

Scenarios and frames in derivation: a case study of derivational families based on animal names

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Objective

- We aim at efficiently representing morphosemantic relations and their regularities in the French derivational lexicon
- We seek a representation of morphosemantic regularities that goes beyond base-derivative pairs using derivational families as units of analysis
- Derivational families are aligned in paradigms when they present morphosemantic regularities (Štekauer, 2014, for a panorama) and these paradigms are what we want to describe

Strategy

We make use of the notion of frame in order to represent derivational paradigms and we test it on derivational families built around animal names.

Meaning “bundles”

The underlying assumption behind our strategy is that meaning is organized in sort of bundles.

meaning bundle: a group of concepts cognitively associated with a word denoting an entity or an event on the basis of the conceptual knowledge of that entity or event.

WASHING: washer; washing machine; clothes; bleach; soap; drying rack; laundromat...

FOOTBALL: playing; teams; matches; supporters; leagues; referees; world cup...

Frames as meaning bundles

The idea that meaning and concepts are organized in “bundles” has been expressed in several domains with the notion of **frame**.

Two major traditions:

- Frames as complex background knowledge required in order to understand all content words (Fillmore, 1976; Fillmore and Baker, 2010). They are **conceived as prose script-like scenarios (i.e. situations where participants interact)**.

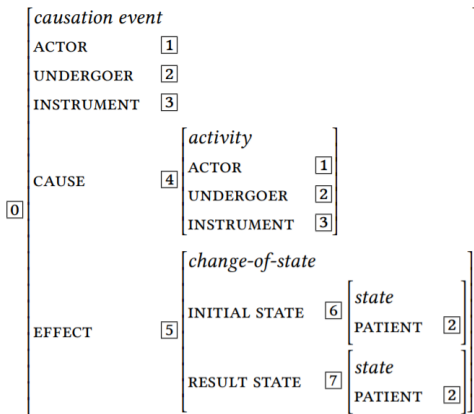
Event-oriented

- Frames as models of distinct chunks of knowledge in human cognition (Barsalou, 1992; Löbner, 2014; Petersen, 2015). They are **conceived as attribute-value matrices or as graphs**.

Modeling of conceptual knowledge.

Frames as recursive attribute-value structures

"Since frames for concepts are **recursive attribute-value-structures**, **each attribute of a frame establishes a relation** between the objects denoted by the concept and the value of the attribute" (Petersen, 2015)



(Plag et al., 2018)

The data: derivational families

Derivational families are sets of derivationally related lexemes. Two types of derivational families are defined by (Hathout, 2011):

morphological derivational families: based on meaning AND form

dériver.v ‘to derive’; *dérivation.n* ‘derivation’ ; *dérivable.a* ‘derivable’ ; *dérivationnel.a* ‘derivational’ ; *dérivationnellement.adv* ‘derivationally’; *dérivatif.a* ‘derivative’; *dériveur.n* ‘deriver’; *dérivée.a* ‘derived’.

lexical derivational families: based on meaning

cheval.n ‘horse’; *cheval.n* ‘horse meat’ ; *chevalier.n* ‘knight’; *cavalier.n* ‘jockey’ ; *chevalerie.n* ‘chivalry’; *chevaucher.v* ‘to ride a horse’; *hip-pique.n* ‘equine’; *hippodrome.n* ‘racecourse’; *hippologie.n* ‘hippology’; *équin.a* ‘equine’; *chevalet.n* ‘trestle’; *équitation* ‘horse riding’...

Derivational paradigms (Štekauer, 2014, for a panorama):

alignment: *“Given two ordered pairs of morphologically related words (w_1, w_2) and (w_3, w_4), we say that the two pairs are aligned if the same content relation holds between them: there is some content relation R_c such that $R_c(w_1, w_2)$ and $R_c(w_3, w_4)$. We call R_c the aligning relation”* (Bonami and Strnadová, 2019).

VERB	AGENT_N	ACTION_N
<i>laver</i> ‘to wash’	<i>laveur</i> ‘washer’	<i>lavage</i> ‘washing’
<i>former</i> ‘to train’	<i>formateur</i> ‘trainer’	<i>formation</i> ‘training’
<i>gonfler</i> ‘inflate’	<i>gonfleur</i> ‘inflater’	<i>gonflement</i> ‘inflating’
...	...	...

The data: why animals?

- Animals constitute a highly lexicalized semantic category
- They denote living entities and not events (predominant in frame representations)
- They exhibit a wide variety of semantic relations in derivation

family of *loup.n* 'wolf'

loup.n 'wolf'; *louve.n* 'female wolf'; *louveteau.a* 'wolf cub'; *louvard.n* 'young wolf'; *louveter.v* 'give birth to a wolf'; *louveterie.n* 'wolf hunting'; *louvetier.n* 'wolf hunter'.

family of *sardine* 'sardine'

sardine.n 'sardine'; *sardinier.n* 'sardine fisherman'; *sardinier.n* 'boat used for fishing sardines'; *sardinier.n* 'owner of a sardine factory'; *sardinier.n* 'worker of a sardine factory'; *sardinade* 'recipe made with sardines'; *se sardiner* 'to cram in a place like sardines'.

Meaning bundle vs derivational family

We collected derivational families from derivational resources such as *Glawinette* (Hathout et al., 2020), which contains lexemes extracted from electronic dictionaries such as *GLAWI* (Sajous and Hathout, 2015).

Meaning bundle of wolf

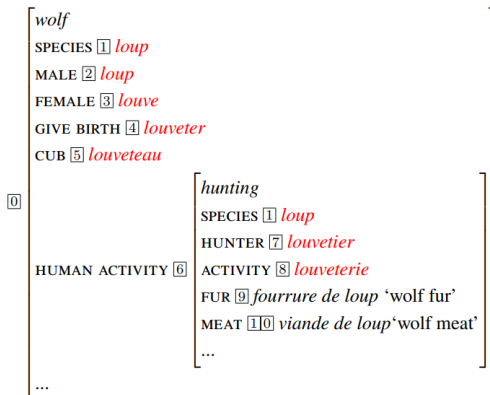
wild habitat; woods; packs; preys; **wolf hunting**; **wolf hunters**; wolf skin; endangered species;

Family of *loup* 'wolf'

loup.n 'wolf'; *louve.n* 'female wolf'; *louveteau.a* 'wolf cub'; *louveter.v* 'give birth to a wolf'; ***louveterie.n*** 'wolf hunting'; ***louvetier.n*** 'wolf hunter'.

AVM for the derivational family of *loup*

Derivational families built on animal names are influenced by the relation with humans and the cognitive scenarios where they are involved in.

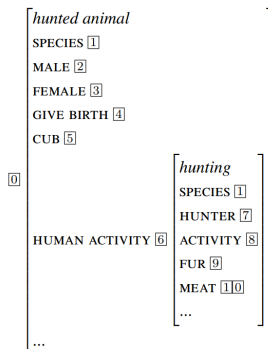


Alignment: "universal" semantic relations

0	<i>animal</i>
	SPECIES 1
	MALE 2
	FEMALE 3
	GIVE BIRTH 4
	CUB 5
	...

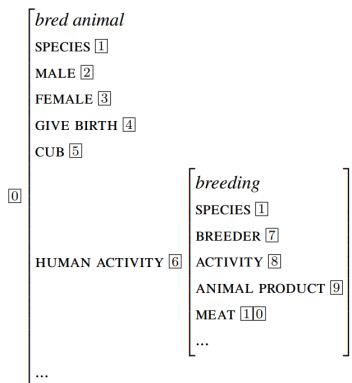
SPECIES_N	MALE_N	FEMALE_N	CUB_N	GIVE BIRTH_V
chien 'dog'	chien 'male dog'	chienne 'bitch'	chiot 'puppy'	chiener 'give birth to a dog'
chat 'cat'	chat 'male cat'	chatte 'female cat'	chaton 'kitten'	chatonner 'give birth to a cat'
âne 'donkey'	âne 'male donkey'	ânesse 'jenny'	ânon 'newborn donkey'	mettre bas 'to litter'
lion 'lion'	lion 'male lion'	lionne 'lioness'	lionceau 'lion cub'	mettre bas 'to litter'
écureuil 'squirrel'	écureuil 'male squirrel'	écureuil 'female squirrel'	écureuil 'newborn squirrel'	mettre bas 'to litter'
...	...	...	...	...

Alignment:hunting



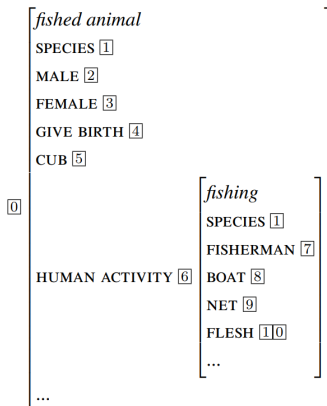
SPECIES_N	HUNTER_N	ACTIVITY_N	FUR_N	MEAT_N
loup 'wolf'	louveter 'wolf hunter'	louveterie 'wolf hunting'	fouurrure de loup 'wolf fur'	viande de loup 'wolf meat'
renard 'fox'	renardier 'fox hunter'	chasse au renard 'fox hunting'	renard 'fox fur'	viande de renard 'fox meat'
loutre 'river otter'	loutrier 'river otter hunter'	chasse à la loutre 'river otter hunting'	loutre 'river otter fur'	viande de loutre 'river otter meat'
sanglier 'boar'	chasseur de sangliers 'boar hunters'	chasse au sanglier 'boar hunting'	sanglier 'boar fur'	sanglier 'boar meat'
...	...	...	...	...

Alignment:breeding



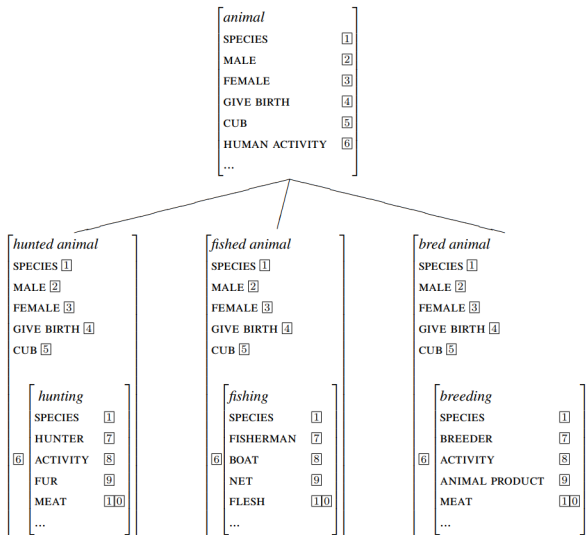
SPECIES_N	ACTIVITY_N	BREEDER_N	ANIMAL PRODUCT_N	MEAT_N
abeille 'bee'	apiculture 'beekeeping'	apiculteur 'beekeeper'	miel 'honey'	-
poisson 'fish'	pisciculture 'fish farming'	pisciculteur 'fish farmer'	oeufs de poisson 'fish eggs'	poisson 'fish'
chèvre 'goat'	élevage des chèvres 'goat farming'	chevrier 'goat farmer'	chèvre 'goat cheese'	viande de chèvre 'goat meat'
...	...	...	...	...

Alignment: fishing



ANIMAL_N	FISHERMAN_N	BOAT_N	NET_N	FLESH_N
sardine 'sardine'	sardine 'sardine fisherman'	sardinier 'boat for sardine fishing'	sardinal 'net for fishing sardines'	sardine 'sardine'
hareng 'herring'	pêcheur de hareng 'herring fisherman'	harenguier 'boat for herring fishing'	harenguière 'net for fishing herrings'	hareng 'herring'
thon 'tuna'	thonier 'tuna fisherman'	thonier 'boat for tuna fishing'	thonaire 'net used for fishing tuna'	thon 'tuna'
...	...	...	...	...

Animals: partial hierarchy



- Where to place derivatives, such as relational adjectives, that do not express “new” conceptual content (e.g. *hippique* ‘related to horses, their breeding, their use, etc.’)?
- Metaphorical senses seem to be less semantically regular and formalizable with frames (e.g. *singer* ‘to imitate a person for mockery’, *lezarder* ‘basking in the sun (like lizards)’)
- Lexemes that may be attested in dictionaries may actually not be used by speakers (no morphological realization of the concept)

Conclusions and ongoing work

- Derivational families partially reflect the organization of meaning in “bundles”
 - Lexemes derived from animal names can be grouped according to scenarios depending on their relation with humans
 - Families can be aligned under these scenarios
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- Testing the quantitative coverage of frames in families built on animal names
 - Testing the coverage of morphosemantic frames on other semantic categories (e.g. toponyms, fruits...)
 - Automation of the “morphosemantic frames” creation

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