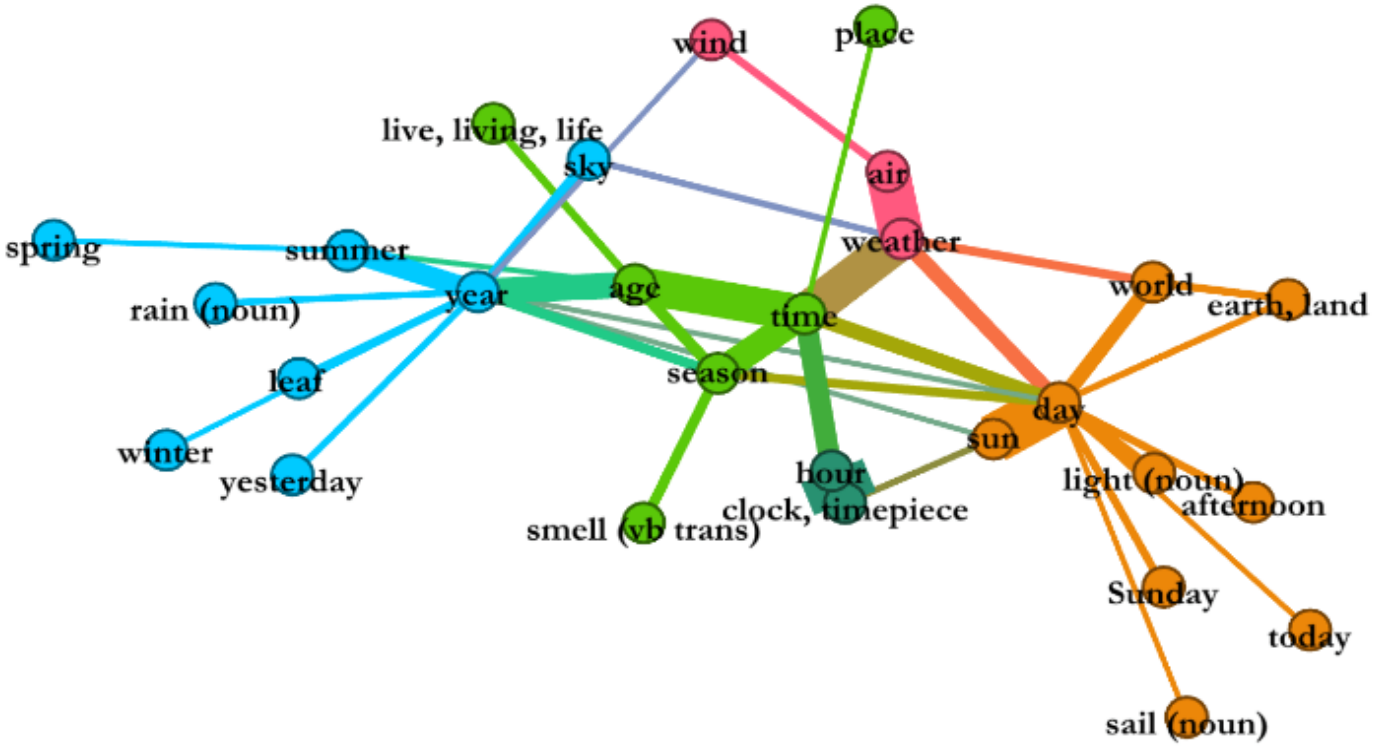
* A method to extract the community structure of large networks. Here, the different colors point to modules (also called clusters or communities) with dense connections between the nodes within the network.

Remove infrequent polysemy patterns

Semantic map of time-related senses (colexification patterns attested in 2^+ languages)

Two connected sub-networks

- NIGHT/DARKNESS/DARK
- DAY/TIME/AGE/YEAR



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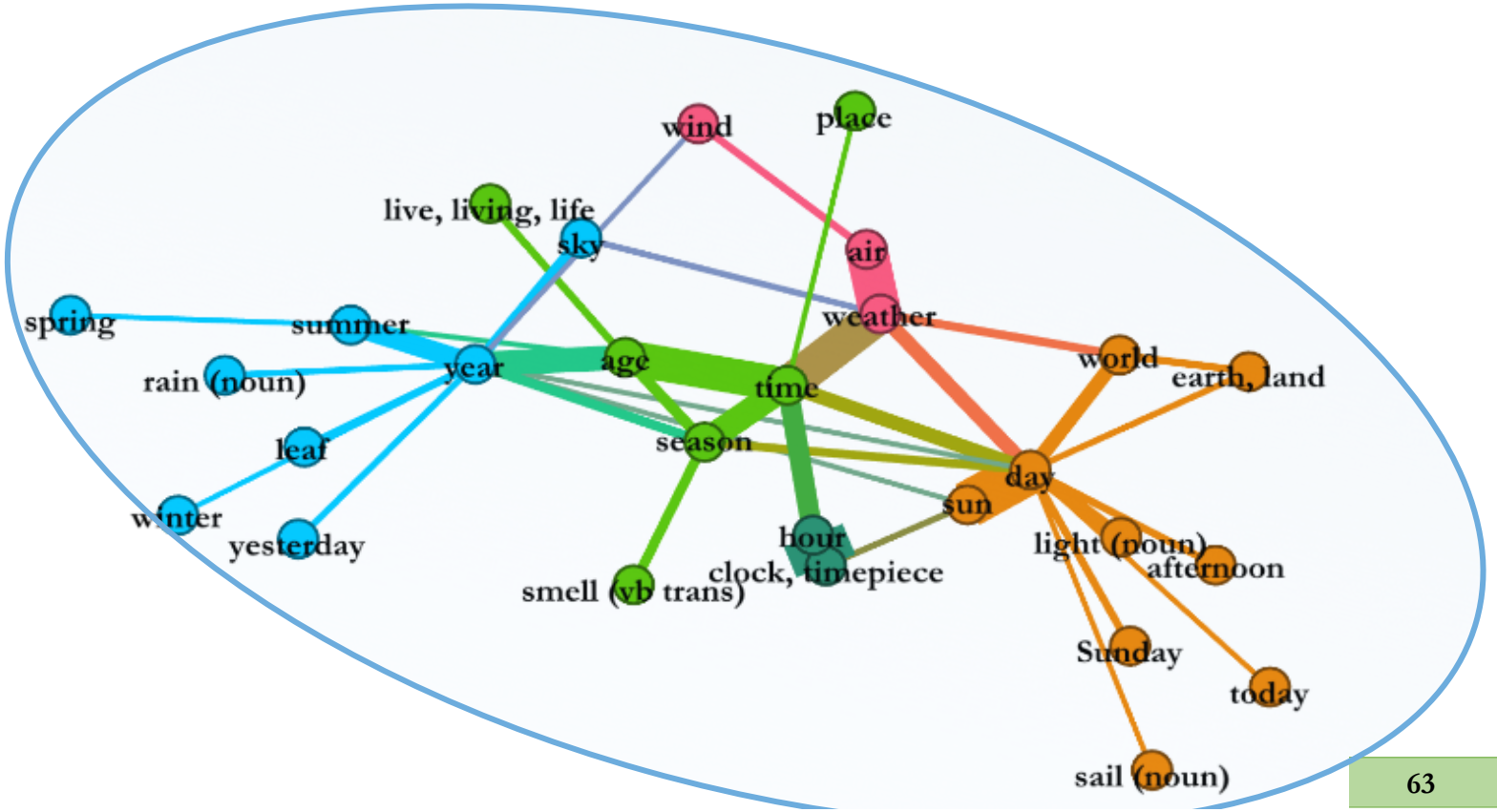
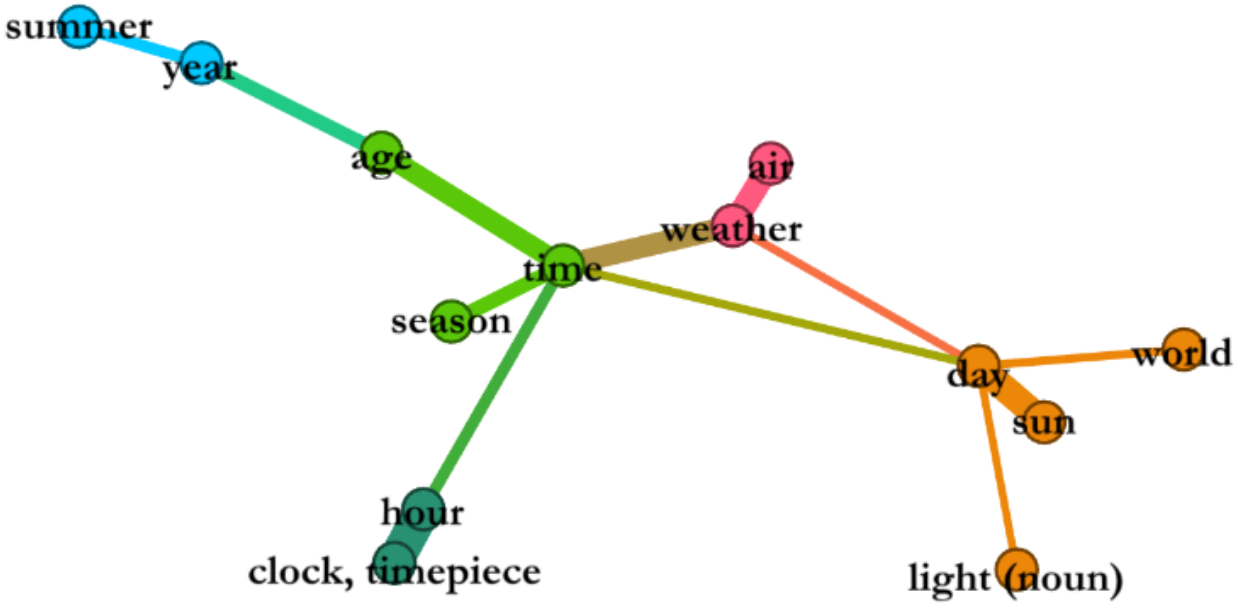


Protocol to construct a (lexical) diachronic semantic map

Remove infrequent polysemy patterns

- In order to investigate directionality of change, 13 meanings that are connected on this map in at least 8 different languages were kept as a basis for diachronic investigation (in the sub-graph day/year)



Protocol to construct a (lexical) diachronic semantic map

Select languages with diachronic data

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(2) Meanings: doll *(source)*—nymph, chrysalis (*target*) (ID: 927); *Form*: kukla; *Language pair*: Russian —Czech; *Realization Type*: **Cognate**

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(5) Meanings: to catch *(source)* → to hunt (*target*) (ID: 415); *Forms*: capto → cacciare; *Languages*: Latin → Italian; *Realization Type:* **Diachronic semantic evolution**

Protocol to construct a (lexical) diachronic semantic map

Select languages with diachronic data

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DatSemShifts

Home | Semantic shifts | Meanings | Languages | Participants | Publications | Contact us | Log in

ID	Source	Direction	Target	Status	Contributed by	Accepted realization	Show
53	time	—	weather	Accepted	DG	4	Show
109	time	—	opportunity	Accepted	IG	2	Show
395	time	—	hour	Accepted	DG	2	Show
406	time	—	24 hours	Suspended	DG	0	Show
795	time	→	one time, once	New	MB	0	Show
1446	time	→	journal, magazine	Accepted	IG	3	Show

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1446	time	→	journal, magazine	Accepted	IG

Comments:
Ср. греч. хронограф, откуда могут быть кальки.

Confirmed by 3 Guru(s)

Derivation: German *Zeit* → *Zeitung, Zeitschrift* 'newspaper, journal'

Derivation: Karaim *вахт* 'time' → *вахтлых* 'journal'

Polysemy: Polish *czas* 'time' — 'journal'

Protocol to construct a (lexical) diachronic semantic map

Select languages with diachronic data

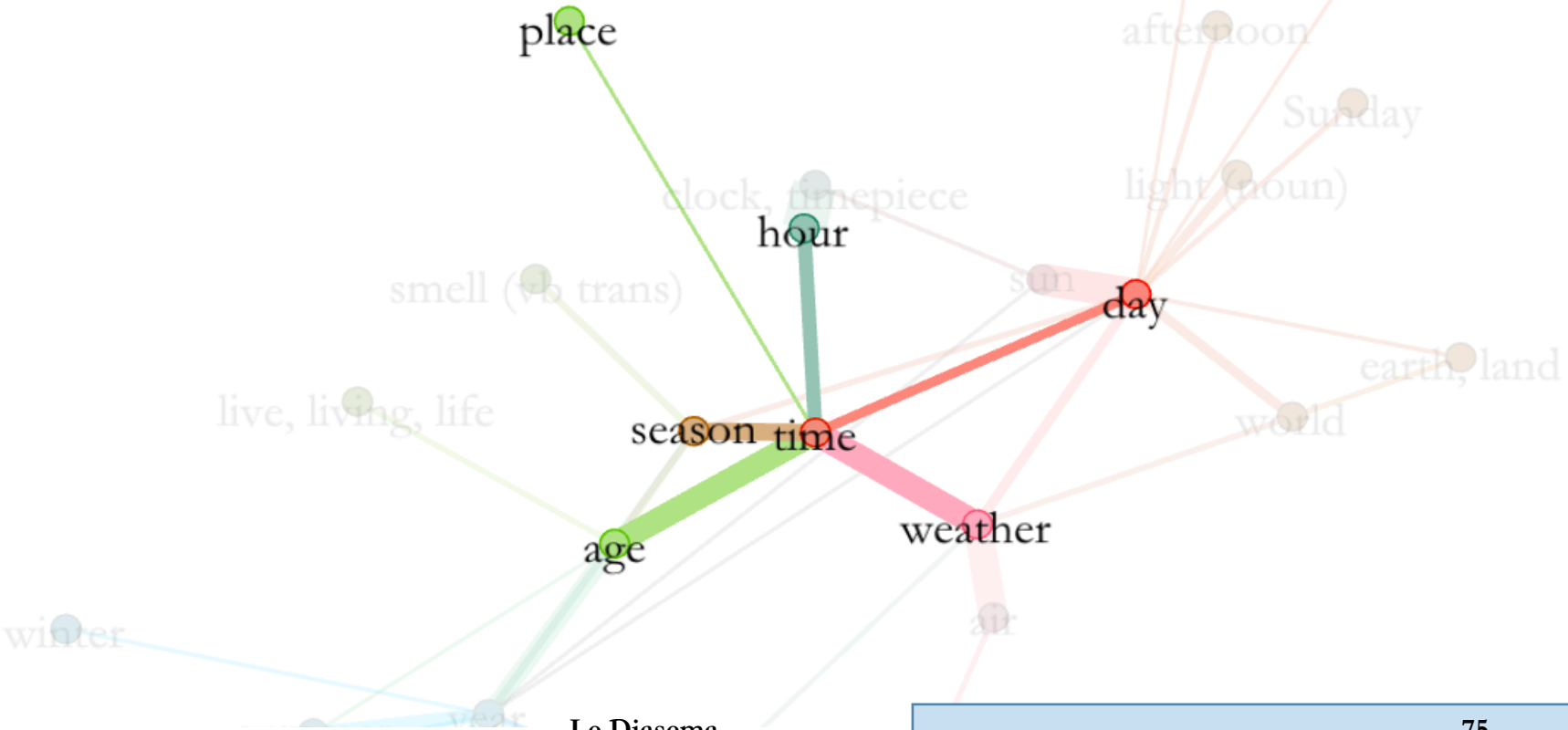
- Ancient Greek (8th – 4th c. BC; in a few cases till 1st c. BC)
  - Perseus digital library (http://www.perseus.tufts.edu/hopper/), TLG (http://stephanus.tlg.uci.edu)
  - Cunliffe (*A lexicon of the Homeric Dialect*), LSJ

- Ancient Egyptian (26th c. BC – 10th c. AD)
  - Thesaurus Linguae Aegyptiae (http://aaew.bbaw.de/tla/)
  - The Ramses corpus (http://ramses.ulg.ac.be),
  - Lexical resources (Coptic etymological dictionaries)

The semantic extension of time-related lexemes

Add diachronic information

- The diachronic material allows us to add diachronic information (graphically, oriented edges) between frequent colexification patterns
  - **TIME?**



The semantic extension of time-related lexemes

- Ancient Greek: *hṓra* ‘season/time/moment’

Approx.
8th c. BC

(1) *hóssá* *te* *phúlla* *kaì* *ánthea*
REL.NOM.PL.N PTC leave:ACC.PL.N CONJ flower:ACC.PL.N

gígnetai ***hṓrēi***
become:PRS.3SG **season:DAT.SG.F**
‘as are the leaves and the flowers in their season’ (Homer, *Iliad* 2.468)

(2) *óphra* *Poseidáōni* *kaì* *állois* *athanátoisin*
CONJ Poseidon:DAT.SG.M CONJ other:DAT.PL immortal:DAT.PL

speísantes *koítoio* *medṓmetha:*
pour.libation:PART.AOR.NOM.PL.M bed:GEN.SG.M think.of:PRS.1PL.SUBJ.M/P

toîo *gàr* ***hṓrē***
DEM.GEN.SG PTC **time:NOM.SG.F**

‘that when we have poured libations to Poseidon and the other immortals, we may bethink us of sleep; for it is the time thereto’ (Homer, *Odyssey* 3.333-334)

The semantic extension of time-related lexemes

- Ancient Greek: *hṓra* 'season/time/moment' ⇒ 'hour'

Approx.
5th c. BC

(3) *anastàs* *dè* *prỳi* *pseustheìs*
raise.up:PTCP.AOR.NOM.SG.M PTC early deceive:PTCP.AOR.PASS.NOM.SG.M

tês ***hṓras*** *badízein*
ART.GEN.SG.F **time:GEN.SG.F** walk:PRS.INF

'He arose early, mistaking the **time/hour**, and started off on his walk'
(Andocides, *On the Mysteries* 1.38)

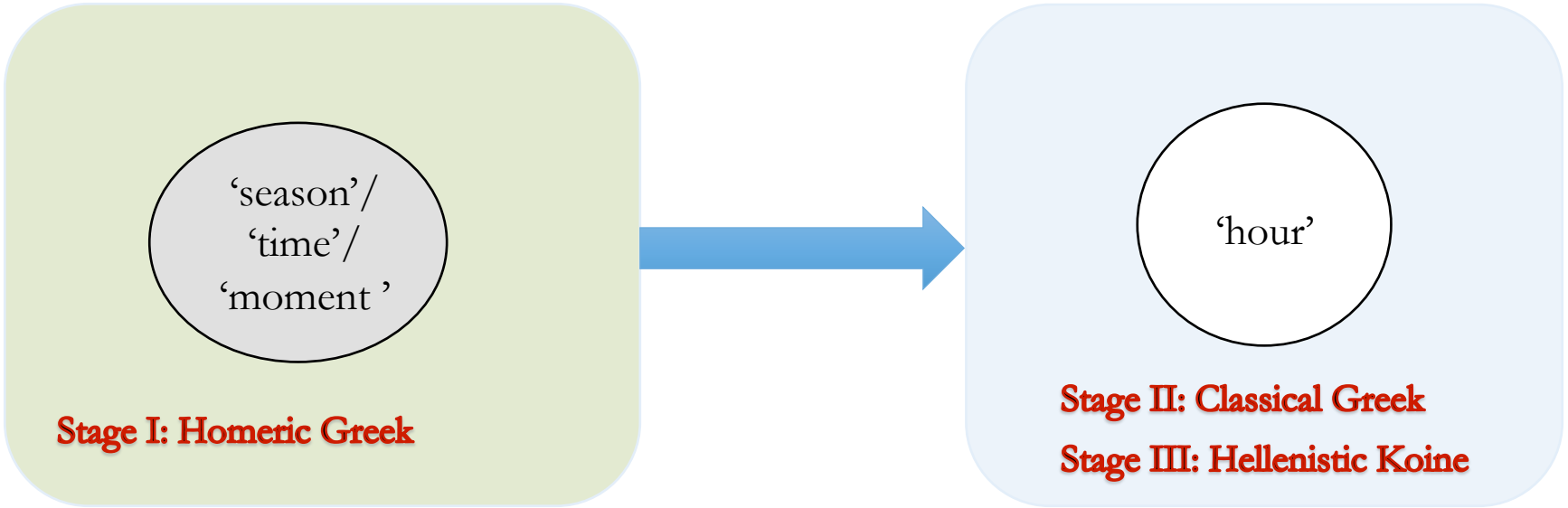
Approx.
1st c. AD

(4) *oukhì* ***dṓdeka*** ***hôrai*** *eisin* *tês* *hēméras;*
NEG **twelve** **hour:NOM.PL.F** be.PRS.3PL ART.GEN.SG.F day:GEN.SG.F

'Aren't there twelve hours of daylight?' (New Testament, John 11.9.2)

The semantic extension of time-related lexemes

Add diachronic information



Metonymy: due to the correlation between the canonical time periods and the time these take to unfold

The semantic extension of time-related lexemes

'Dynamicizing' the map

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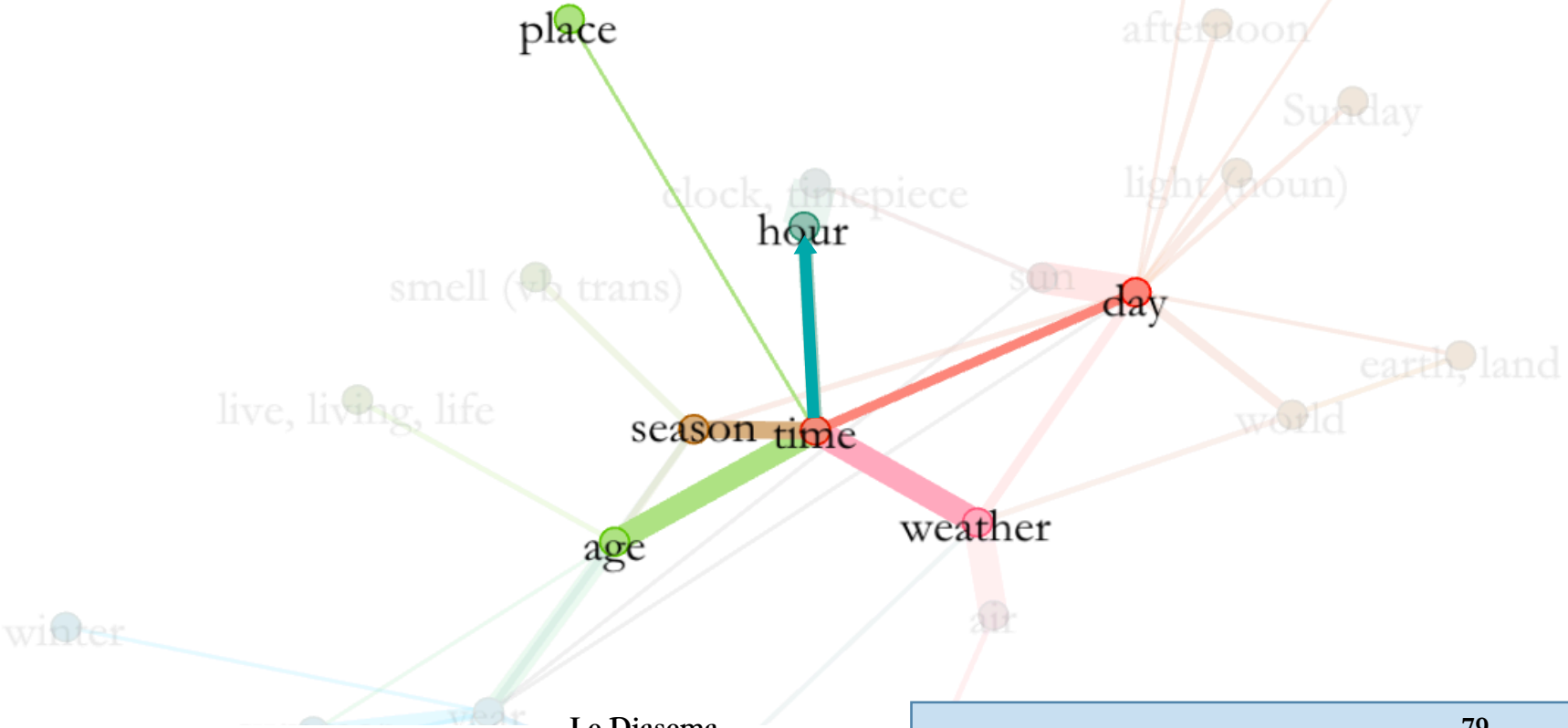


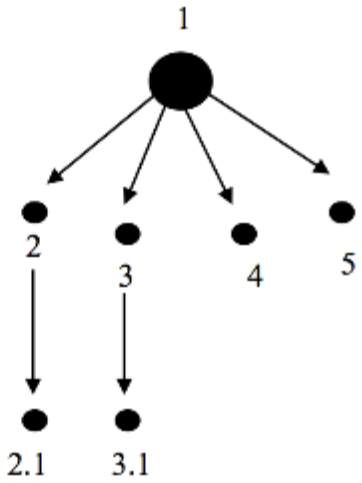
The semantic extension of time-related lexemes

'Dynamicizing' the map

A recurring issue: English as metalanguage and the lack of (contextualized) definitions for the meanings in the typological literature and resources

	Stage A	Stage B	Stage C
Duration	✓	✓	✓
Moment	–	✓	✓
Event	–	✓	✓
Matrix	–	✓	–
Agentive	–	✓	✓
Commodity	–	✓	✓
Measurement-system	–	–	–
Grammatical	–	–	✓

The senses of *khrónos* in the diachrony of AG
(Georgakopoulos & Piata 2012)



1: The Duration Sense
2: Matrix Sense
2.1: Agent Sense
3: Moment Sense
3.1: Event Sense
4: Commodity Sense
5: Grammatical Sense

The radial structure of *khrónos* in AG
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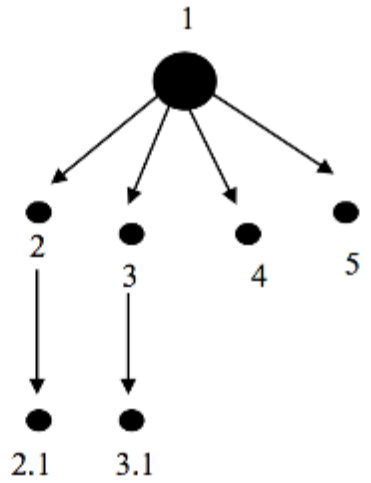

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Ekaterina Rakhilina and Tatiana Reznikova
4. A Frame-based methodology for lexical typology

The semantic extension of time-related lexemes

Enriching the map

- The material allows us to add new polysemy patterns, and to provide a diachronic account
  - **SUMMER?**

The semantic extension of time-related lexemes

Enriching the map

- Summer?

There are 17 links involving the concept "summer": ?

Concept	IDS-Key	Occurrences	Families	Languages	Network		Forms
year	14.73	233	10	16	COM	SUB	FORMS
age	14.12	257	2	3	COM	SUB	FORMS
bow	20.24	231	2	2	COM	SUB	FORMS
spring	14.75	174	2	3	COM	SUB	FORMS
autumn	14.77	167	1	1	COM	SUB	FORMS
cave	1.28	256	1	1	COM	SUB	FORMS
cousin	2.55	346	1	1	COM	SUB	FORMS
hang up	9.341	280	1	1	COM	SUB	FORMS
hot	15.85	303	1	1	COM	SUB	FORMS
put	12.12	306	1	1	COM	SUB	FORMS
rain (noun)	1.75	257	1	1	COM	SUB	FORMS
reach, arrive	10.55	329	1	1	COM	SUB	FORMS
rise	10.21	334	1	1	COM	SUB	FORMS
season	14.78	193	1	1	COM	SUB	FORMS
sun	1.52	245	1	1	COM	SUB	FORMS
wall	7.27	239	1	1	COM	SUB	FORMS
wine	5.92	162	1	1	COM	SUB	FORMS

(http://clics.lingpy.org/all.php?gloss=summer)

The semantic extension of time-related lexemes

Language-specific colexification patterns

- Ancient Greek: *théros* 'summer' ⇒ 'harvest'

(5) *autàr* *epèn* *élthēisi* ***théros*** *tethaluîá*
PTC when come:AOR.SUBJ.3SG **summer:NOM.SG.M** thrive:PART.PERF.NOM.SG.F

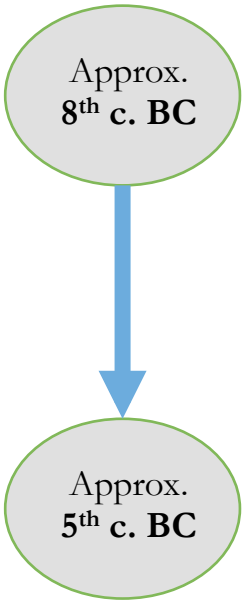
t' *opṓrē*
PTC autumn:NOM.SG.F

'But when **summer** comes and rich autumn' (Homer, *Odyssey* 11.192)

(6) *kâit'* *anḕr* *édoksen* *eînai,* *tallótrion*
ADV man:NOM.SG.M seem:AOR.3SG be.INF another:GEN.SG

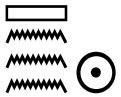
amôn ***théros***
reap.corn:PTCP.PRS.NOM.SG.M **summer:ACC.SG.N**

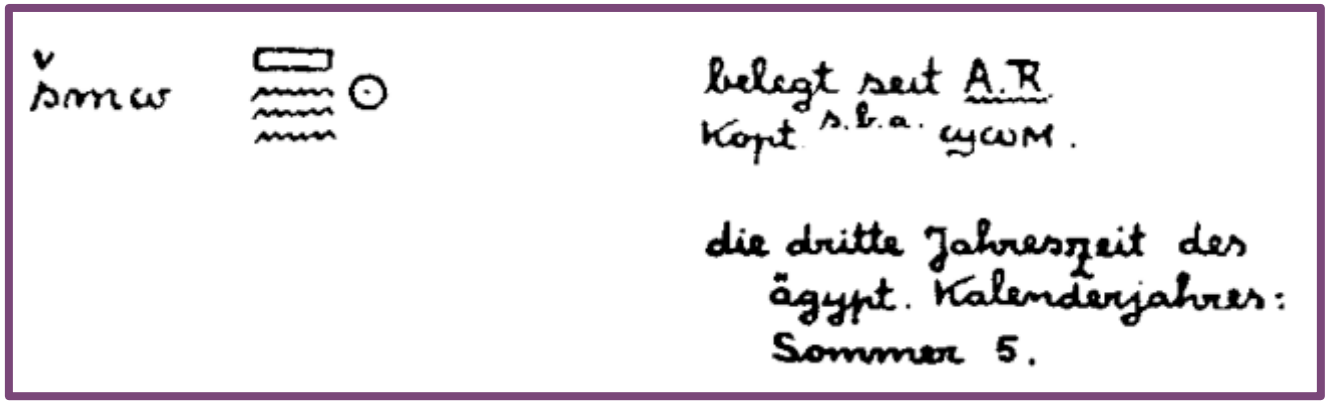
'he has only made himself a name by reaping another's **harvest**' (Aristophanes, *Knights* 392)

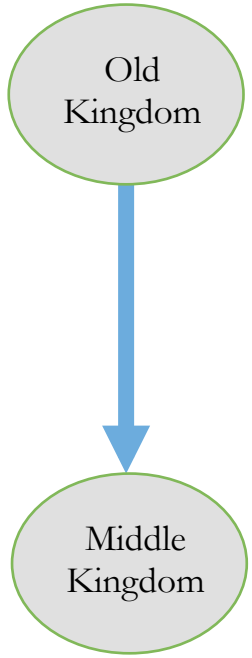


The semantic extension of time-related lexemes

Language-specific colexification patterns

Ancient Egyptian:  *šmw* ‘summer’ ⇒ *šmw* ‘harvest’





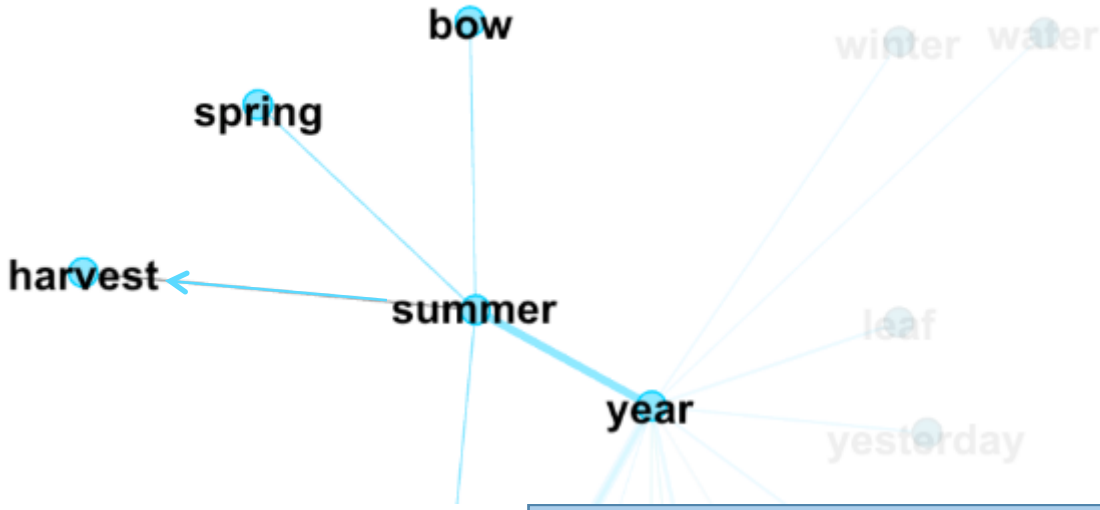
The semantic extension of time-related lexemes

Language-specific colexification patterns

- The material allows us to add new polysemy patterns, and to provide a diachronic account
  - **SUMMER?**

Metonymy

HARVEST



The semantic extension of time-related lexemes

Language-specific colexification patterns

- The material allows us to highlight unexpected pathways of change:
  - **From temporal proximity to spatial proximity**

- **What about the TIME IS SPACE Metaphor?**

  - (Cross-linguistically Time to Space transfers are extremely rare; cf. French depuis; Haspelmath 1997)

The semantic extension of time-related lexemes

Ancient Egyptian

Peasant, B1, 103-104

(7)

m	***rk***	*ḥm-f*	*nswt-bity*	*nb-kꜣw-r^{c}*
in	**time**	Majesty-3SG.M	King of U. and L. Egypt	Nebkaure

‘(Now, the peasant spoke these word) **during the time** of his Majesty, the King of Upper and Lower Egypt, Nebkaure (the justified)’ (= Parkinson 1991: 19)

Approx. **1400 BC**

(8)

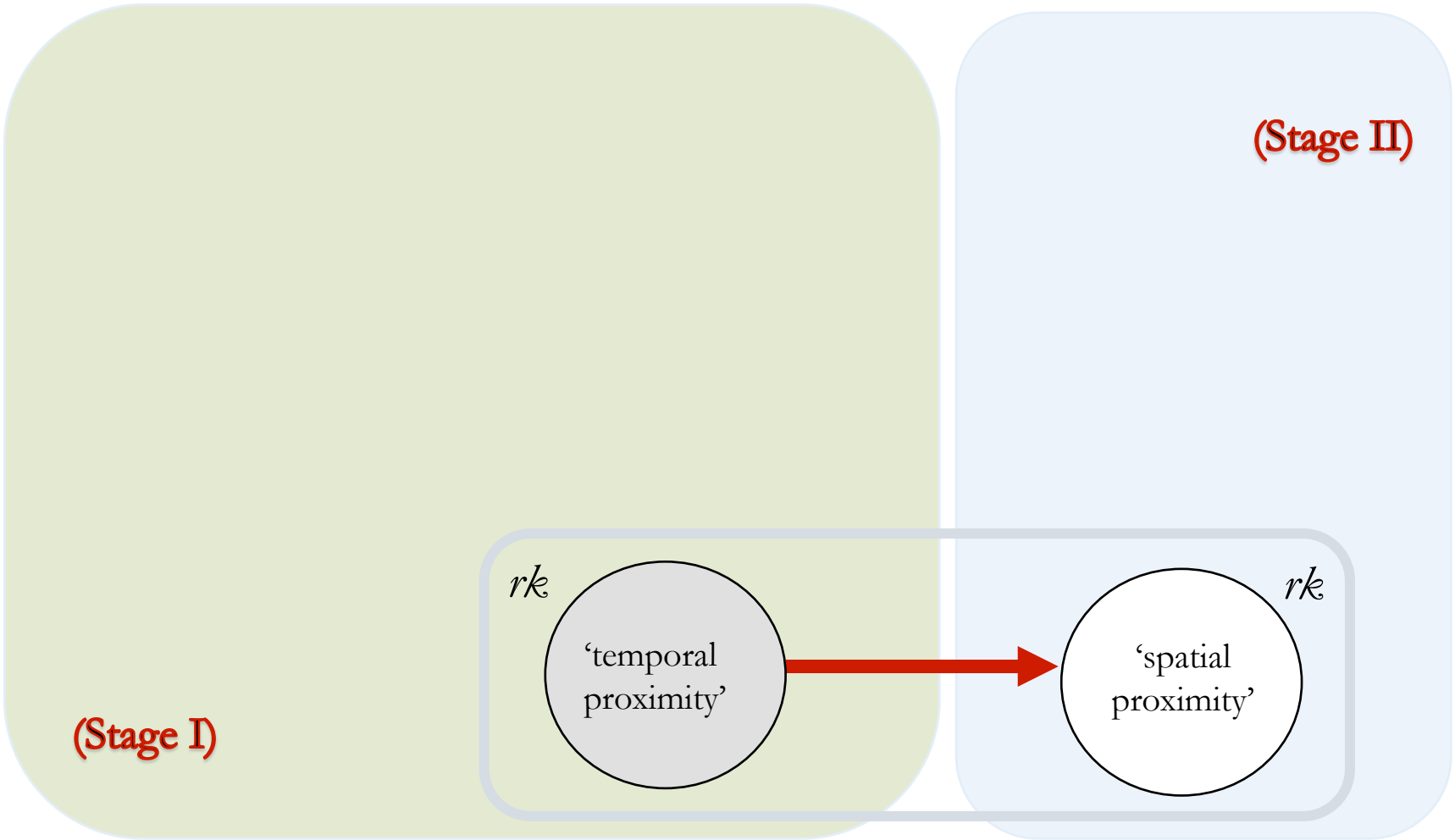
sbty	*ḏr*	***m***	***rk***	*mš^{c}-f*	(= K*RI* II, 6,8)
rampart	strong	**in**	**proximity**	army-3SG.M	

(speaking of the King who is)
‘A strong rampart around his army, (their shield in the day of fighting)’

Approx. **1250 BC**

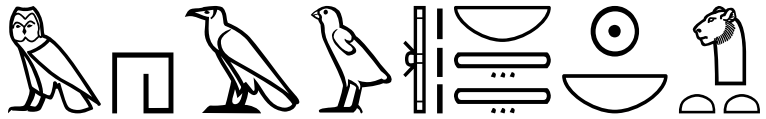
The semantic extension of time-related lexemes

Ancient Egyptian



The semantic extension of time-related lexemes

Ancient Egyptian



Biography of Ahmose, 5

(9) ***m*** ***ḥ³w*** *nb* *t³-wj* *nb-pḥ.tj-r^{c}*

in **prox-time** lord land-DU Nebphtire

(And then I became a soldier (…),)
'**during the time** of the lord of the Two Lands, Nebpehtire (justified, when I was a young man, not having a wife yet)' (= *Urk.* IV, 2,13)

Sinuhe, B8

(10) ***m*** ***ḥ³w*** *nh.t*

in **prox-space** Sycamore

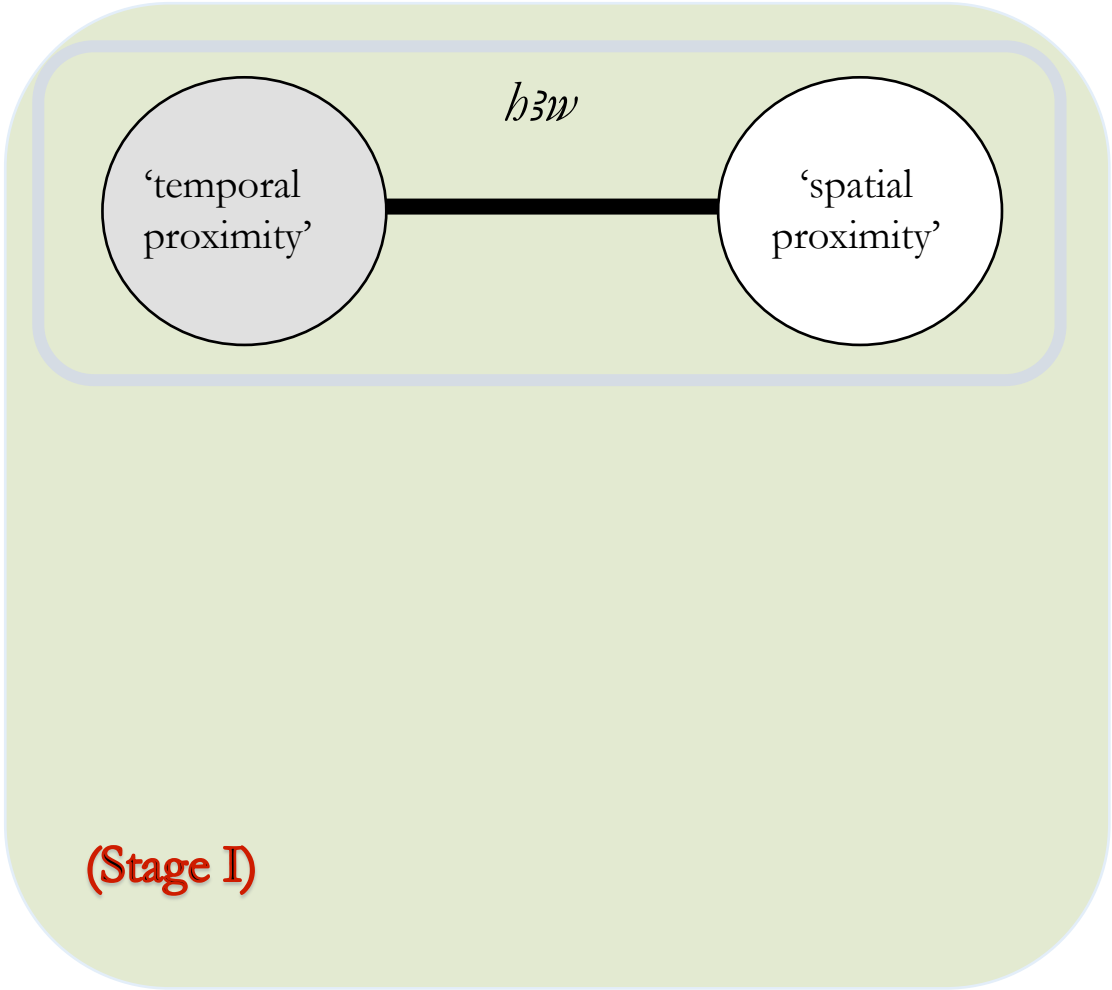
'(I crossed the place called The Two Truths,) **in the vicinity** of The Sycamore" (and I landed at The Island of Snefru)' (= Koch 1990: 14)

Approx. **1350 BC**

Approx. **1500 BC**

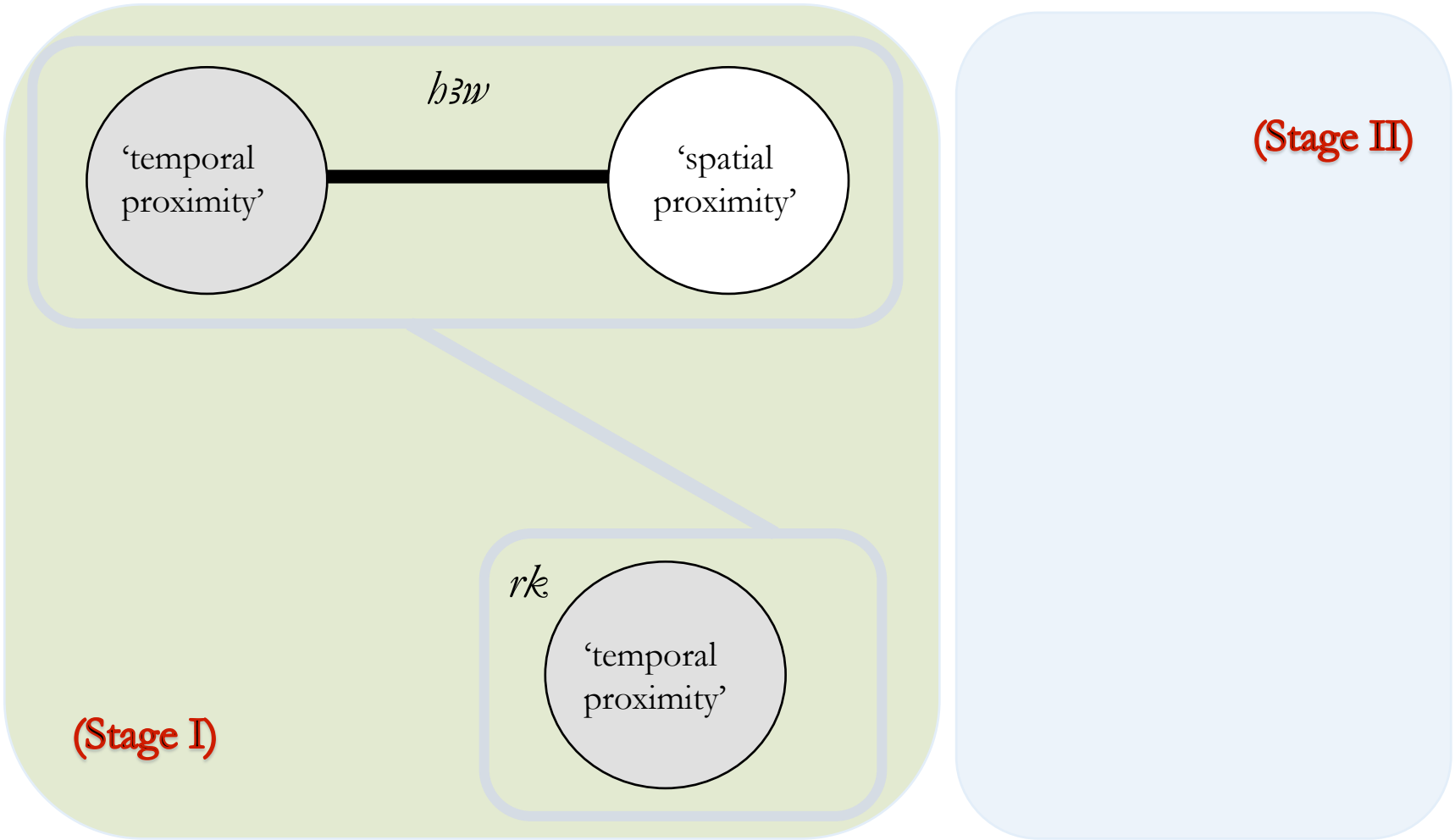
The semantic extension of time-related lexemes

Ancient Egyptian



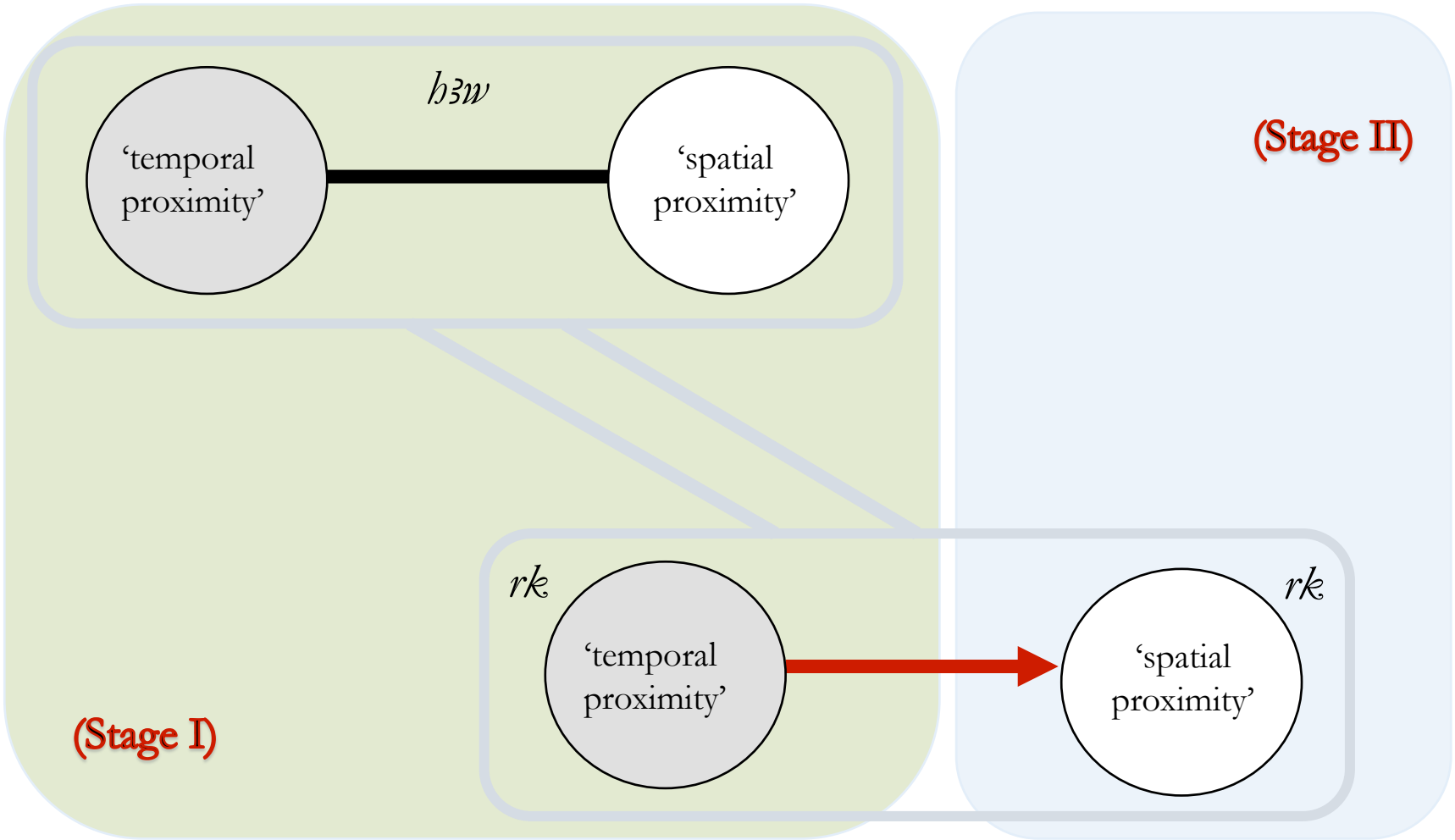
The semantic extension of time-related lexemes

Ancient Egyptian



The semantic extension of time-related lexemes

Ancient Egyptian



The semantic extension of time-related lexemes

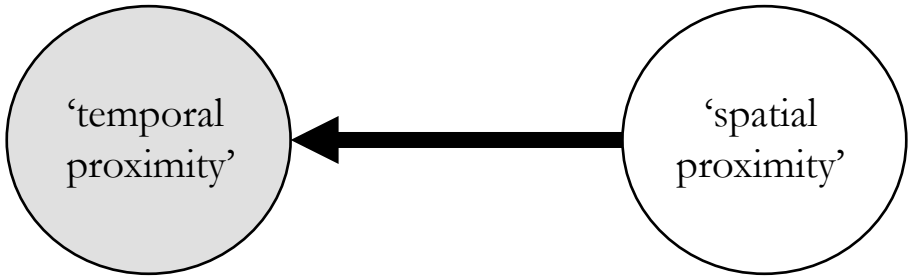
Language-specific colexification patterns

From undirected

The semantic extension of time-related lexemes

Language-specific colexification patterns

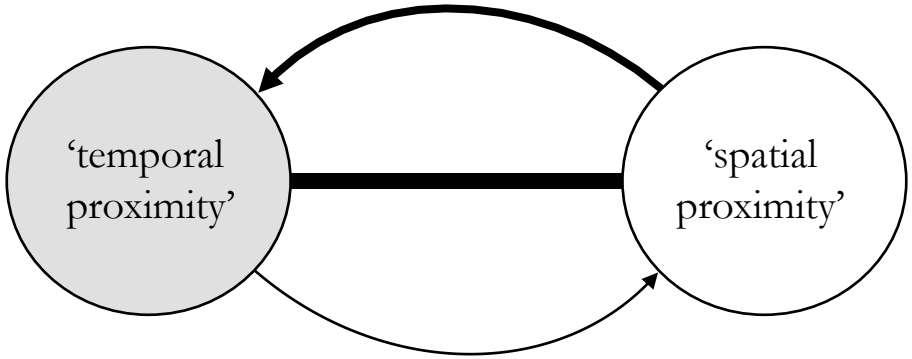
From undirected > to directed



The semantic extension of time-related lexemes

Language-specific colexification patterns

From undirected > to directed > to mixed graphs



Case-study 2
Semantic maps for areal lexical typology?

The verbs of perception and cognition

Perception and Cognition

Choice of concepts

- Perception and cognition are among the basic concepts that are lexicalized in the languages of the world (e.g. Swadesh 1952)

- The domain is well studied: our results can be compared (e.g. Sweetser 1990; Evans & Wilkins 2000; Vanhove 2008)

- The literature has revealed both universal and culture-specific patterns

Perception and Cognition

Verbs of perception & cognition

Semantic extensions

Intrafield (= *Intradomain*)
(senses: same semantic field)

Interfield (= *Interdomain/ Transfield*)
(senses: different semantic field)

(based on Wilkins 1996: 274; cf. Matisoff 1978)

Perception and Cognition

Verbs of perception & cognition

Intrafield extensions

sight > hearing > touch > { smell / taste }

Figure. Vibergs sense modality hierarchy for semantic extensions and polysemies of perception verbs
(Viberg 1984: 136)

Table. Inventories of the verbs of perception
(Viberg 1984: 140)

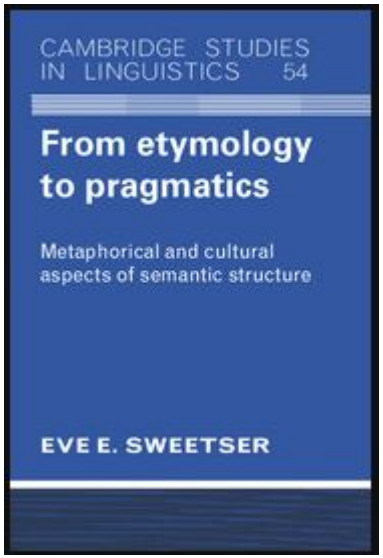
Walbiri (West Australia) Source: Hale 1971: 478		Djaru (West Australia) Tasaku 1981: 418		Lesghian (East Caucasus) Dixon 1979: note 54	
nja-	'to see'	nyang-	'see/ look'	akun	'see/look'
puḍa-nja-	'to hear, to feel'	pura-nyang-	'hear/ listen'	van akun	'hear/listen'
paṇṭi-nja-	'to smell'				

Perception and Cognition

Interfield extensions

M i n d - a s - b o d y - Metaphor:

The internal self is understood in terms of the bodily external self (Sweetser 1990: 45)



- **Common cross-linguistically (if not universal)**: the connection between VISION and KNOWLEDGE (Sweetser 1990: 45)

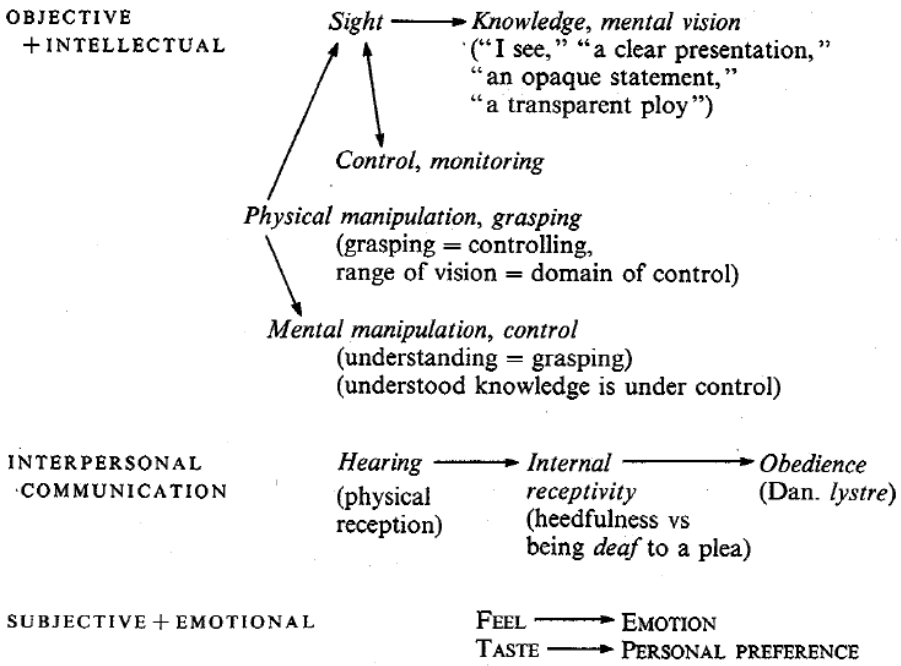


Figure. The structure of our metaphors of perception (Sweetser 1990: 38)

Perception and Cognition

- Convenience sample: Central, East and North European languages
- Case study: Auditory and visual perception
  - *Opportunistic perception verbs* = *non-controlled experience* (e.g., hear)
  - *Explorative perception verbs* = *controlled activity* (e.g., listen)
- Goal: how the encoding of a specificity distinction may differ cross-linguistically.
  - (Probably a) typological rarum
  - But particular areal feature for Baltic languages
- Method: probabilistic semantic maps based on parallel corpora

Perception and Cognition

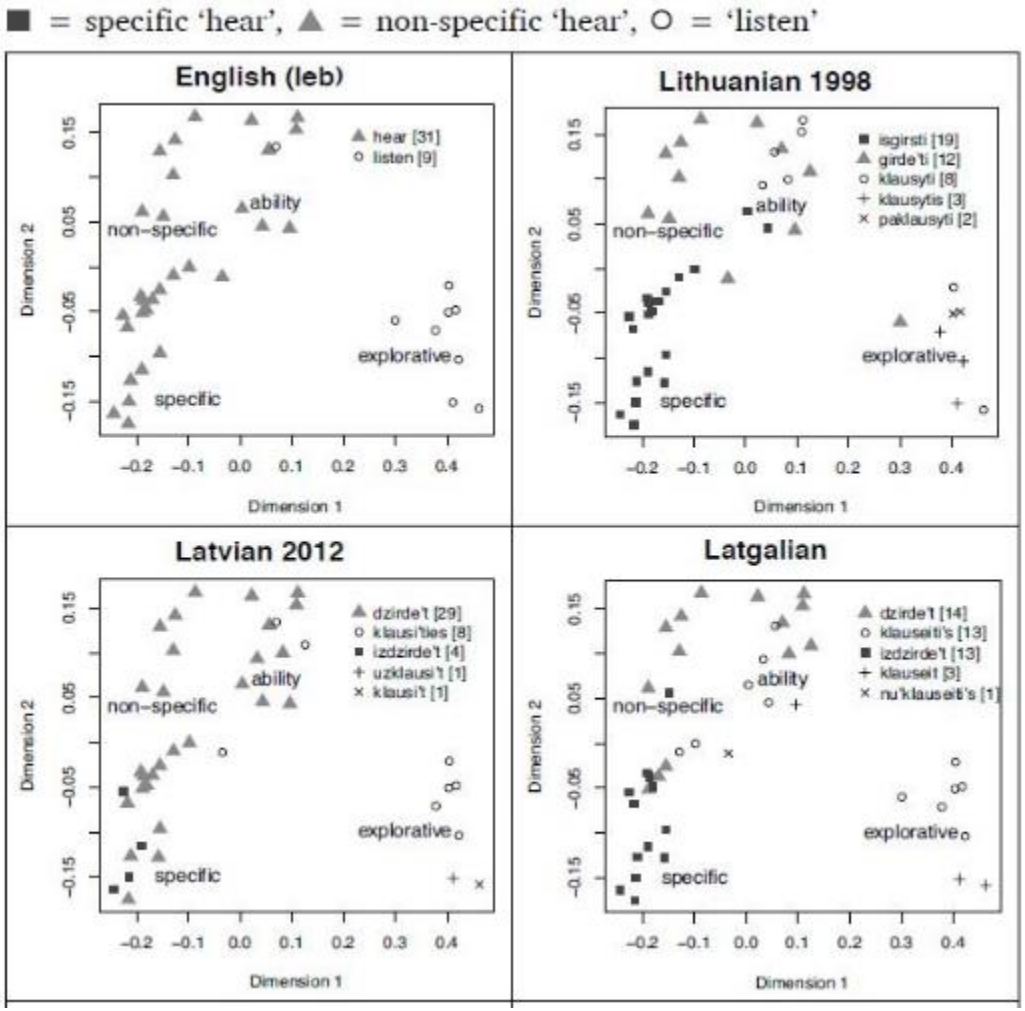
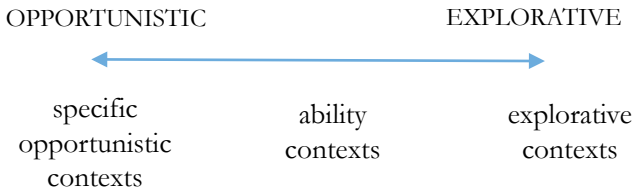


Figure. Probabilistic semantic map of 44 auditory contexts in *Mark* based on 64 doculects in English (leb), Lithuanian (1998), Latgalian and Latvian (2012) (Wälchli 2016: 77)



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Non-specific, specific and obscured perception verbs in Baltic languages

BERNHARD WÄLCHLI
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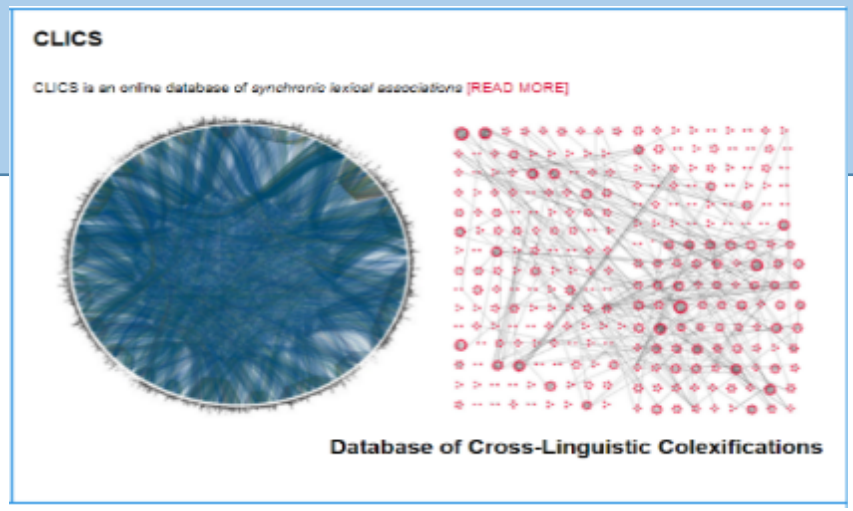
Perception and Cognition



- *N* of lgs: 221
- *N* of lg families: 64
- *N* of concepts: 1280

Meaning 1	Meaning 2	*N of language*	*N of forms*	language:form
see	know	5	6	aro_std:[ba]//ayo_std:[iˈmoʔ]//haw_std:[ʔike]//mcq_std:[ɓanahe]//mri_std:[kitea]//tel_std:[aarayu]//tel_std:[arayu]
see	find	15	23	agr_std:[wainat]//arn_std:[pe]//con_std:[ˈatʰeye]//cwg_std:[yow]//emp_std:[uˈnu]//kgp_std:[we]//kpv_std:[addzɪnɪ]//kyh_std:[mah]//mca_std:[wen]//mri_std:[kitea]//oym_std:[ɛsa]//pbb_std:[uy]//plt_std:[mahìta]//pui_std:[duk]//ray_std:[tikeʔa]//rtm_std:[ræe]//sap_Enlhet:[neŋwetayˀ]//sei_std:[aʔo]//shb_std:[taa]//sja_std:[unu]//swh_std:[ona]//tbc_std:[le]//yag_std:[tiki]
see	get, obtain	6	6	kgp_std:[we]//mbc_std:[eraʔma]//pbb_std:[uy]//sap_Standard:[akwitayi]//srq_std:[tea]//udi_std:[акъсун]

Polysemy data from CLiCs (http://clics.lingpy.org/download.php) (List et al. 2014)

Perception and Cognition

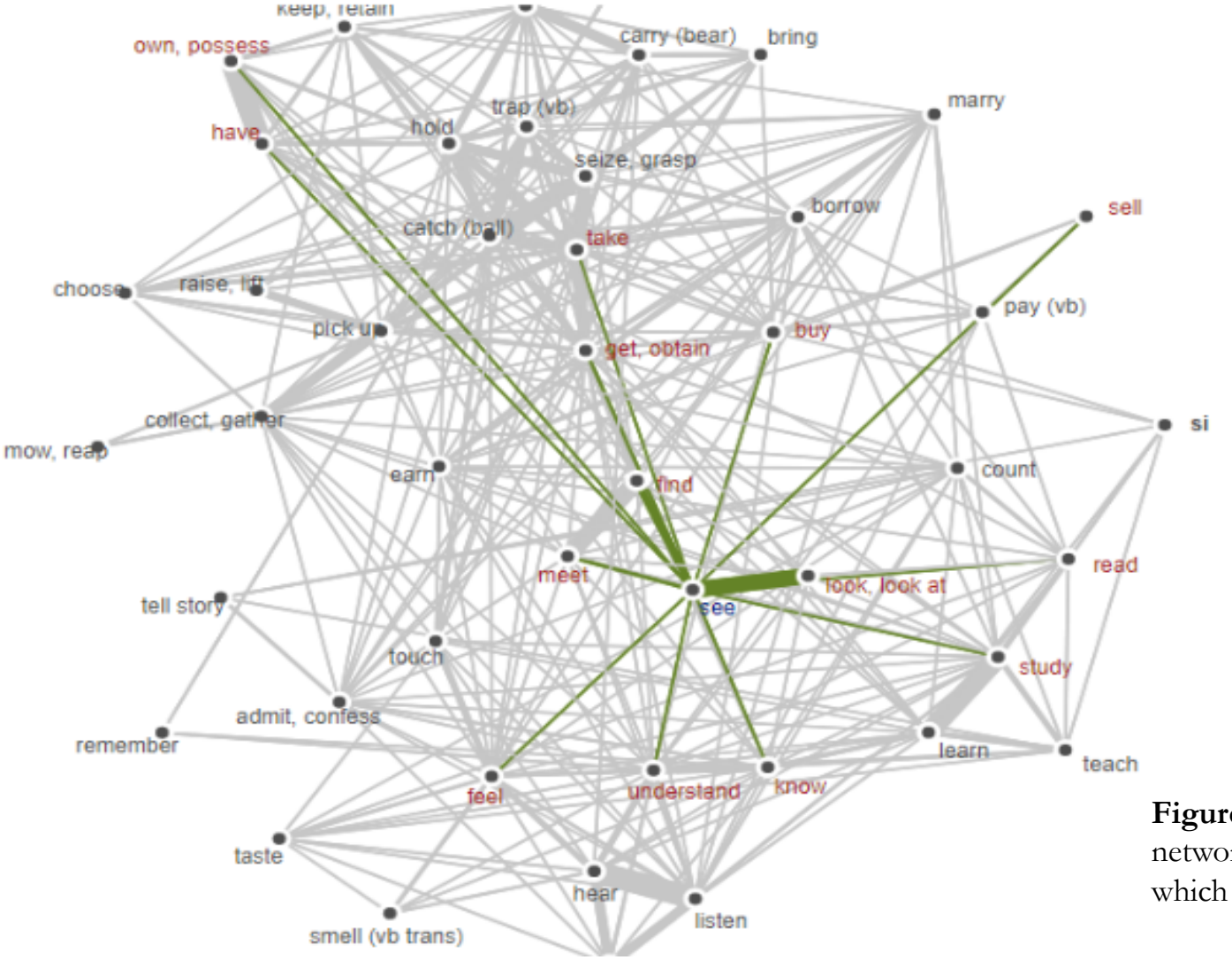
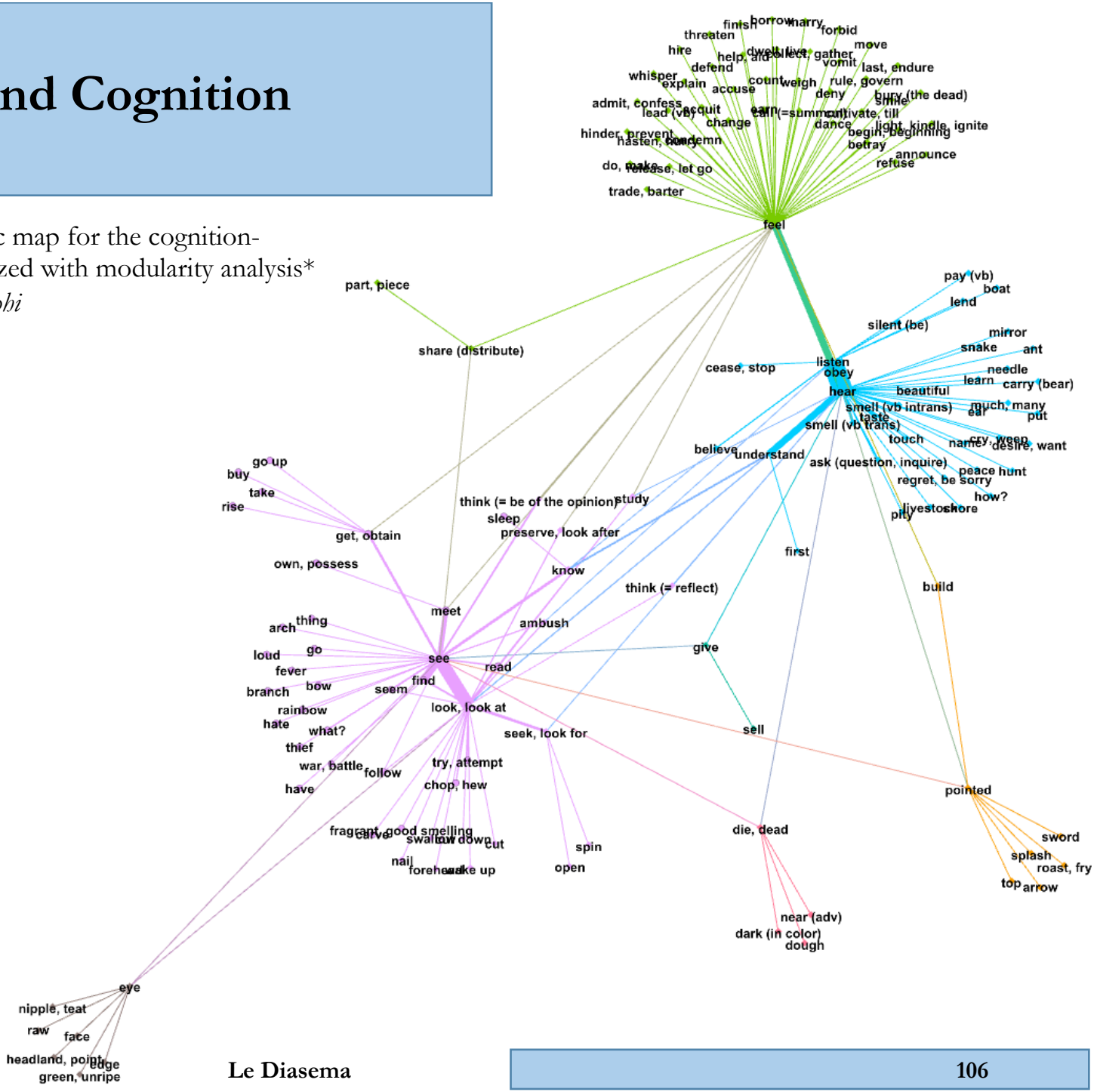


Figure. Complete sub-network in CLICS of which SEE is part

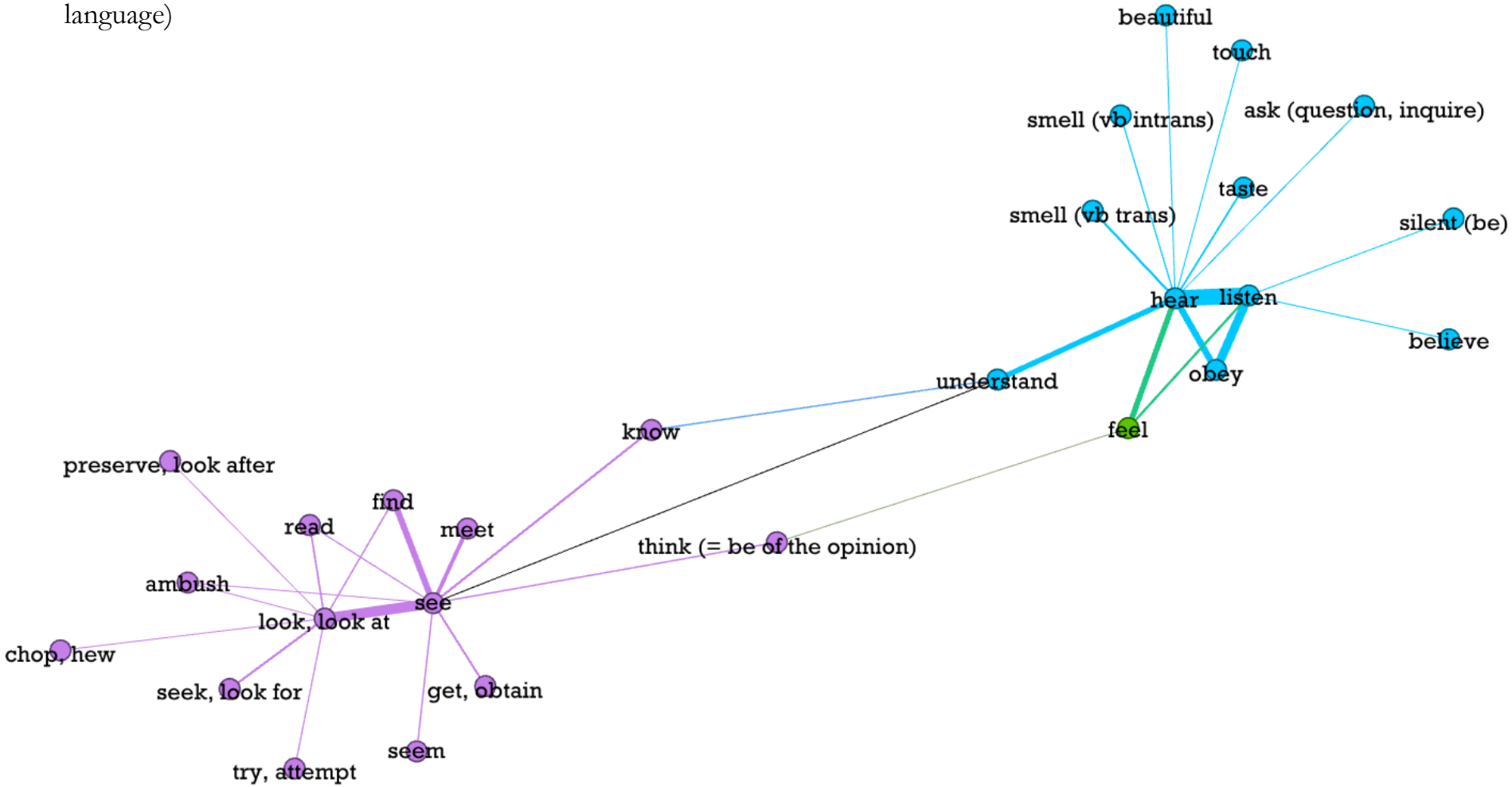
Perception and Cognition

Figure. Weighted semantic map for the cognition-perception domain, visualized with modularity analysis* (Blondel et al. 2008) in *Gephi*



Perception and Cognition

Figure. Weighted semantic map for the cognition-perception domain (polysemy patterns in more than 1 language)

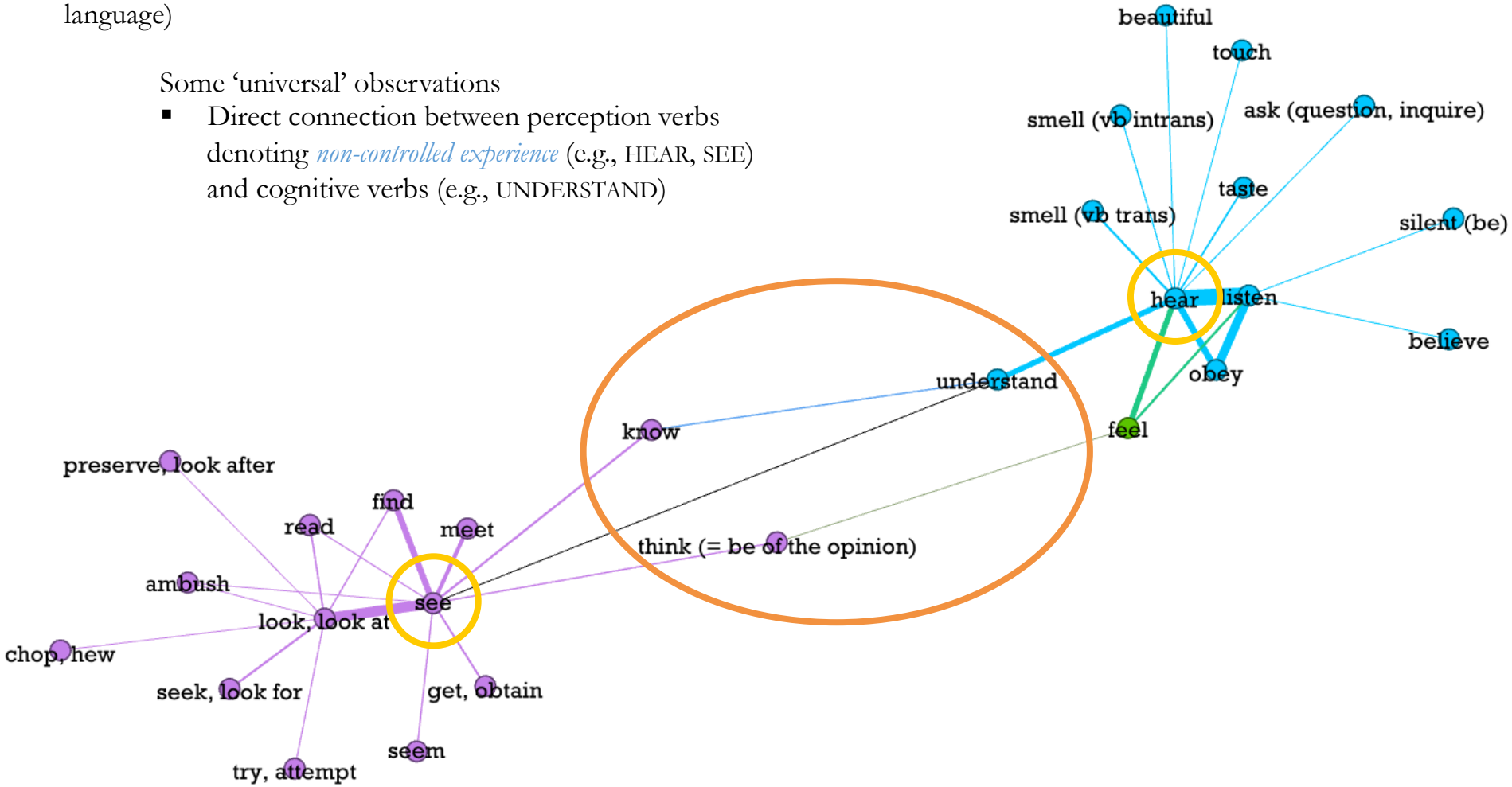


Perception and Cognition

Figure. Weighted semantic map for the cognition-perception domain (polysemy patterns in more than 1 language)

Some 'universal' observations

- Direct connection between perception verbs denoting *non-controlled experience* (e.g., HEAR, SEE) and cognitive verbs (e.g., UNDERSTAND)



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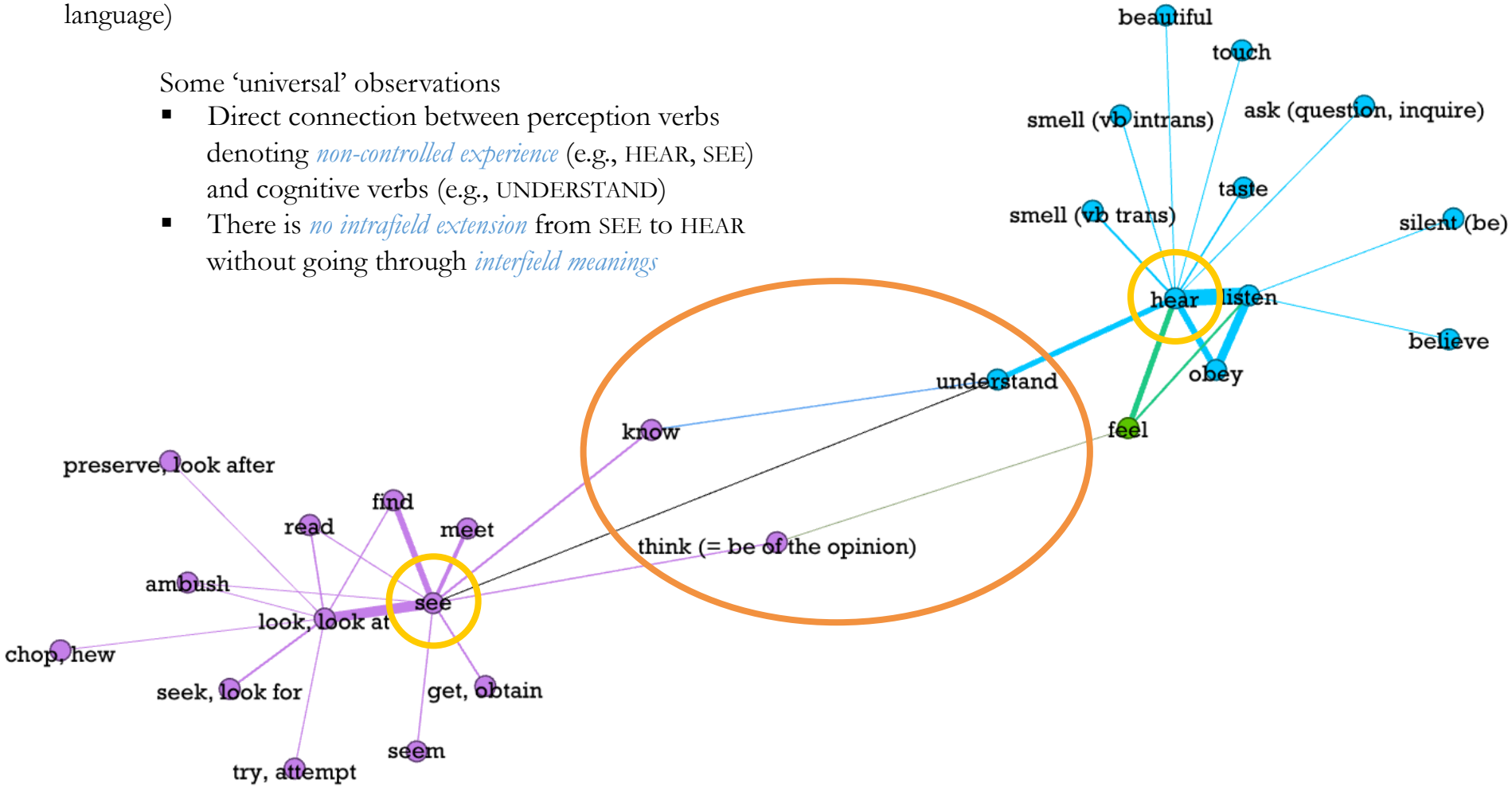

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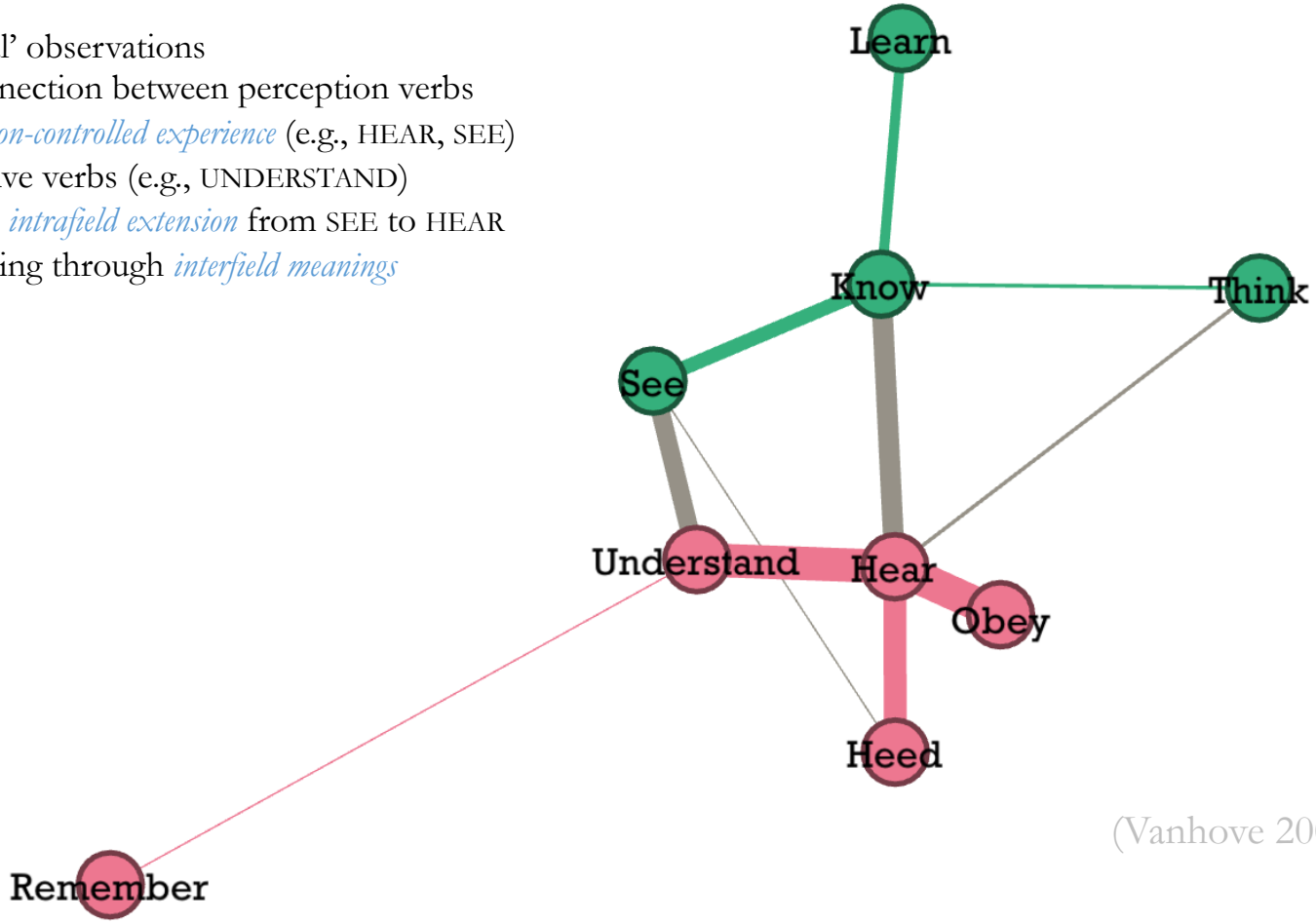

(Vanhove 2008)

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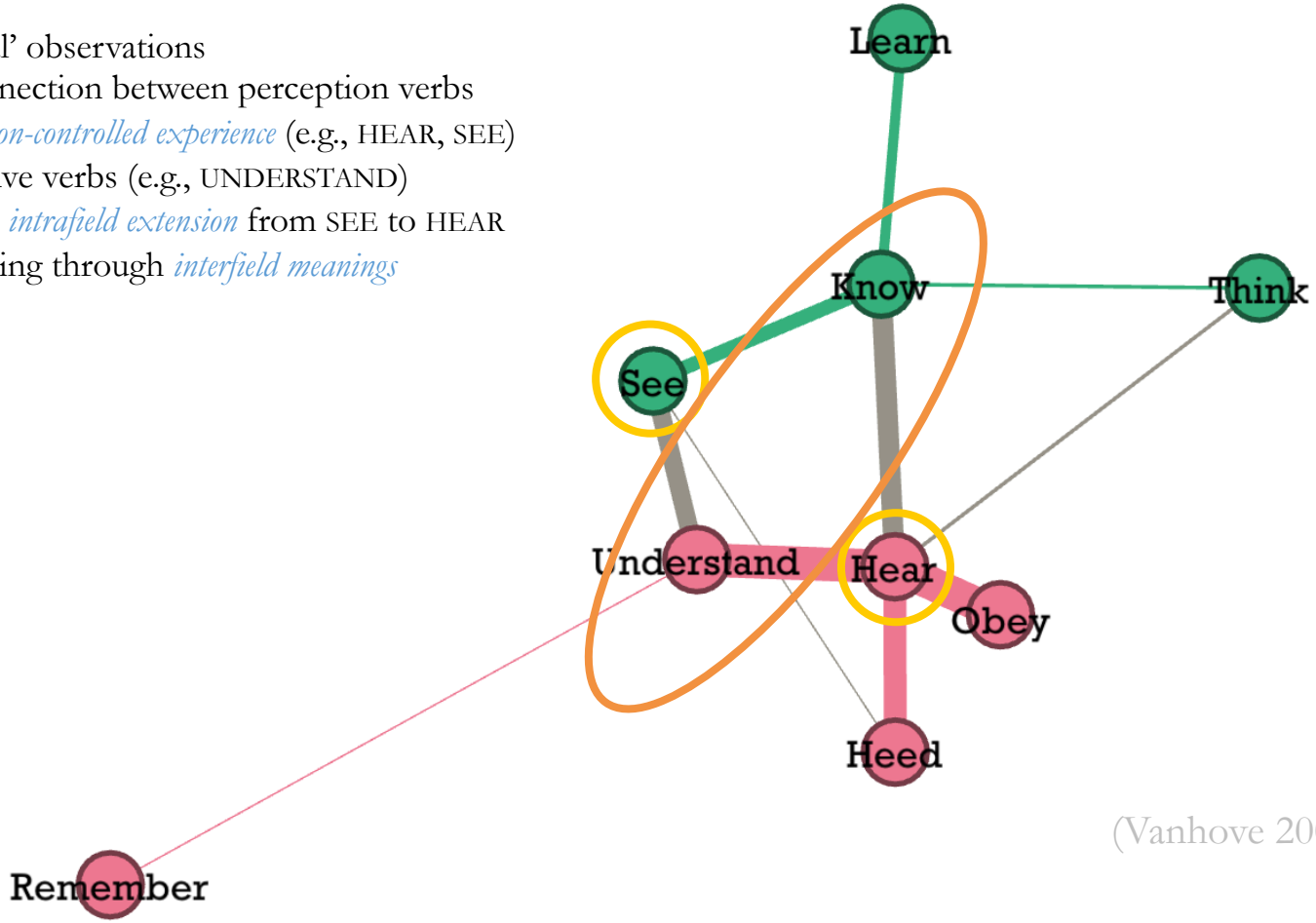

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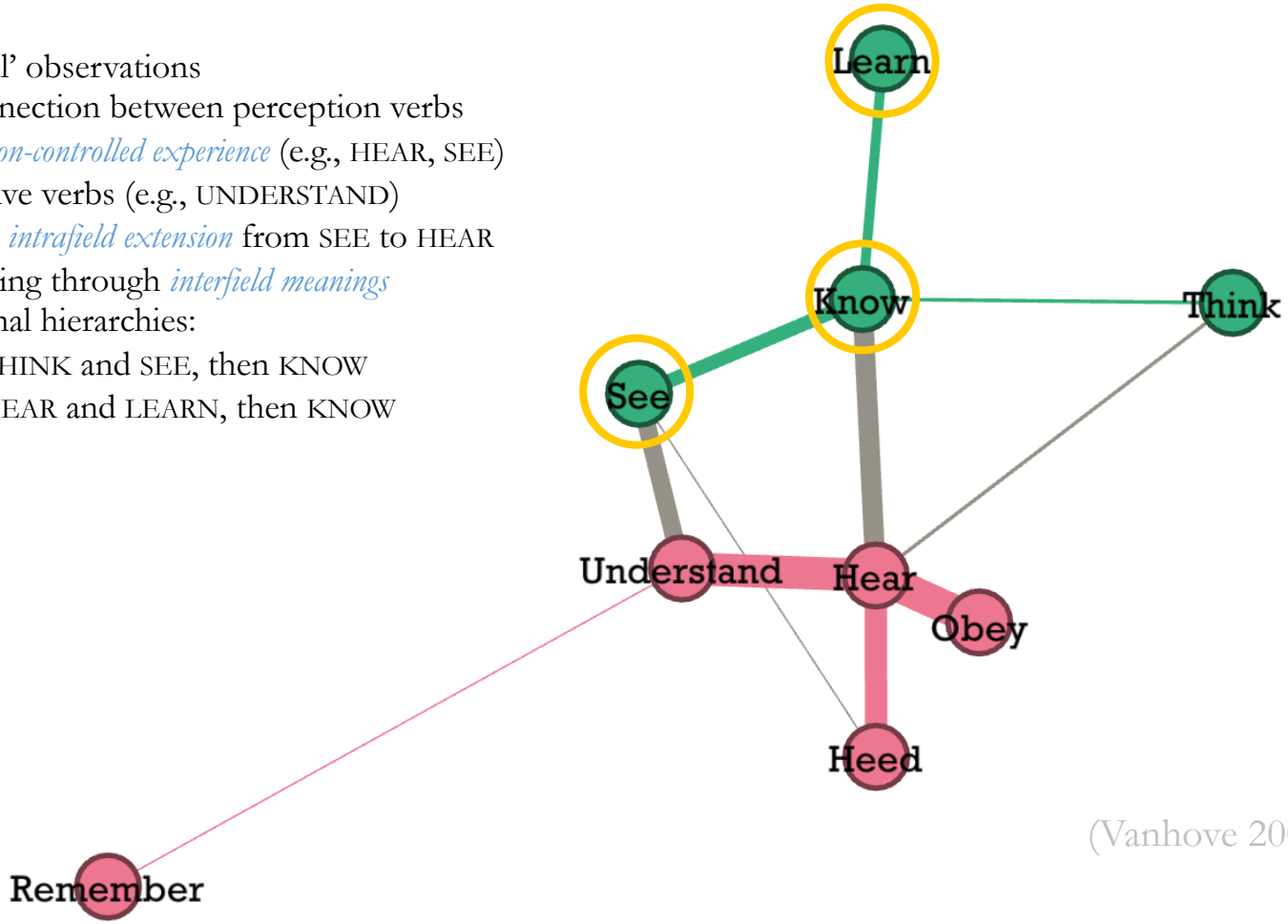
  - If THINK and SEE, then KNOW
  - If HEAR and LEARN, then KNOW



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Perception and Cognition

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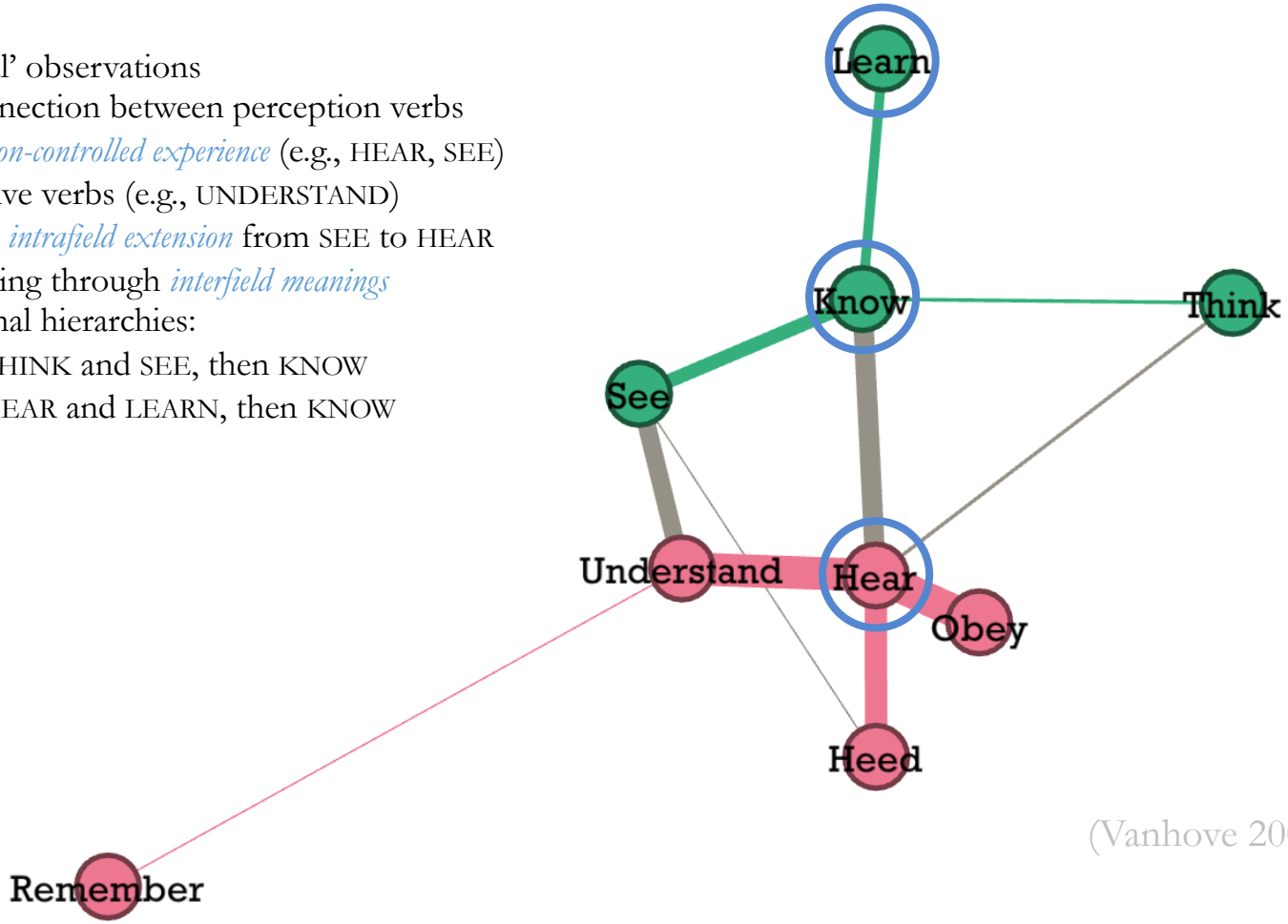

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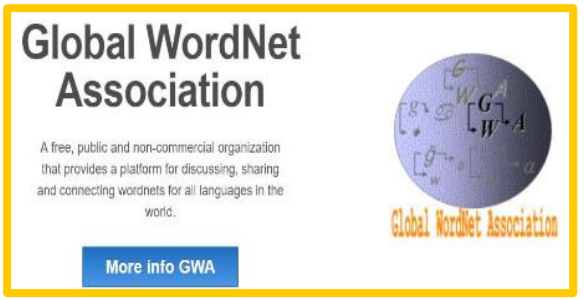

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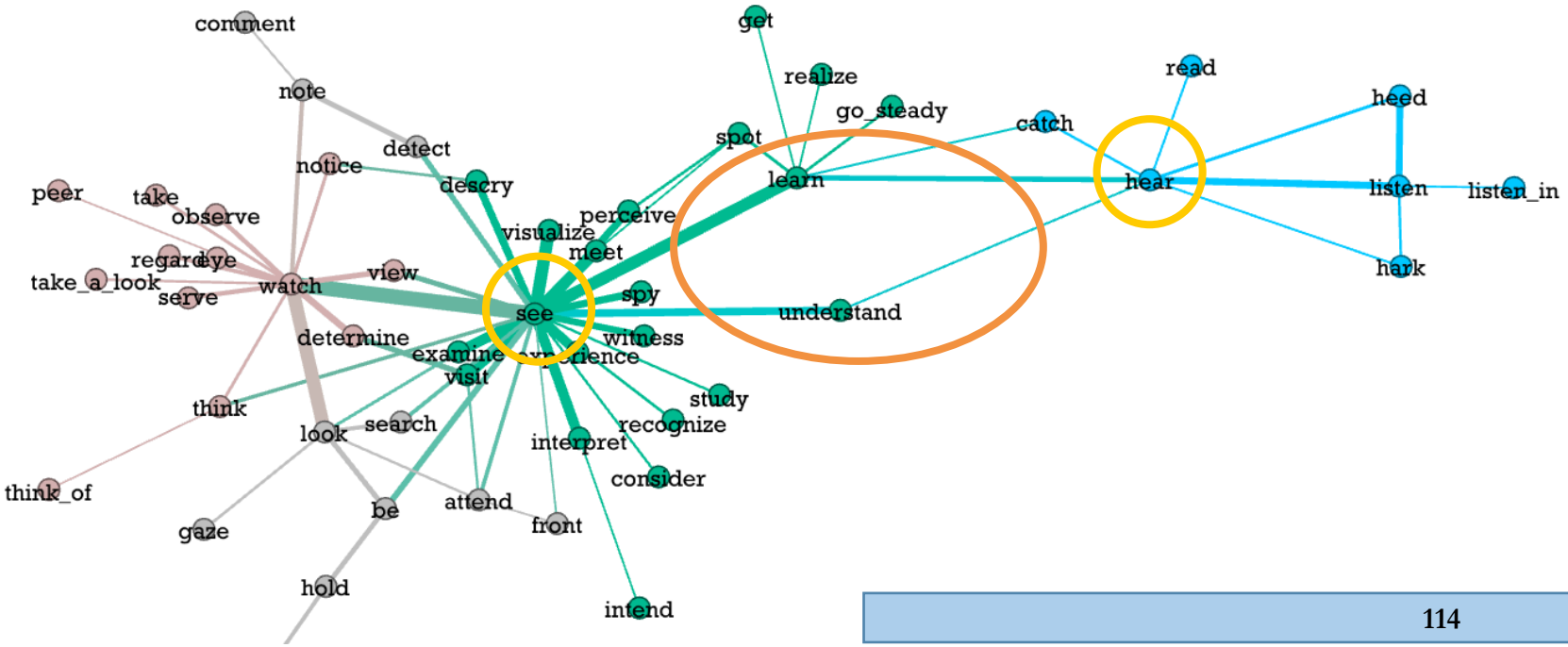

Perception and Cognition

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```
1 < 8 > learn listen ==> hear;
2 < 4 > learn read ==> hear;
3 < 4 > listen read ==> hear;
4 < 2 > listen spot ==> hear learn read hark listen_in heed;
5 < 3 > read spot ==> hear;
6 < 2 > hear learn read spot ==> listen hark listen_in heed;
7 < 14 > learn understand ==> see visualize examine;
8 < 3 > listen understand ==> hear;
9 < 5 > spot understand ==> perceive see visualize watch;
10 < 9 > learn perceive ==> see;
11 < 1 > read perceive ==> hear spot;
12 < 1 > hear spot perceive ==> read;
13 < 8 > understand perceive ==> see visualize watch;
14 < 3 > hear interpret ==> understand;
15 < 32 > learn interpret ==> see meet;
16 < 1 > listen interpret ==> hear understand intend;
17 < 3 > spot interpret ==> learn see meet watch visit;
18 < 5 > perceive interpret ==> learn see meet watch visit;
19 < 1 > hear see ==> learn understand perceive interpret determine get catch visualize realize meet experience examine wa
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Perception and Cognition

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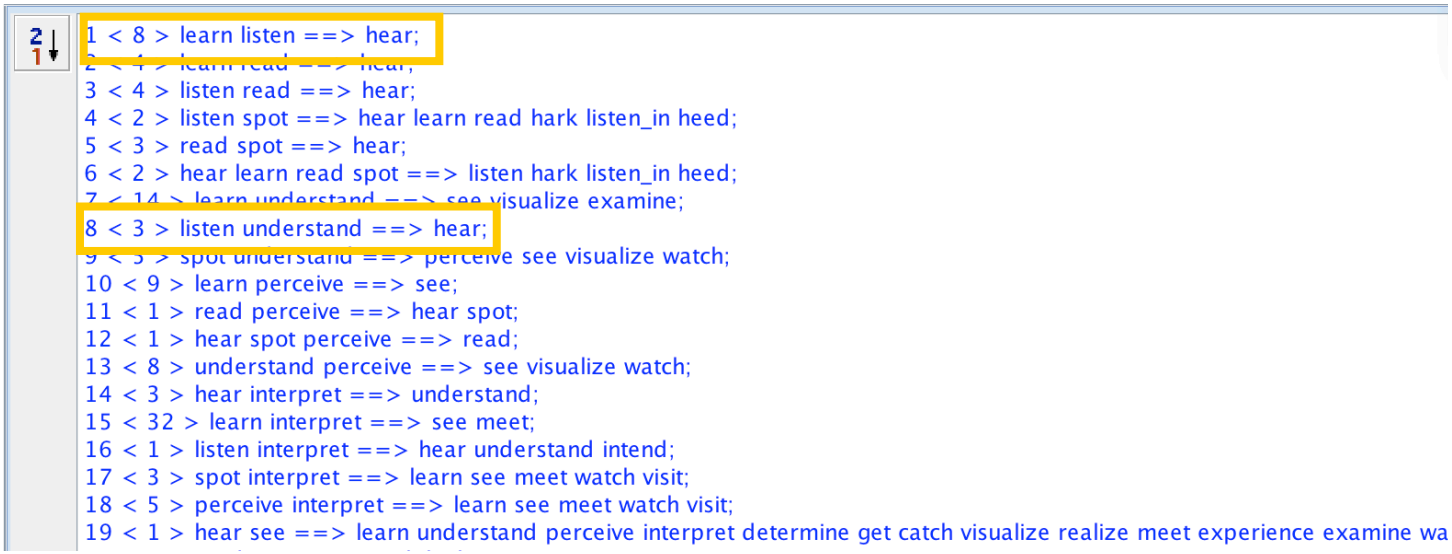

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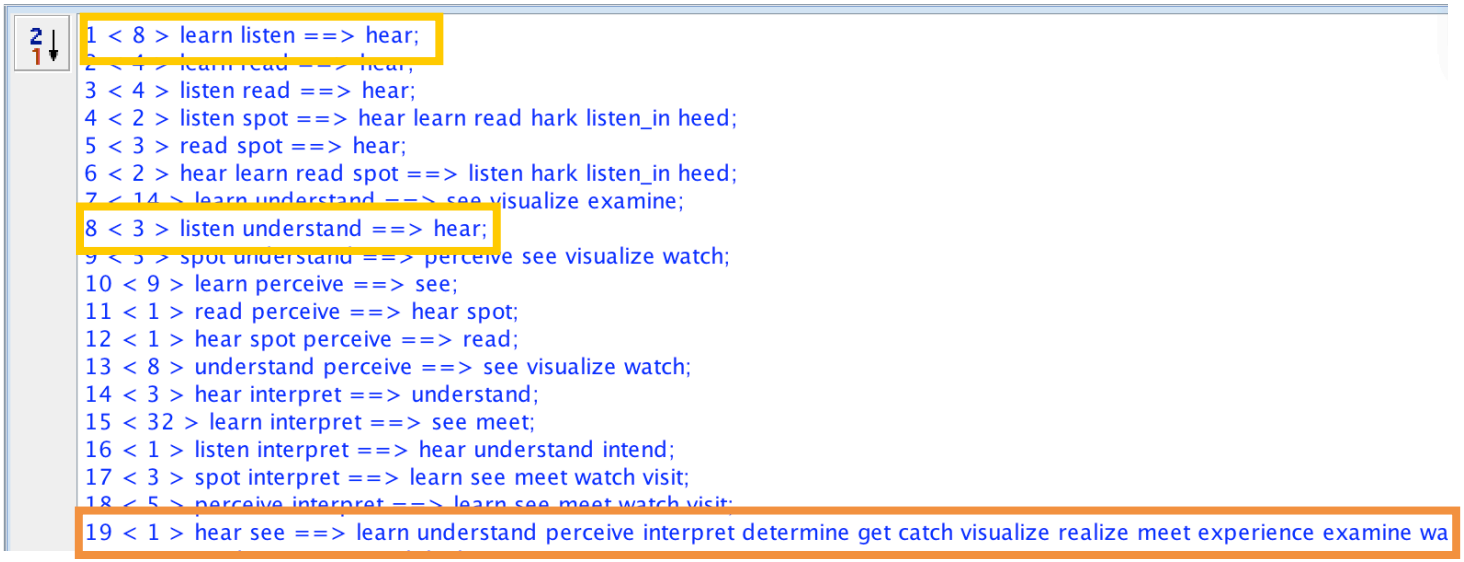
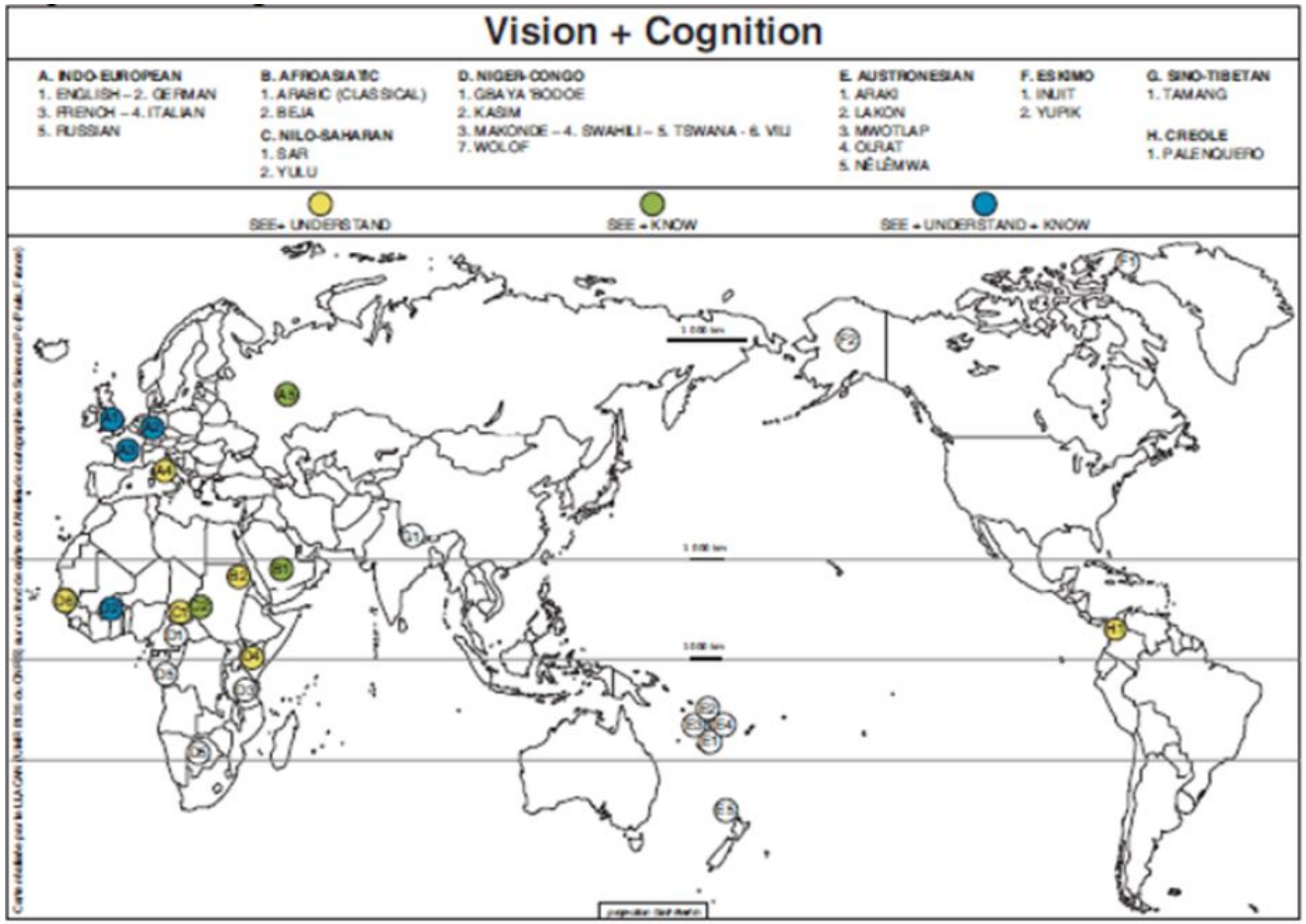


Perception and Cognition

Areal patterns (Vanhove 2008)



Perception and Cognition

Areal patterns

- A general approach: scatter plot of the CLICS data (2D t-SNE)

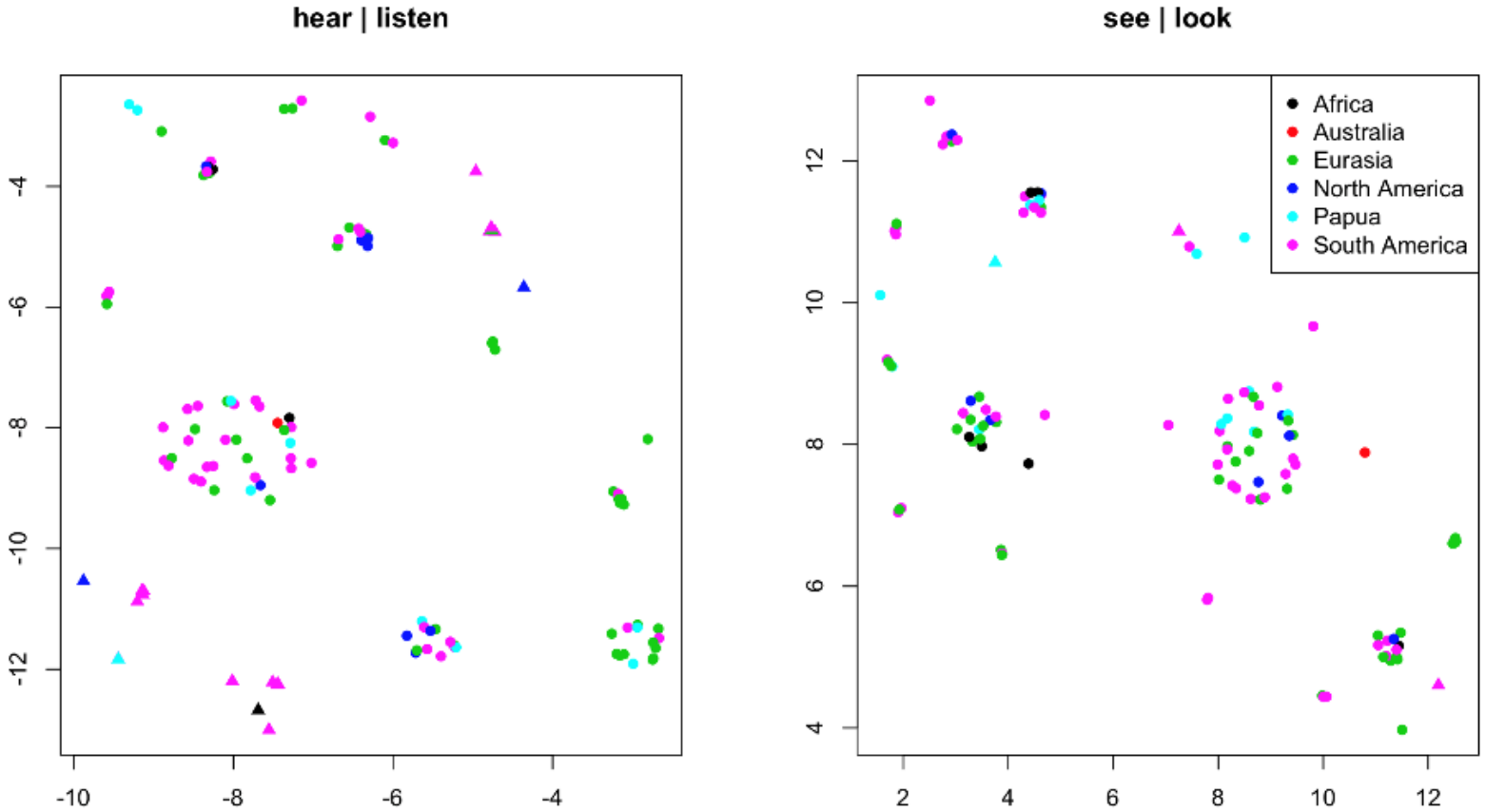
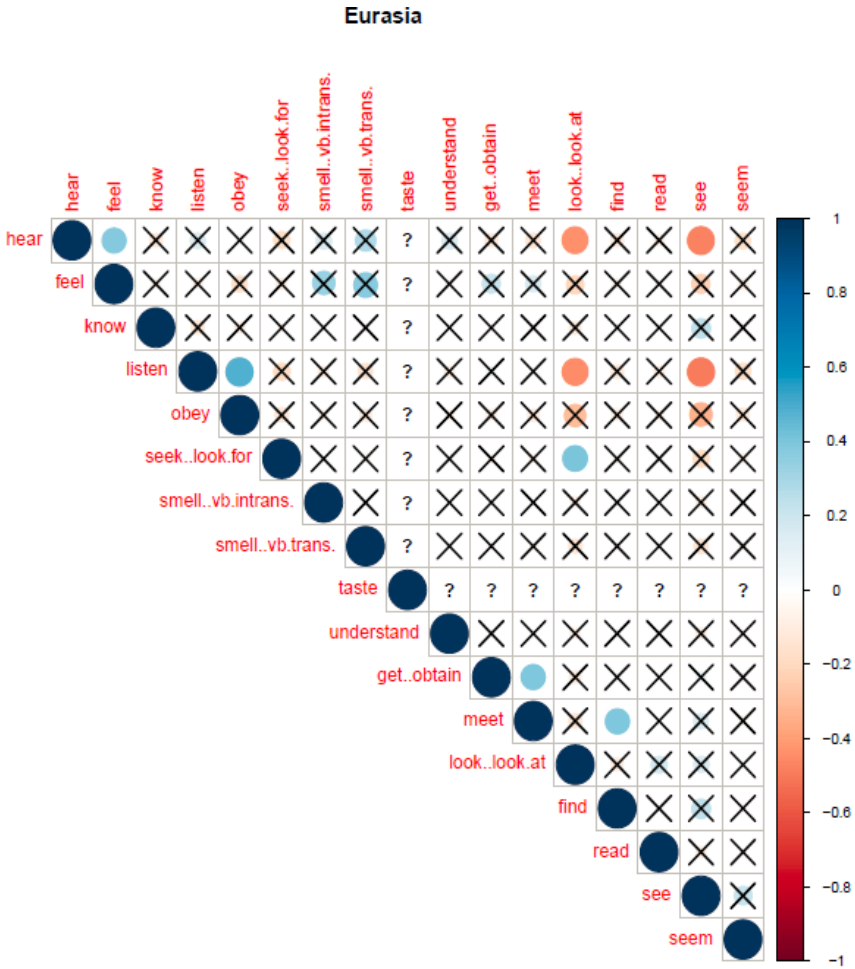


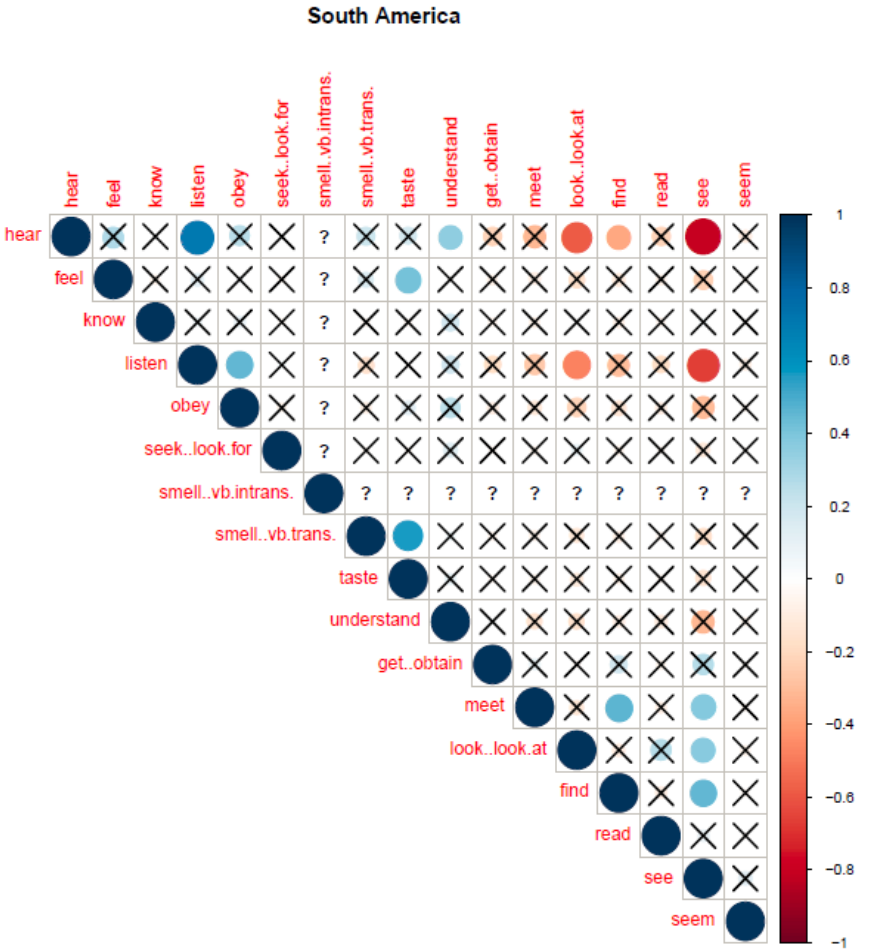
Figure. A 2D t-SNE projection of the polysemy patterns of verbs with meanings HEAR or LISTEN and SEE or LOOK from the CLICS dataset

Perception and Cognition

Areal patterns

- Corrplot: Eurasia vs South America





Perception and Cognition

Areal patterns

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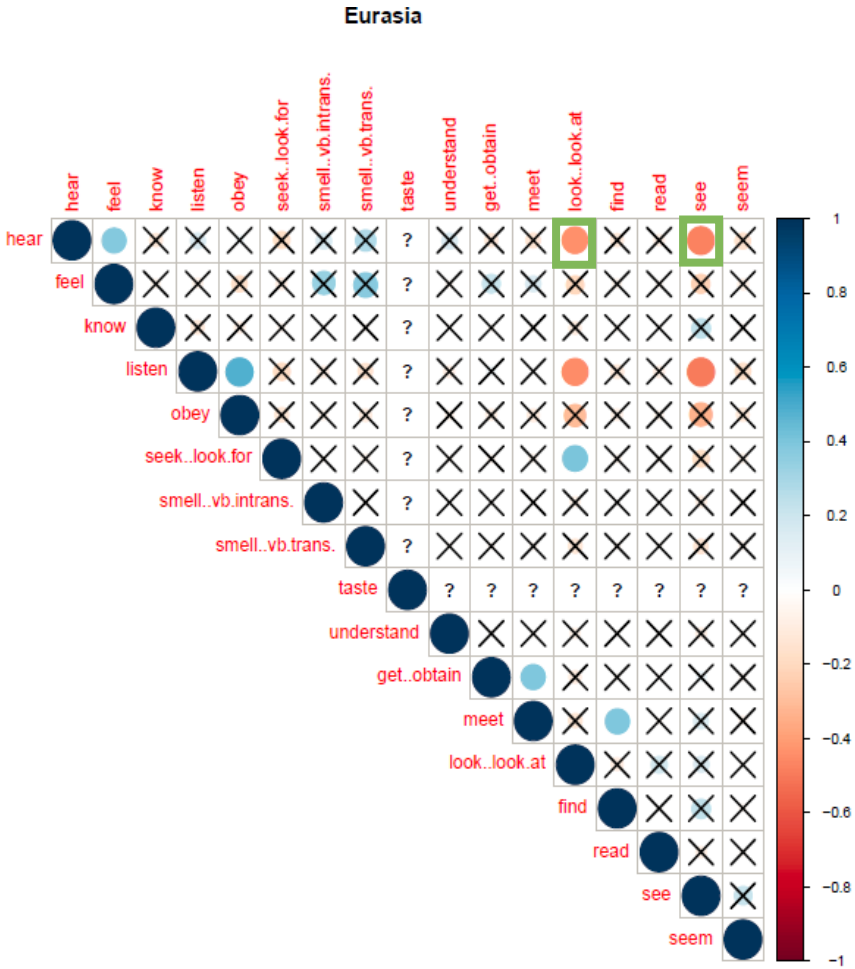

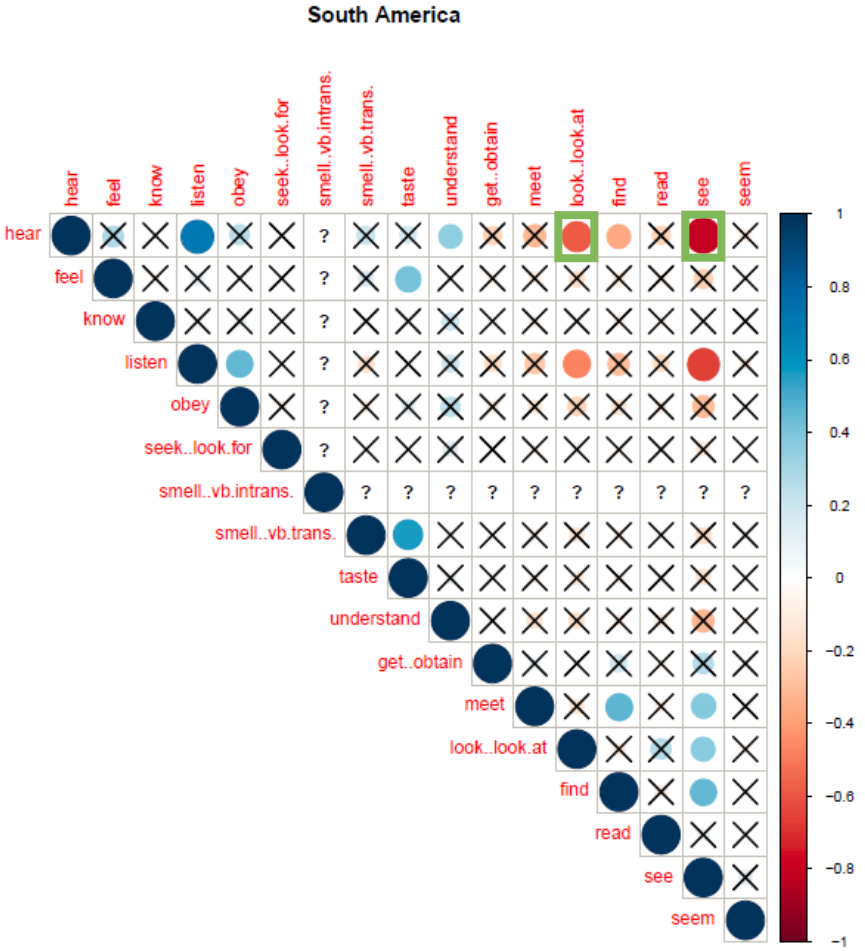

Perception and Cognition

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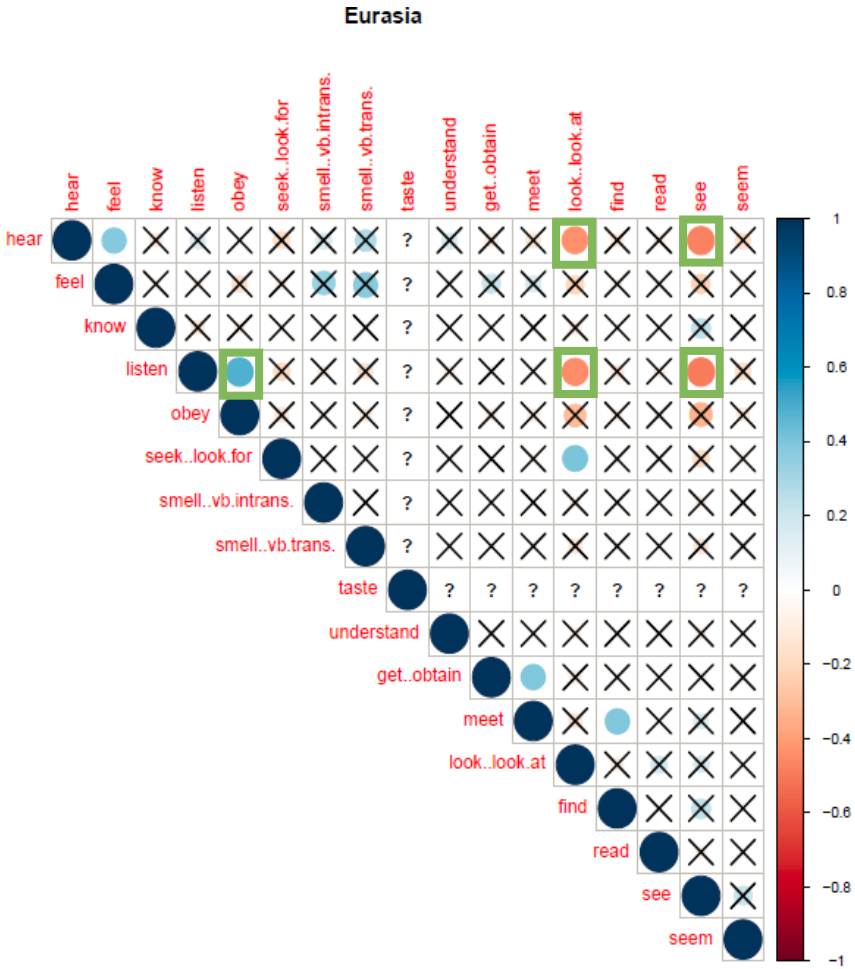

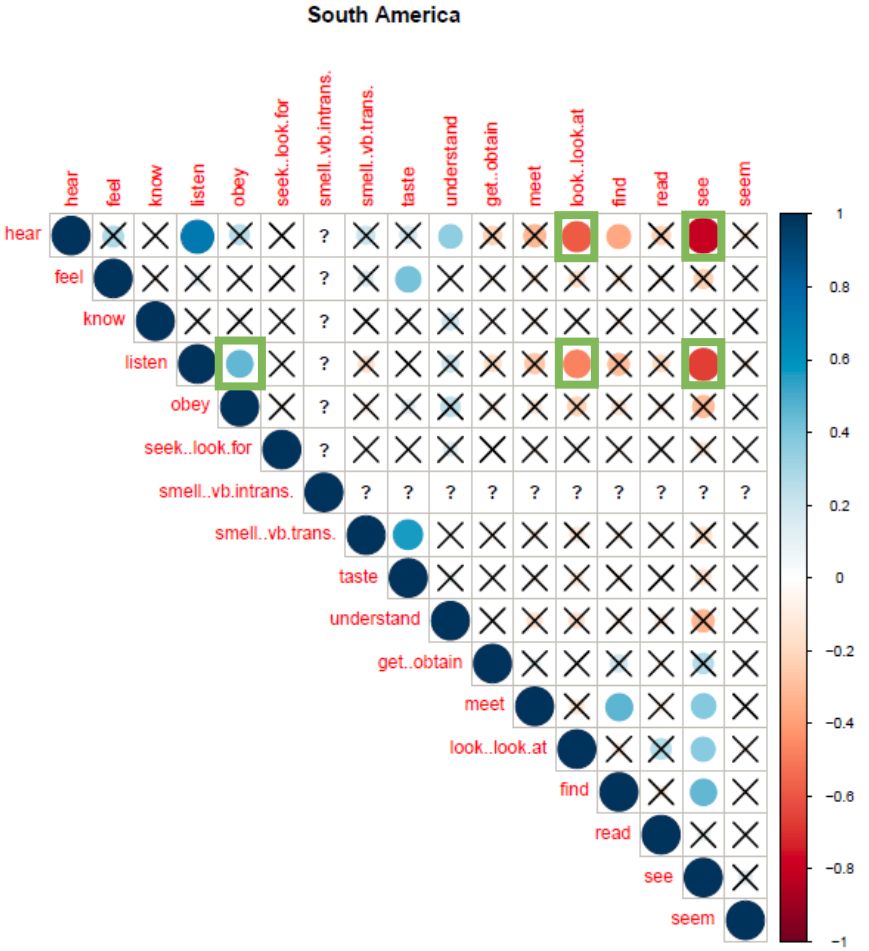

Perception and Cognition

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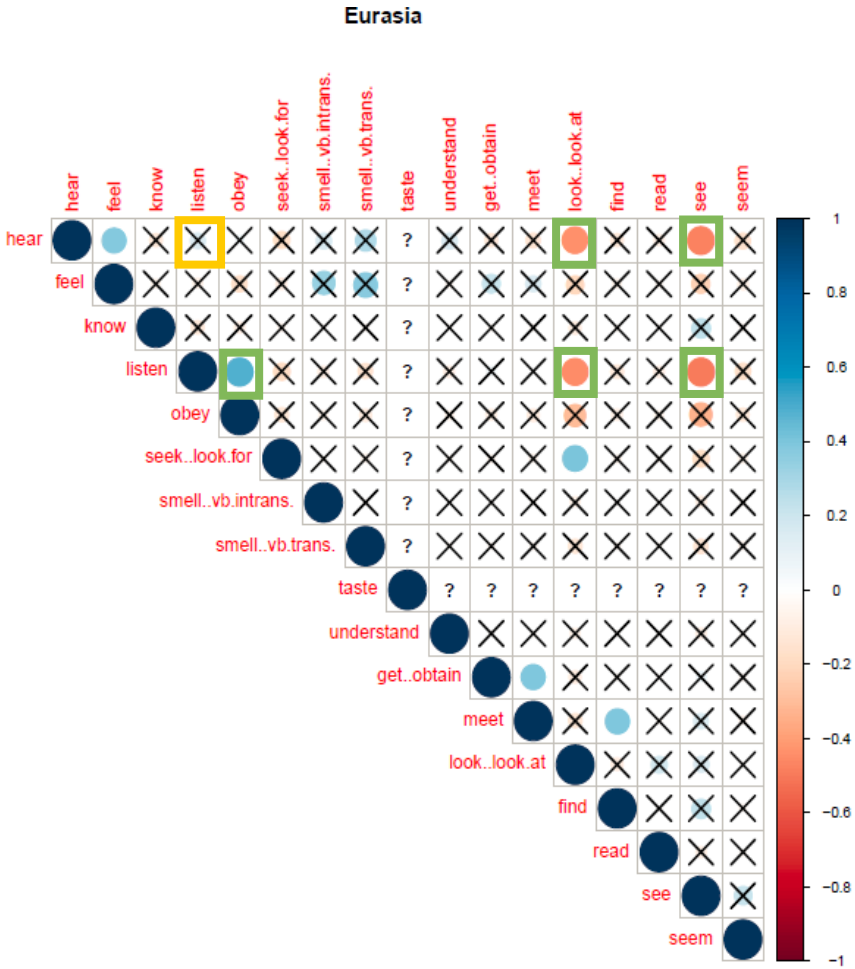

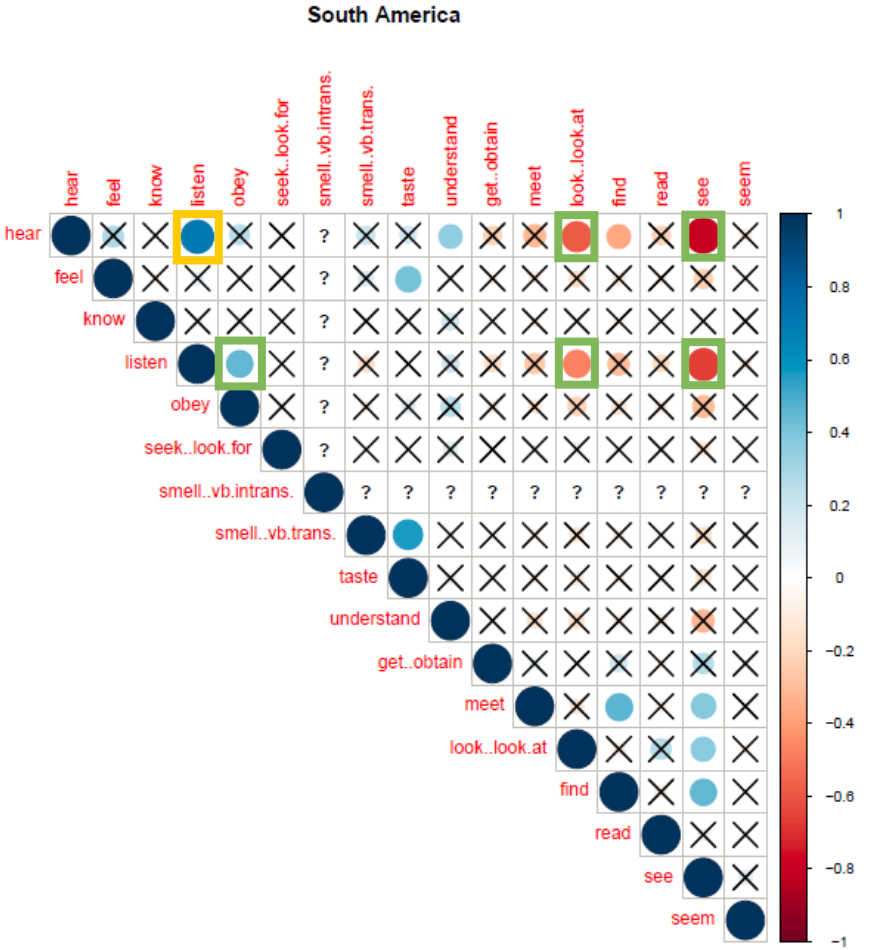

Perception and Cognition

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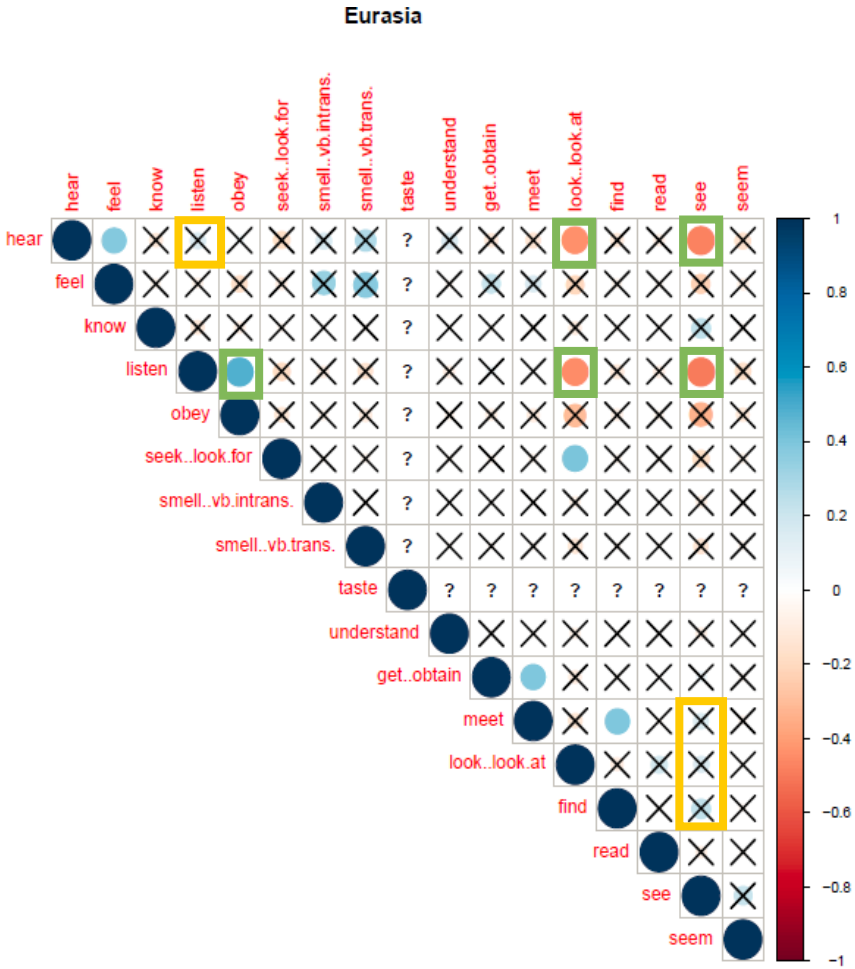
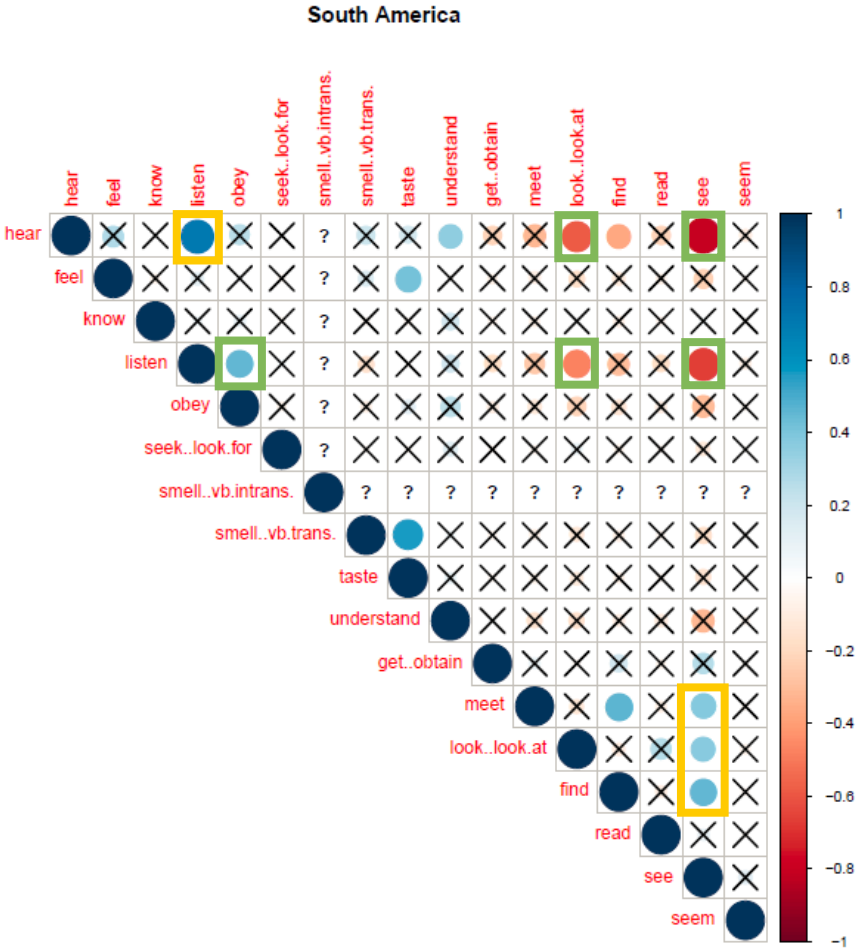
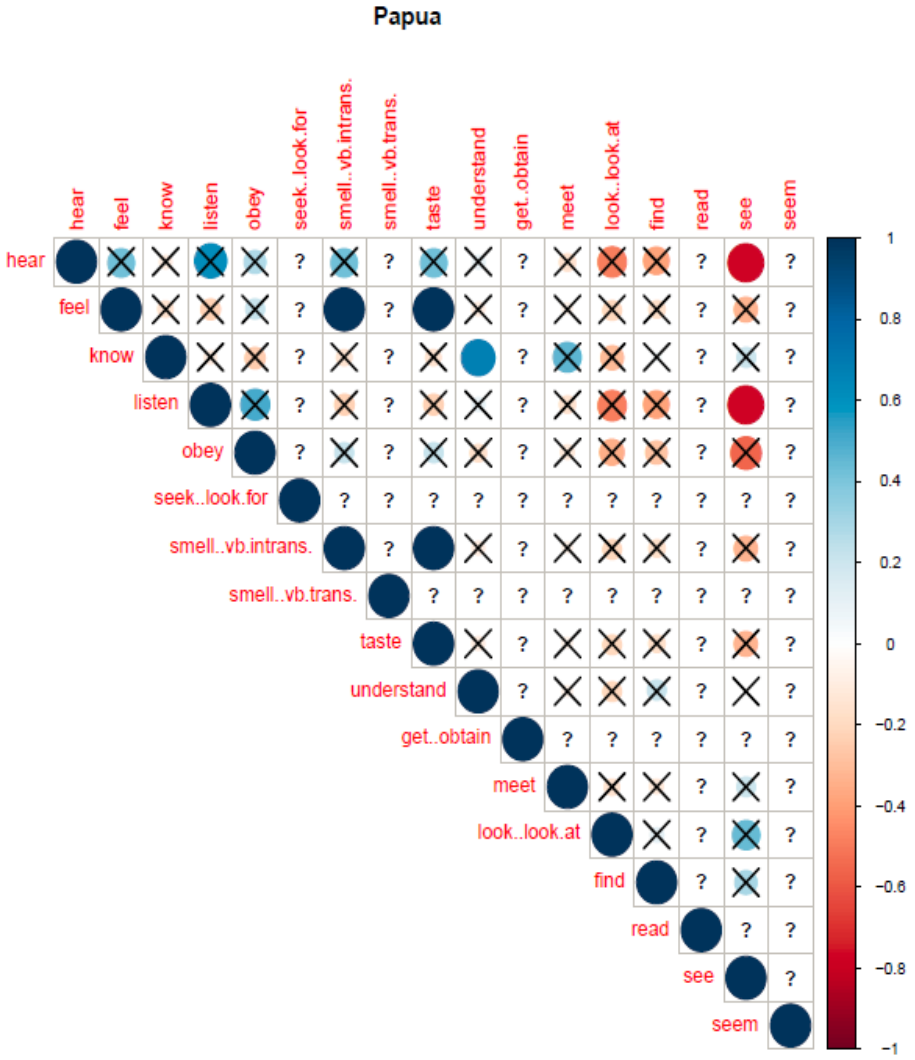




Perception and Cognition

Areal patterns

- Corrplot: Papua



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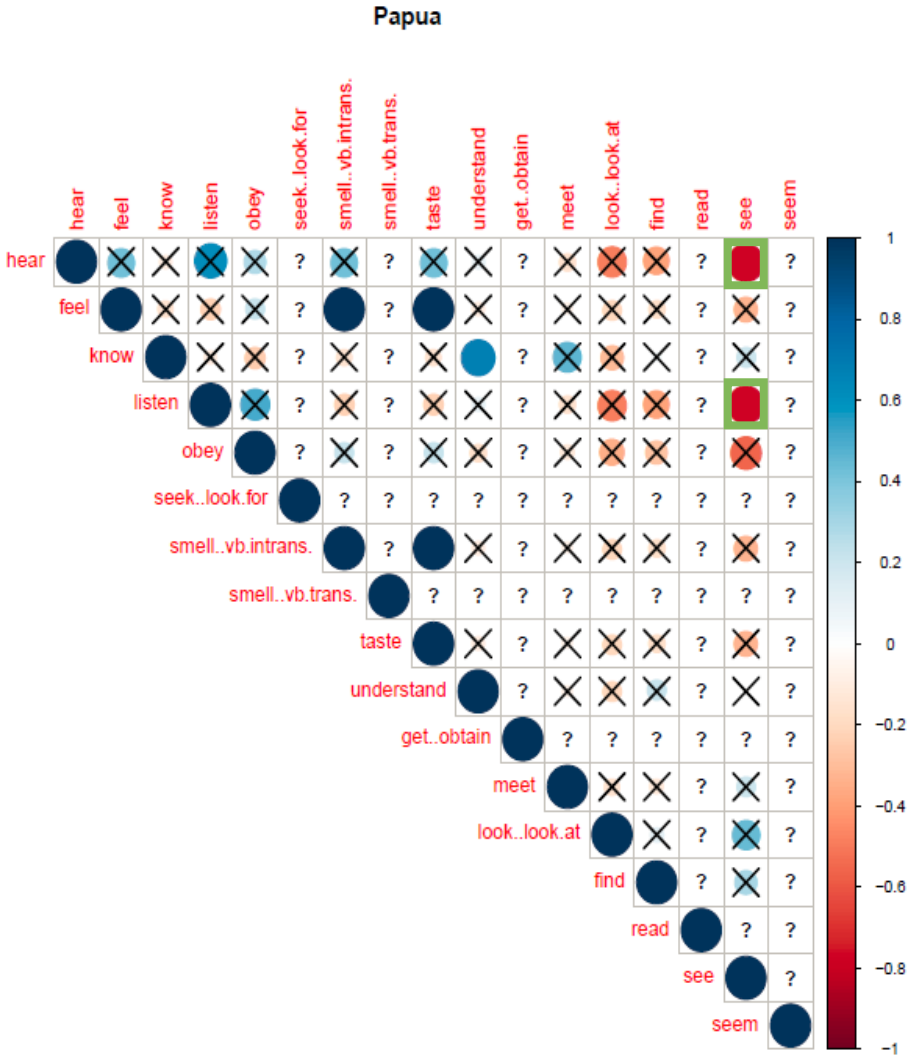

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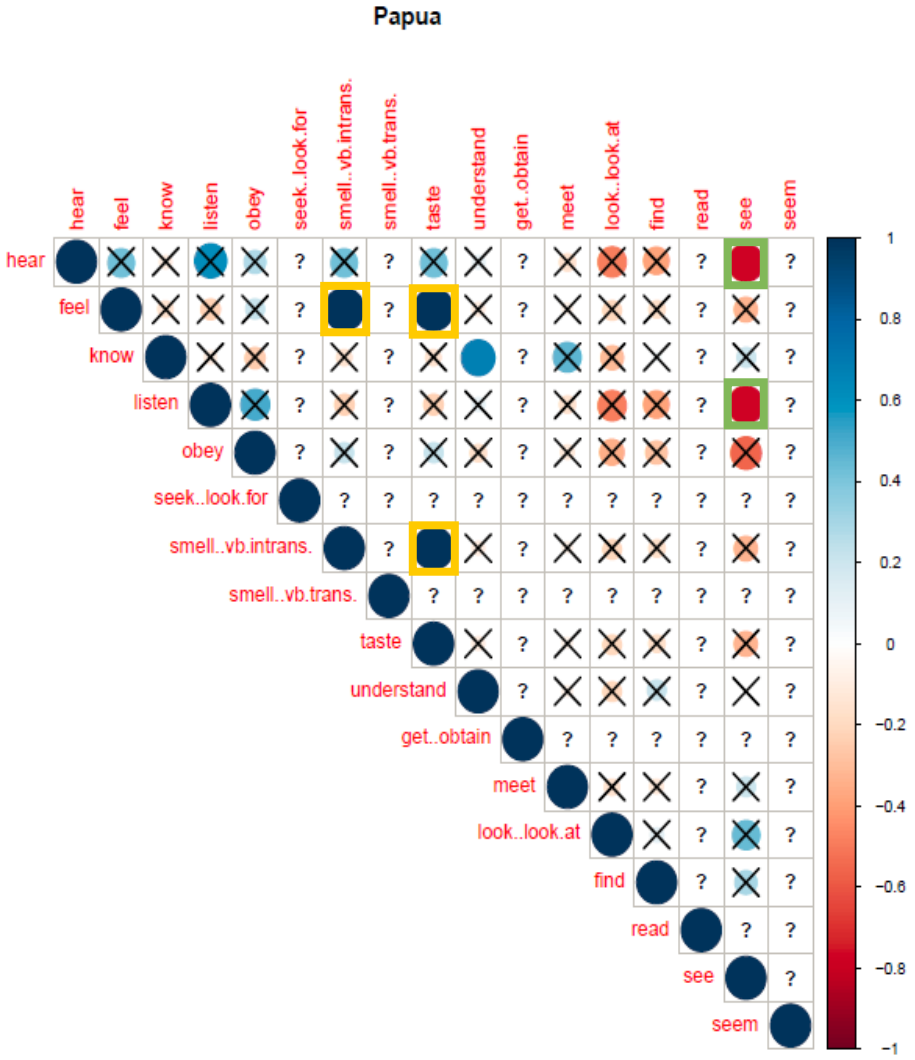
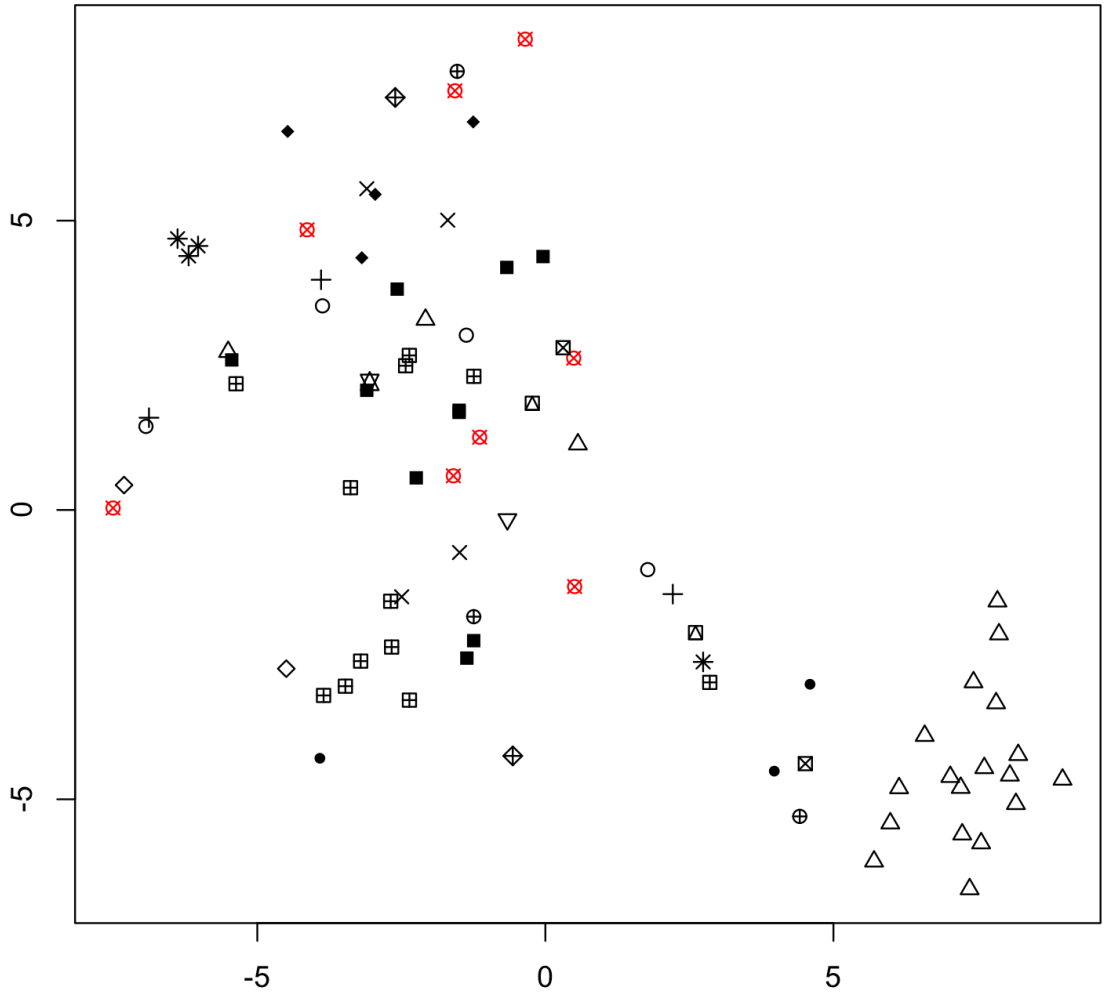


Perception and Cognition

Areal patterns

- 2D t-SNE of the Wordnet data



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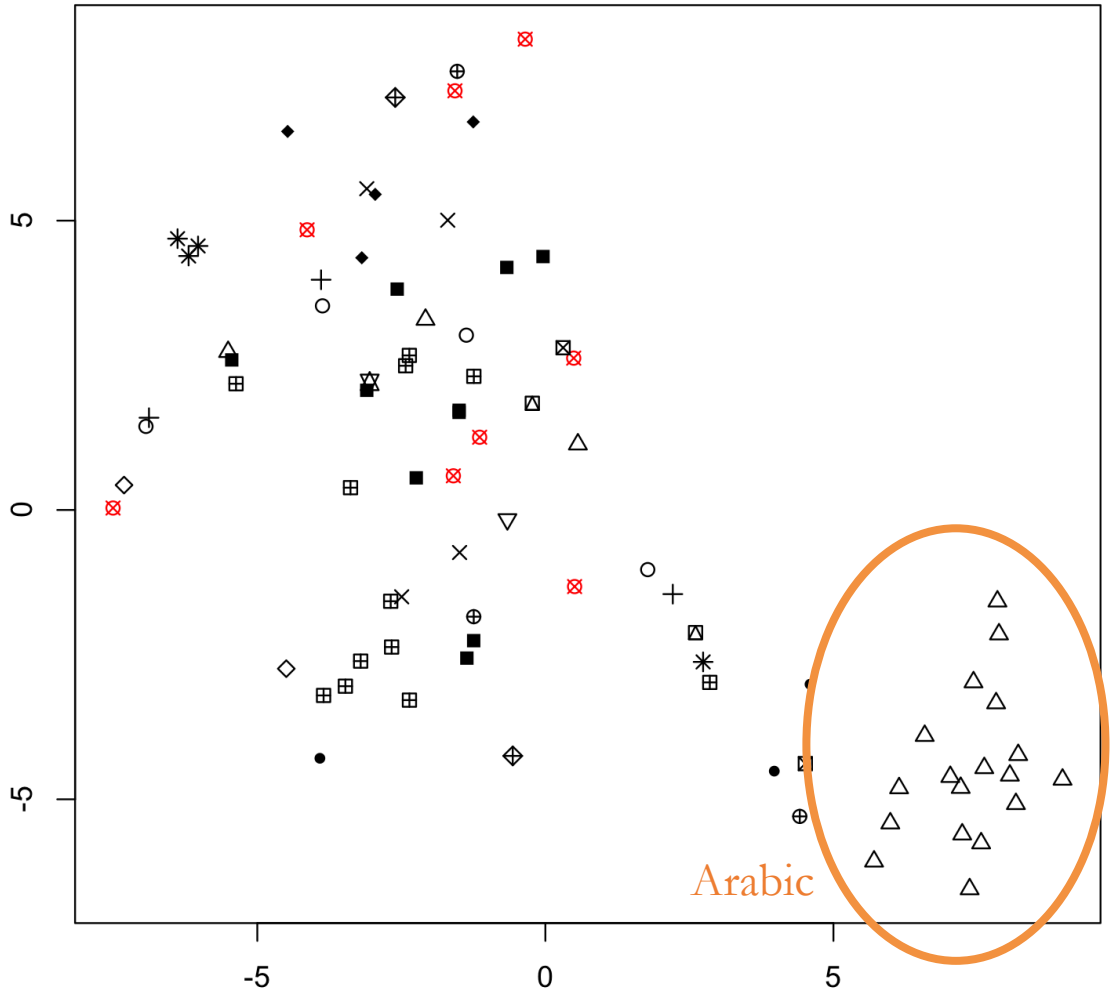

Perception and Cognition

Areal patterns

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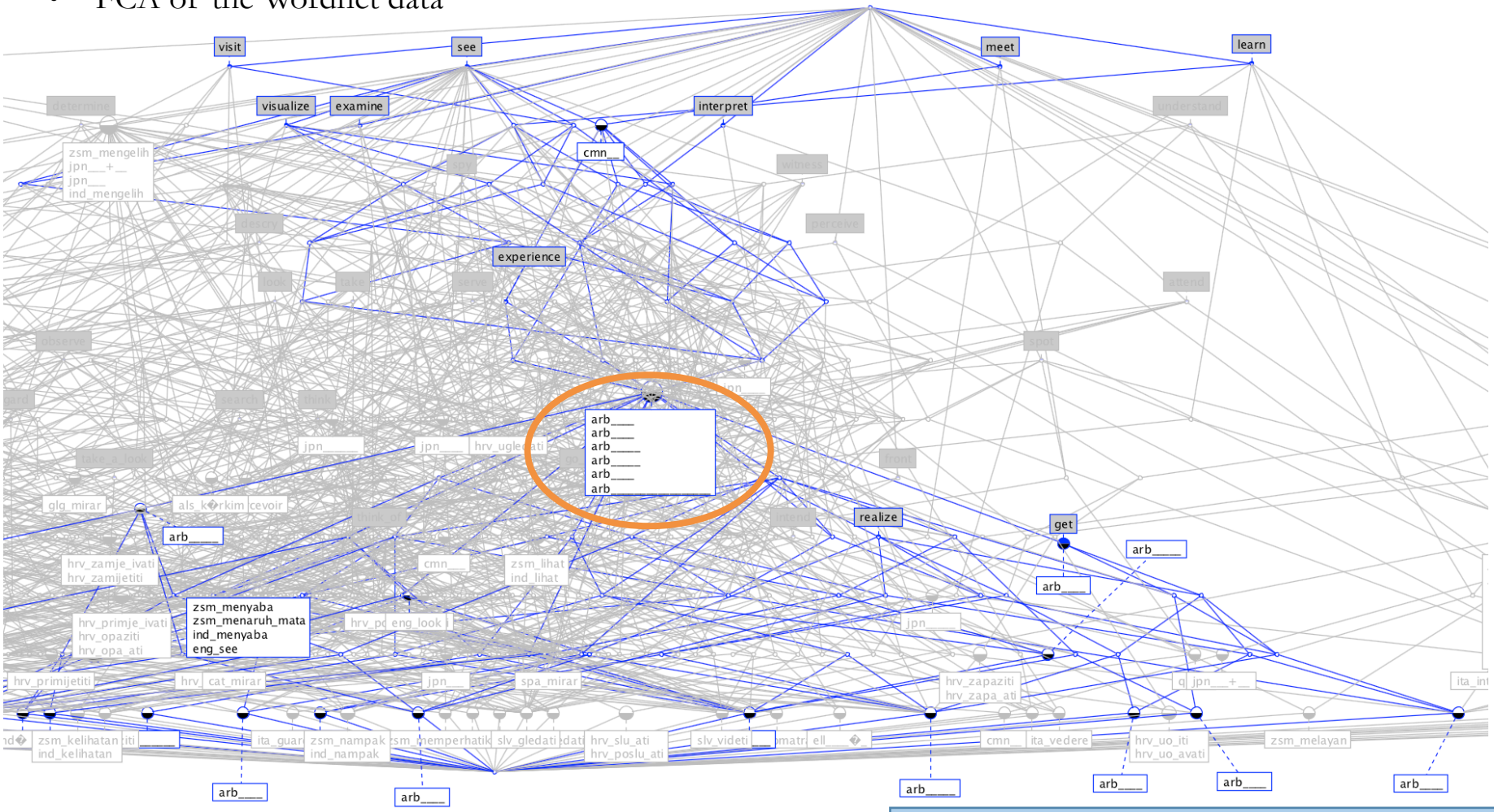

Perception and Cognition

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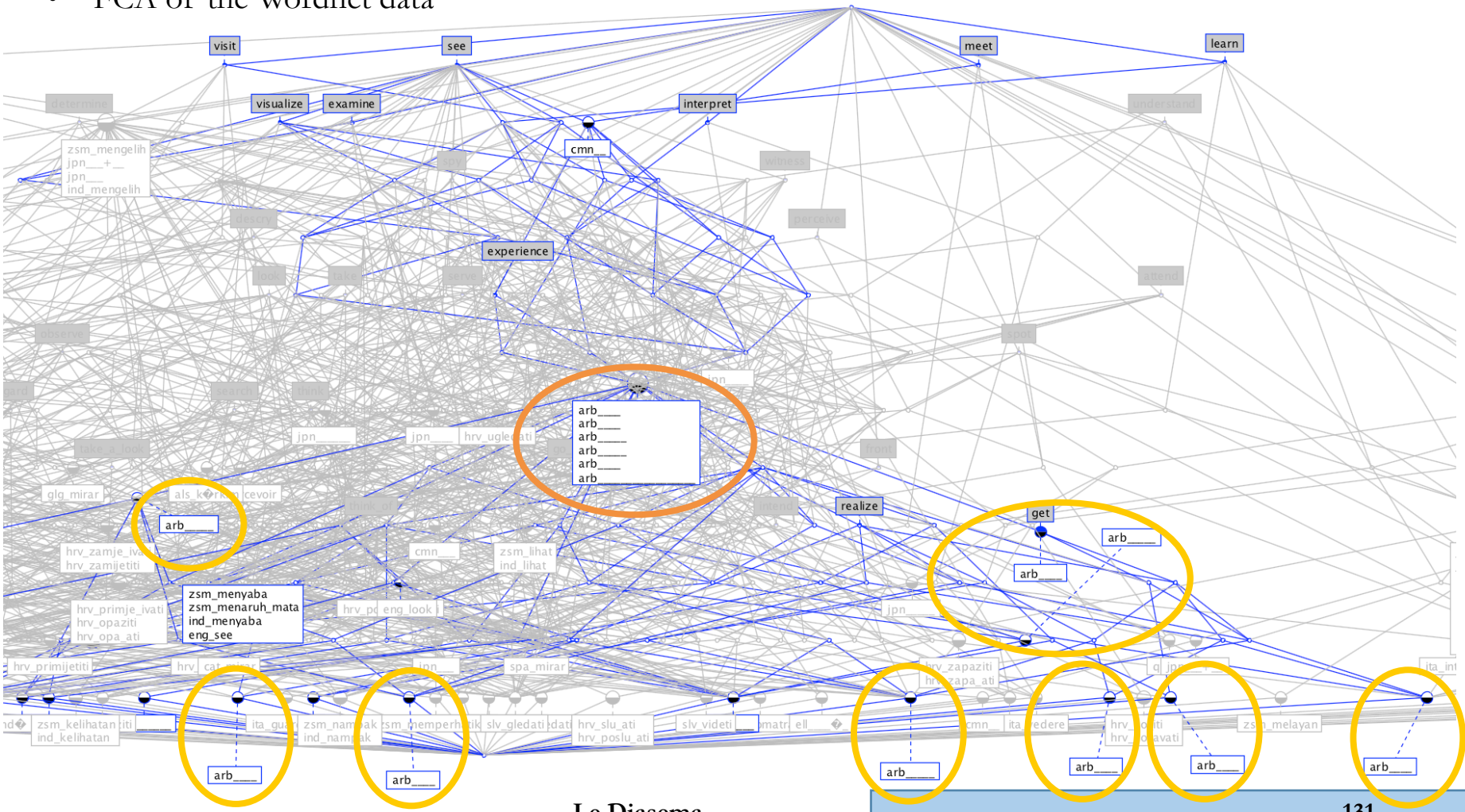
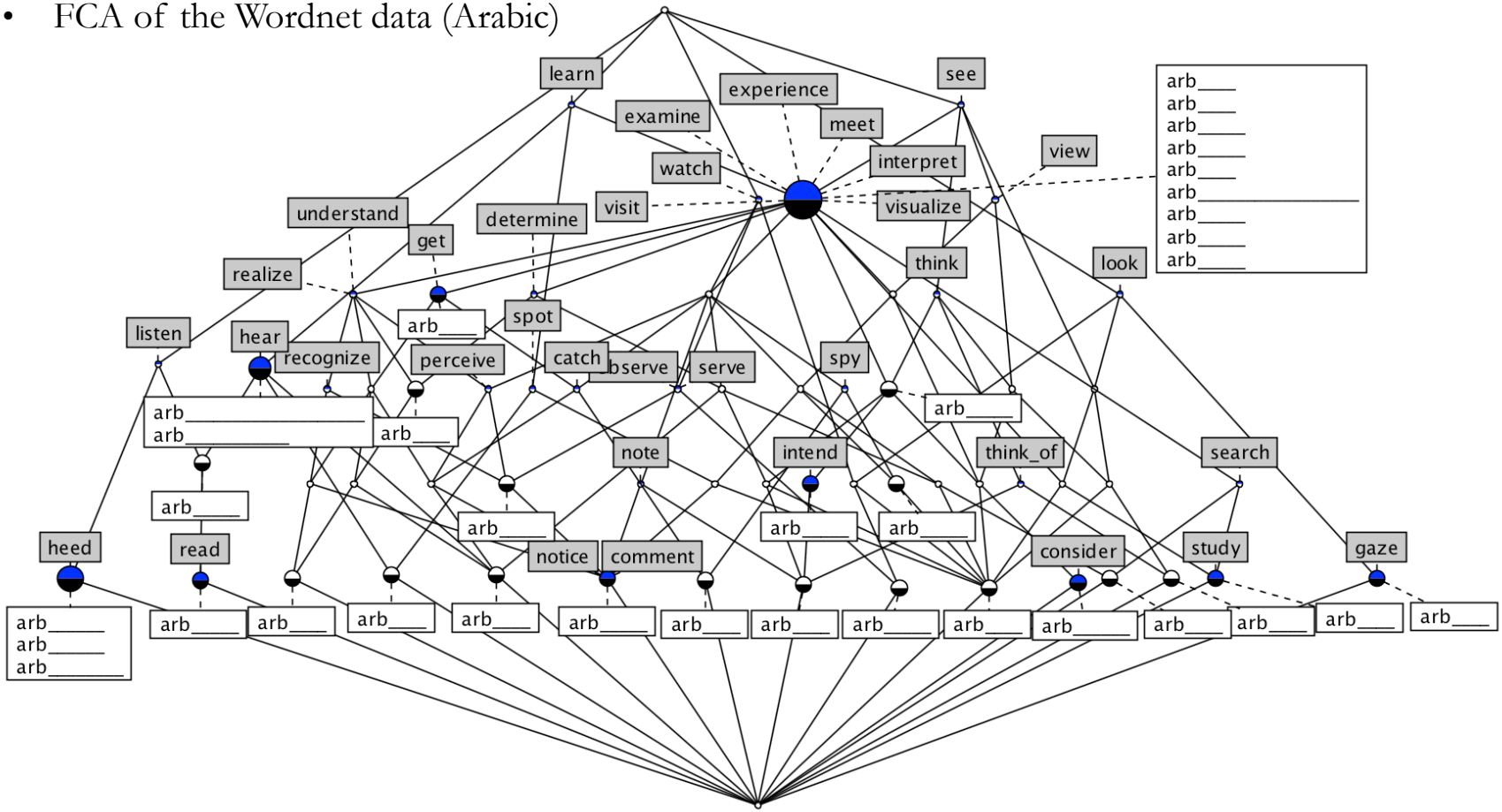


Perception and Cognition

Areal patterns

- FCA of the Wordnet data (Arabic)



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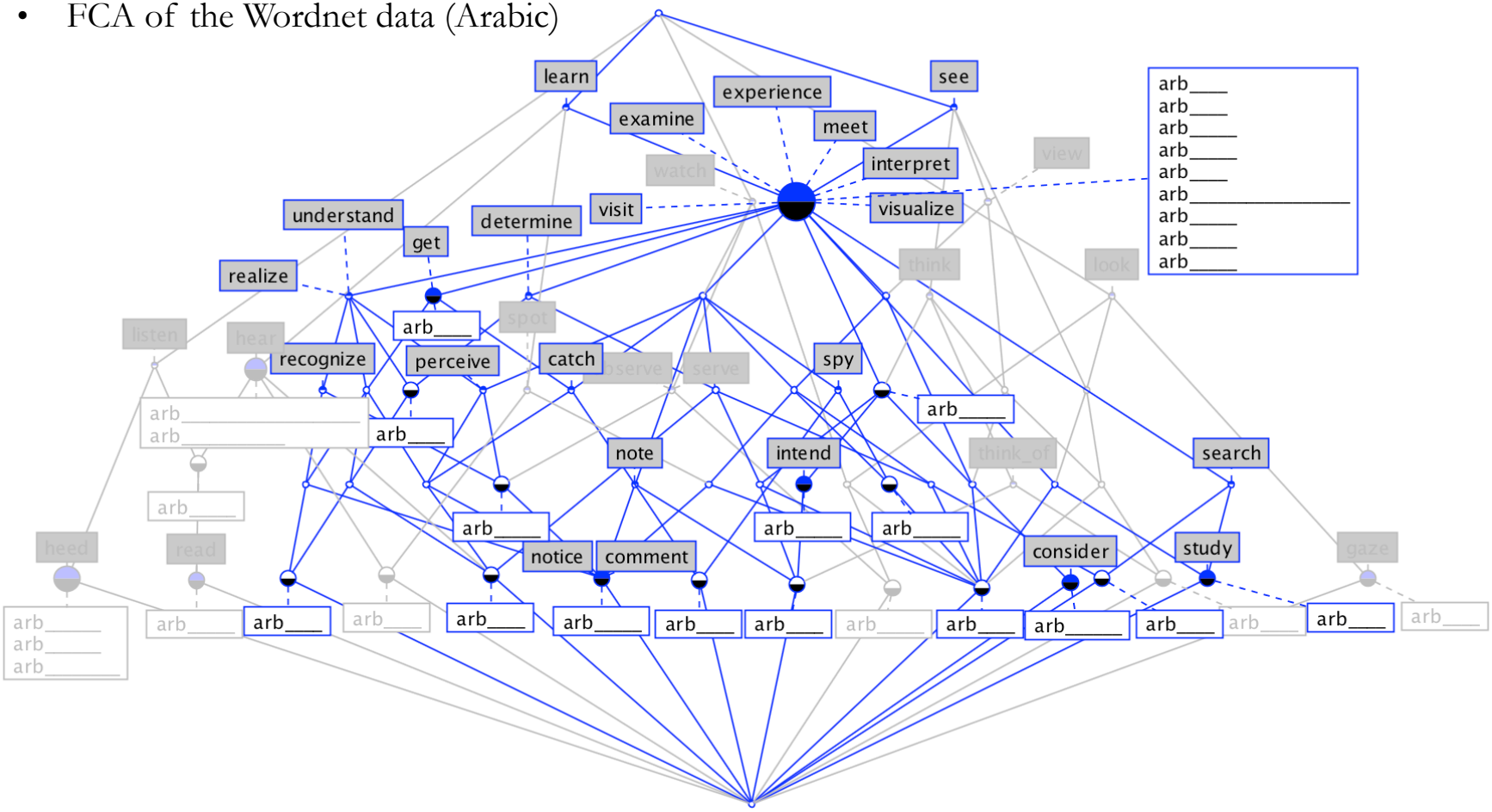
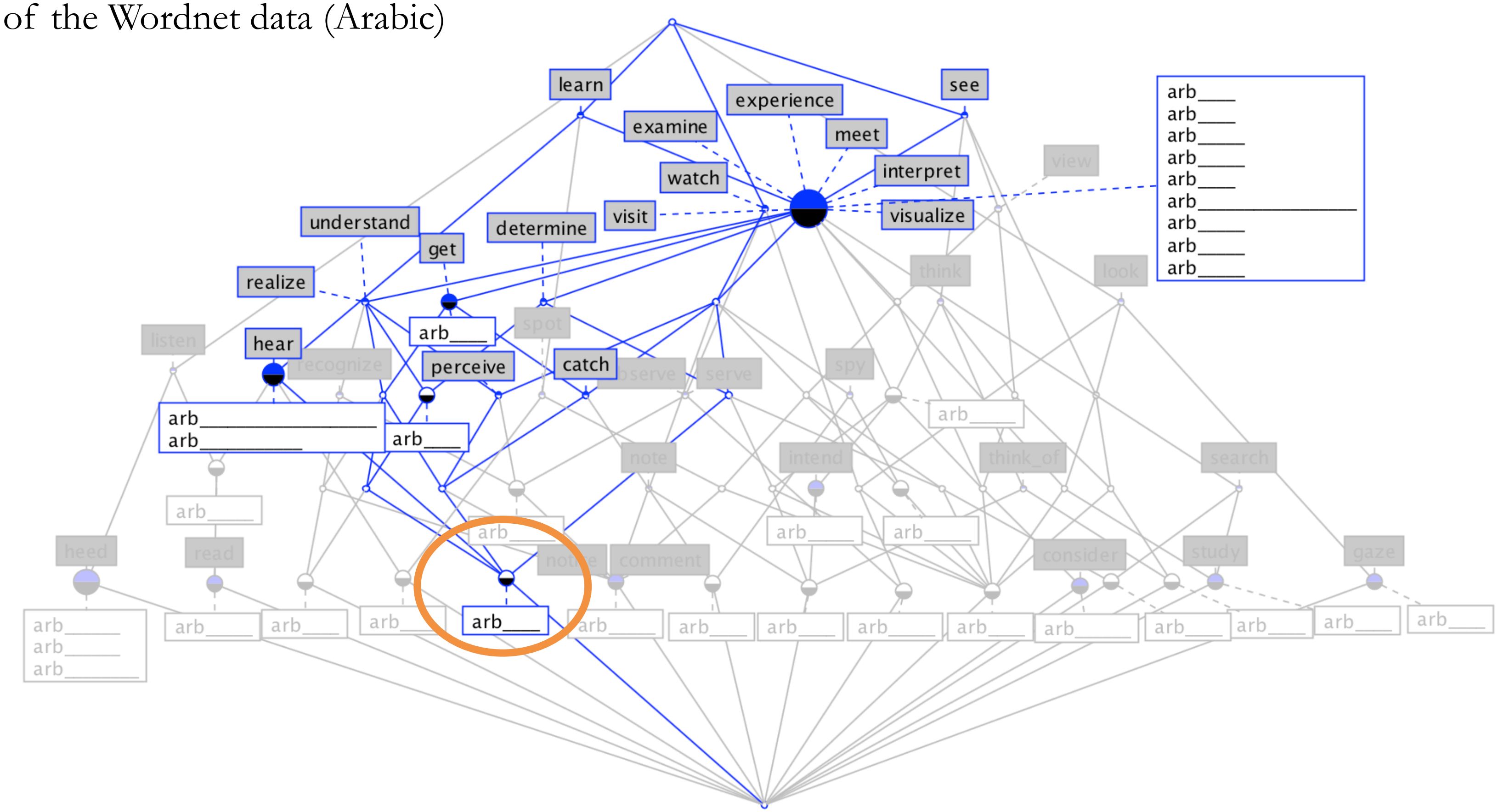


Perception and Cognition

Areal patterns

- FCA of the Wordnet data (Arabic)



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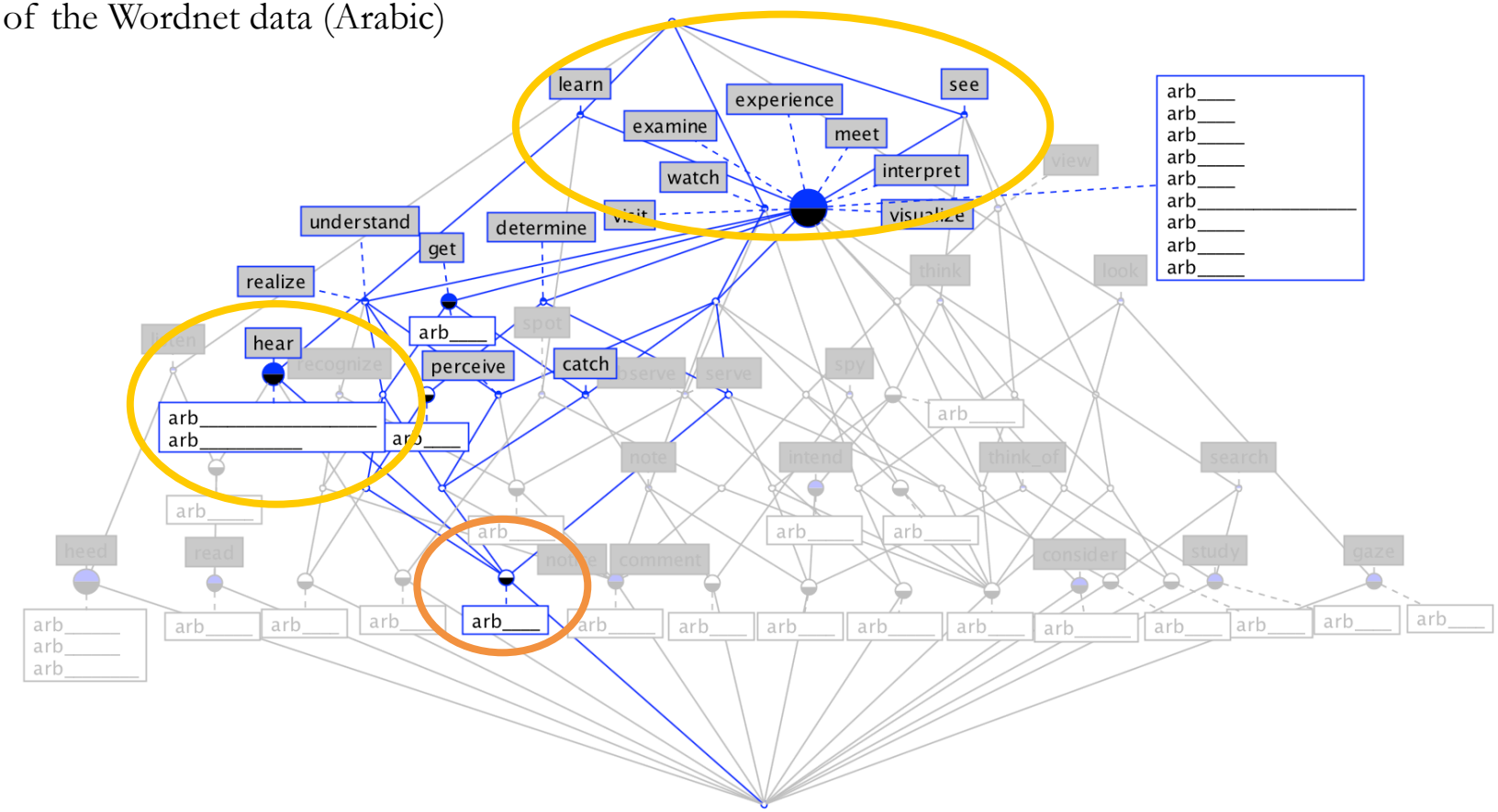

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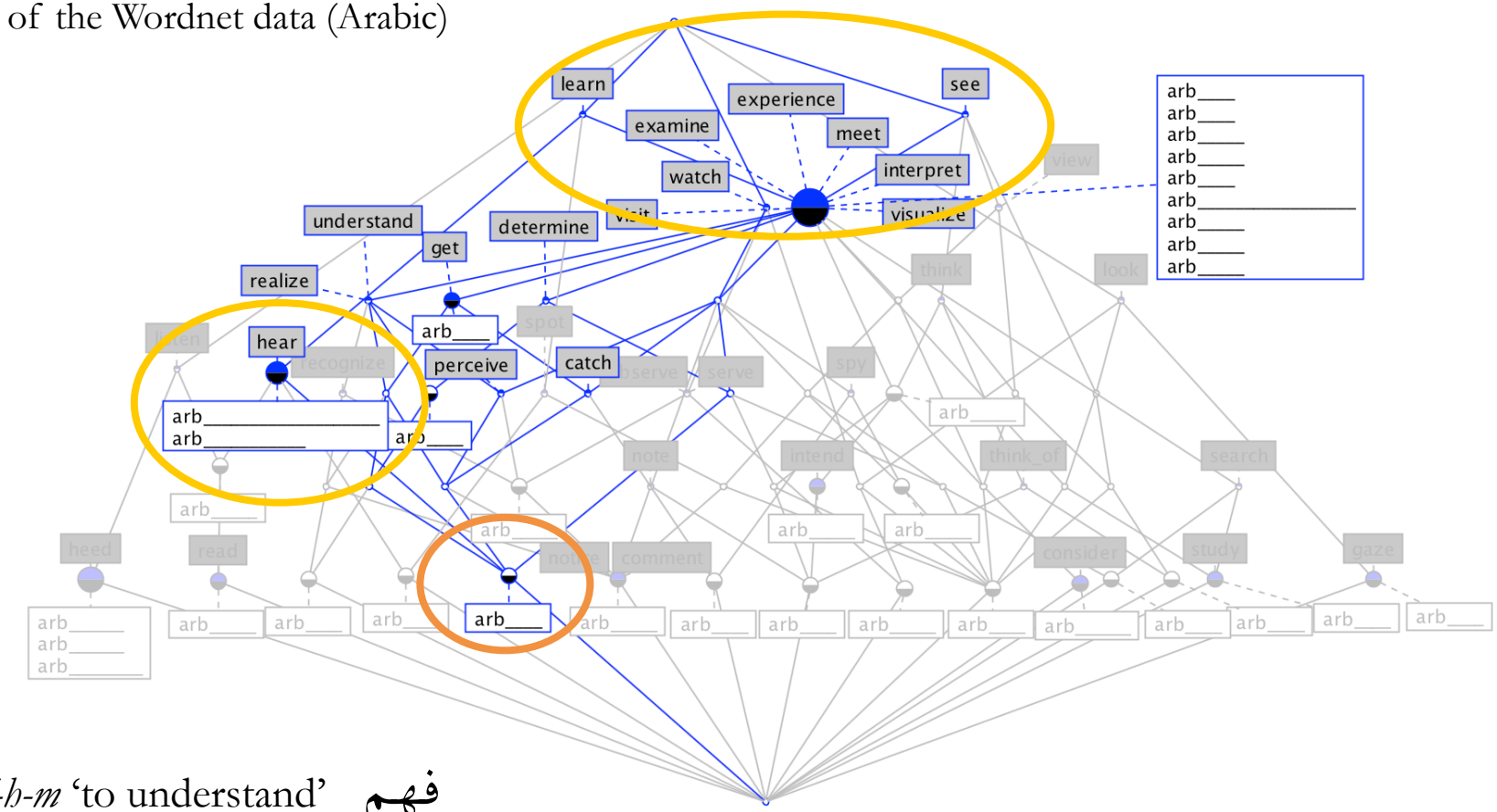

f-h-m 'to understand' فهم

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- *Corpus*
  - Statistical significance is difficult to reach with the 'small' samples at our disposal
  - A sample of areally related, but genetically diverse languages (with enough languages in each family in order to reach statistical significance) would be the way to go in order to investigate further these questions (i.e., beyond semantic factors)

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- *Methodology*
  - We used 2D t-SNE, correlation plot, and FCA, but did not take properly advantage of the graph model of the classical semantic maps.
  - We could compare minimal path distances and number of different paths between nodes in semantic maps for different domains in different areas. This would give us an estimate of the degree of connectedness of different verb senses in different regions, giving rise to different colexification networks.

Conclusions

More tomorrow (9AM)

Thanks!

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