



easier

*intelligent Automatic
Sign language tRanslation*

Future technologies 1

Using the power of Wordnet for dictionary work

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1. What is Wordnet and why is it useful?
2. The EASIER multilingual sign wordnet
3. How to add Wordnet senses to your dictionary



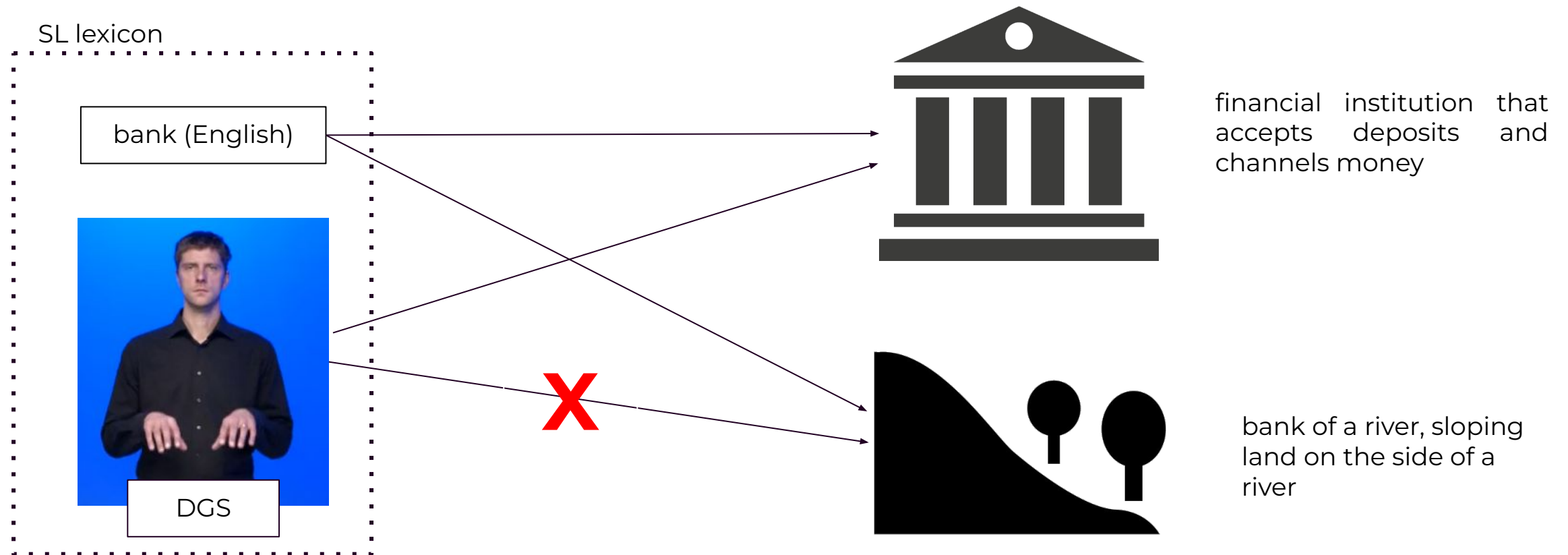
**What is Wordnet
and why is it useful?**

How to represent the sense of a sign ?



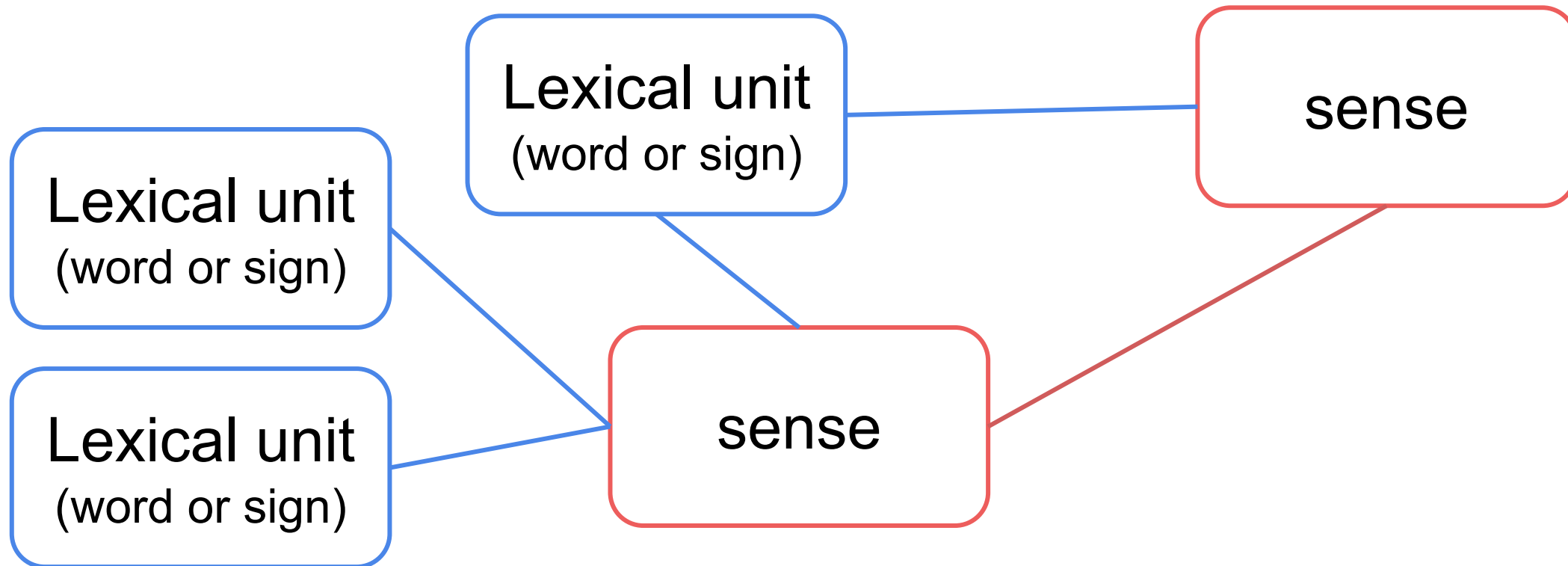
How to represent the sense of a sign ?

- Bilingual strategy : Spoken language equivalents
 - but: not precise, subject to mistranslation, depend on contact language

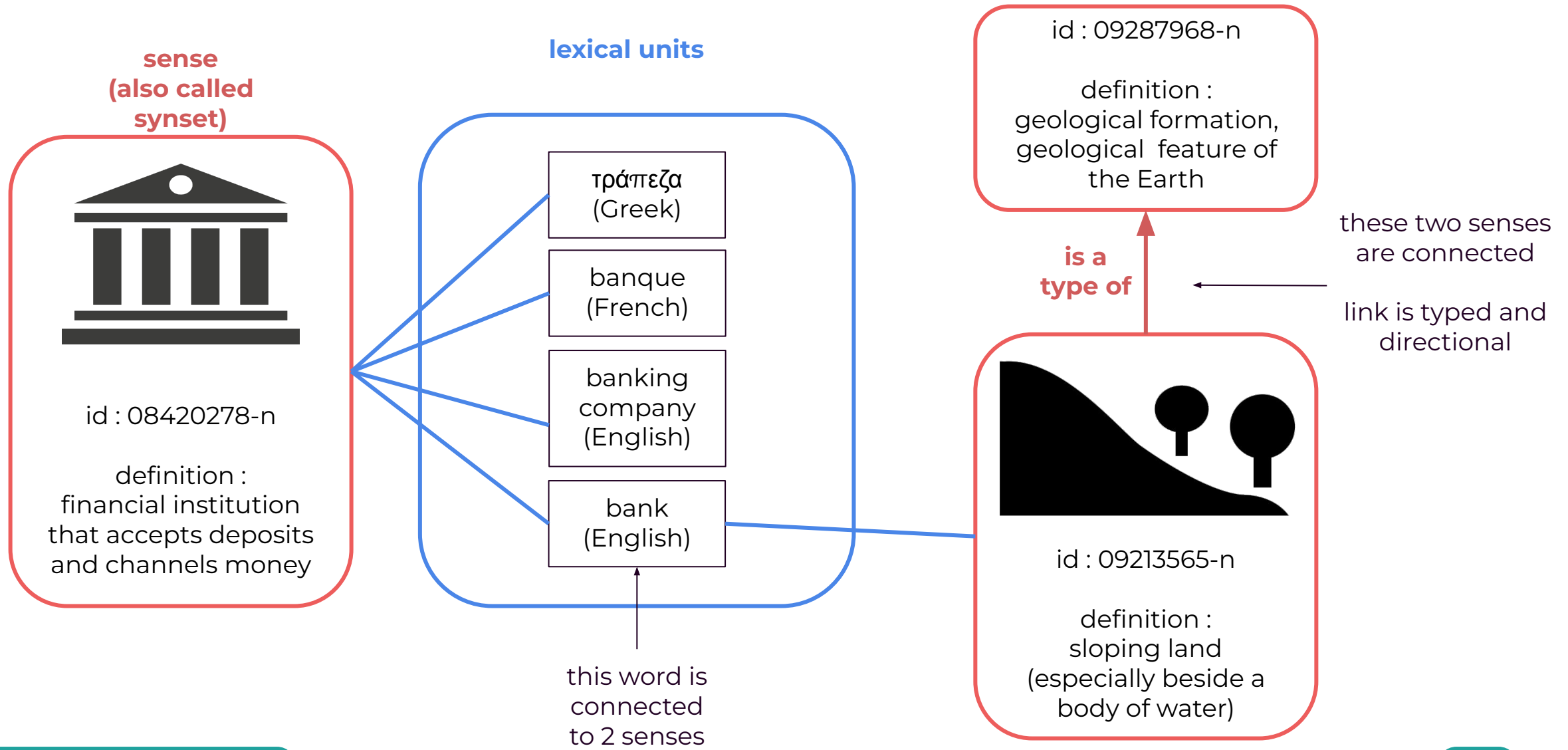


- Bilingual strategy : Spoken language equivalents
 - but: not precise, subject to mistranslation, depends on contact language
- Monolingual strategy : Definitions and examples
 - but: extra work
- Wordnet strategy : Semantic links

Wordnet = **senses** + **lexical units** + links

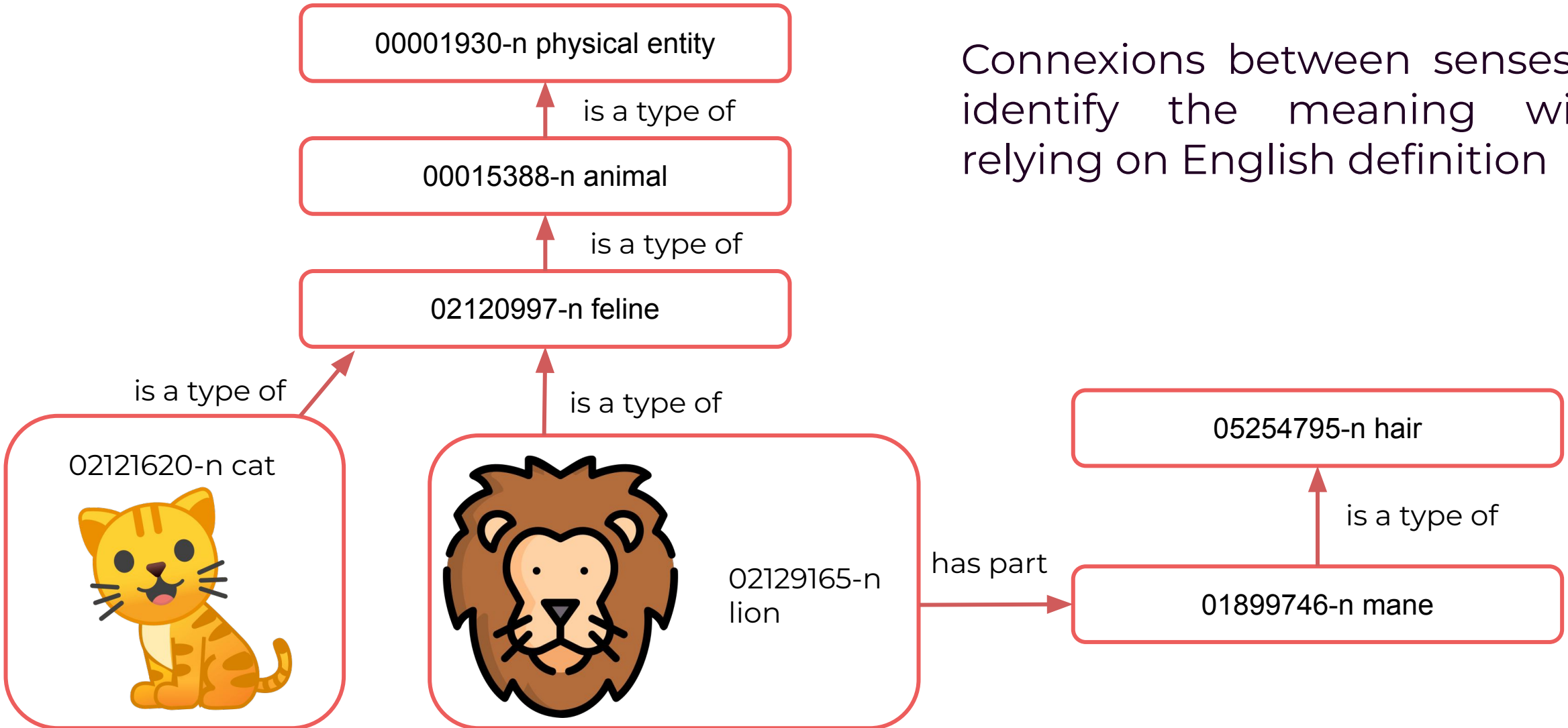


What is Wordnet?



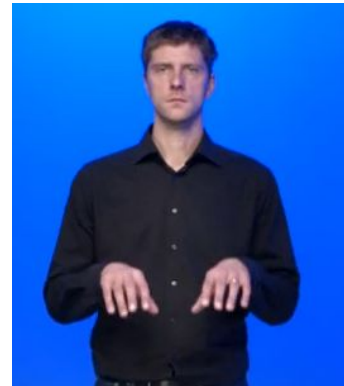
What is Wordnet?

Connexions between senses help identify the meaning without relying on English definition



How to add signs to Wordnet?

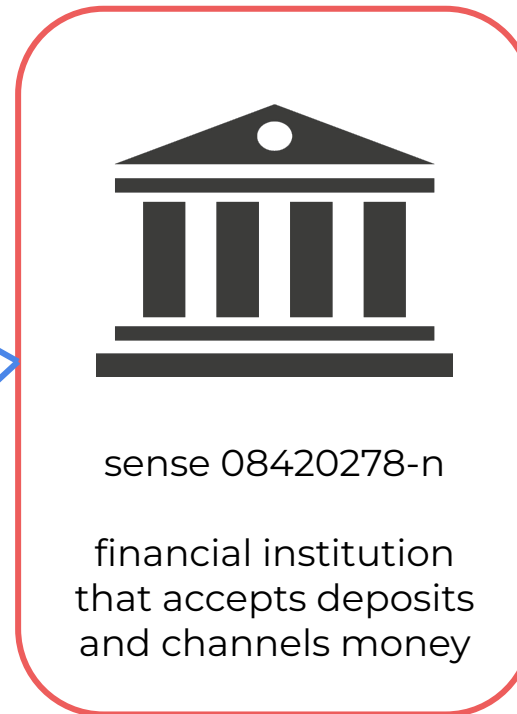
We simply add new **lexical units** that contain a sign instead of a word



(DGS)



(GSL)



bank
(English)

τράπεζα
(Greek)

banque
(French)

Signs are attached to the sense, not the word "bank" -> avoids ambiguity of translation

Wordnet IDs are used in many resources, for example image banks

08420278-n



09213565-n



pictures from
[Babelnet](#)

“Wordnet” is a type of structure. There are several Wordnets.

Main resource is [Open Multilingual Wordnet](#)

- Based on original Princeton’s Wordnet (biggest monolingual Wordnet, only English)
- 100 000+ senses, 28 languages
- IDs largely used
- All senses have definition and example in English, but they don’t all have words in all languages

Depending on your contact language, you may want to work with another Wordnet

[Bond and Foster 2013](#)

⚠ It's a tool to make a vocabulary easier to explore for humans and machines.

It's not intended to be a perfect representation of the language.



The Multilingual Sign Languages Wordnet



sign-net.meine-dgs.de

- 9177 signs linked to 6519 senses
- 5 languages : BSL, DGS, GSL, LSF, NGT
- Created mostly manually, high quality
- Part of project EASIER

omw.00049433-r now | in the historical present; at this point in the narration of a series of past events

- [bsl.4114](#) current, now, currently, nowadays, today, present
- [dgs.80580](#) HIER-JETZT1^
- [dgs.14501](#) JETZT2^
- [dgs.15532](#) JETZT3^
- [gsl.2951](#) σήμερα

omw.00051848-r directly, straight, direct | without deviation

- [dgs.14265](#) RICHTUNG1^
- [dgs.14543](#) ZIEL2^
- [dgs.79772](#) ZIEL4^
- [lsf.856](#) TOUT DROIT

omw.00056930-v give birth, deliver, bear, birth, have | cause to be born

- [dgs.13995](#) GEBURT1A^
- [gsl.686](#) γεννώ
- [lsf.374](#) DONNER NAISSANCE
- [ngt.1212](#) GEBOREN-A / BORN-A

omw.00058519-n exit | the act of going out

- [dgs.13504](#) LASSEN2A^
- [dgs.40697](#) LASSEN2C^
- [dgs.26982](#) SPRINGEN2^
- [gsl.1159](#) έξοδος

Synset omw.00042769-r

View more data about this synset in its original resource: [OMW link](#)

Lemmas: unfortunately, unluckily, regrettably, alas

Definition: by bad luck

Examples:

- unfortunately it rained all day
- alas, I cannot stay

[bsl.2706](#) bad, appalling, dreadful, terrible, horrible, shame, awful, unfortunate, unfortunately

View more data about this sign in its original resource: [direct link](#)



[dgs.13869](#) LEIDEN1A^

View more data about this sign in its original resource: [direct link](#)



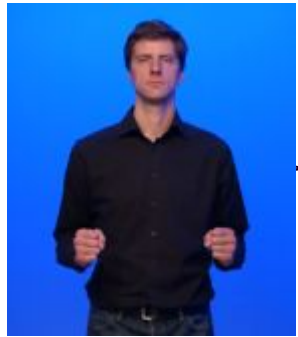
dgs.3603 RUND3A^

View more data about this sign in its original resource: [direct link](#)



Synset ID and links	Synset lemmas	Synset definition	Synset examples	Type of validation	Also attested in these languages
omw.00308779-n omw link internal link	<ul style="list-style-type: none"> round trip 	a trip to some place and back again		Automatic validation	
omw.07873807-n omw link internal link	<ul style="list-style-type: none"> pizza pizza pie 	Italian open pie made of thin bread dough spread with a spiced mixture of e.g. tomato sauce and cheese		Automatic validation	
omw.06793231-n omw link internal link	<ul style="list-style-type: none"> sign 	a public display of a message	<ul style="list-style-type: none"> he posted signs in all the shop windows 	Automatic validation	GSL

SL lexicon



keywords, glosses, etc
in spoken language

- refrigerator
- freeze
- shiver

step 1: automatically find
candidate synsets

- 04070727-n in which food can
be stored at low temperatures

step 2: if only one
sense, auto validation

- 00374135-v change to ice
- 01834730-v stop moving or
become immobilized
- 00012613-v suddenly behave
coldly and formally

step 3: if several senses, manual
validation by human signer

How it was made



You are annotating if the synsets below should be linked to the sign above.

[Search for a missing synset](#)

Synset ID and links	Synset lemmas	Synset definition	Synset examples	Current status	Also attested in these languages	Validation
omw.01421417-v omw link internal link	unplug, disconnect	pull the plug of (electrical appliances) and render inoperable	<ul style="list-style-type: none">unplug the hair dryer after using it	validated: no confidence: 2		validate as correct ok!
omw.03589672-n omw link internal link	jack	a small ball at which players aim in lawn bowling		validated: no confidence: 2		validate as correct ok!
omw.03968293-n omw link internal link	plug, male_plug	an electrical device with two or three pins that is inserted in a socket to make an electrical connection		validated: no confidence: 2	DGS	validate as correct ok!

38 Custom senses created to fill gaps

- 11 personal & possessive pronouns
- 21 interrogative pronouns
- 3 conjunctions
- 1 modal
- 4 sign specific concepts
 - general-purpose pointing
 - palm-up gesture
 - oral, orally
 - textphone

	Total	BSL	DGS	GSL	LSF	NGT
Signs	9177	1273	2758	2632	1013	1501
Sign / sense links	13049	1617	3543	5109	1013	1767

may include duplicate signs

Browse online :

- On sign-net.meine-dgs.de
- Work in progress to include it in [OMW](#)'s website

Or download links on the website

Download .tab files for NLTK

```
wn.synset_from_pos_and_offset("n",2129165).lemma_names("ngt")
>>> ['https://signbank.cls.ru.nl/dictionary/protected_media/
glossvideo/NGT/LE/LEEUEW-B-22.mp4',
      'https://signbank.cls.ru.nl/dictionary/protected_media/
glossvideo/NGT/LE/LEEUEW-A-1759.mp4']
>>> ['LEEUEW-B', 'LION-B', 'LEEUEW-A', 'LION-A']

sense=wn.synsets("LION-B",lang="ngt")[0]

sense.offset()
>>> 2129165
sense.definition()
>>> large gregarious predatory feline of Africa and India having a
tawny coat with a shaggy mane in the male
```


Download CSV files

```
sign_id,synset_id,confidence  
ngt.996,omw.02374451-n,manual accept  
ngt.997,omw.02374451-n,manual accept  
ngt.999,omw.02051845-n,auto accept
```

```
sign_id_wordnet,sign_id_original,language,origin,video,links,gloss  
ngt.996,996,ngt,global-signbank,https://signbank.cls.ru.nl//dictionary/protected_media/glossvideo/NGT/PA/PAARD-A-996.mp4,https://signbank.cls.ru.nl/dictionary/gloss/996.html,PAARD-A / HORSE-A  
ngt.997,997,ngt,global-signbank,https://signbank.cls.ru.nl//dictionary/protected_media/glossvideo/NGT/PA/PAARD-C-997.mp4,https://signbank.cls.ru.nl/dictionary/gloss/997.html,PAARD-C / HORSE-C
```



How to make yours

Mostly manual work, no miracle solution!

- Too fine-grained meanings : more manual work
 - Examples : freeze 13 senses ; go 35 senses
 - Exclude technical vocabulary
 - Save time by starting from our Wordnet
- Missing senses (pronouns, SL meta-language & deaf culture)
 - Let's talk to create compatible IDs
- Do you have keywords in 2 spoken languages? Cross-validate
- Not enough native annotators
 - Non-native do a first pass, flag for review by native where needed

Want to add Wordnet to your dictionary?
I'd love to hear about it!

Time for questions !



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THANKS



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