B5 – Polysemy in a Conceptual System

- Accomplishments so far
  - Detailed formal lexical-semantic analyses of verbs in the movement domain (‘pousser’) and in the psychological domain (‘encourager’), as well as intra-domain differences between readings (‘pousser’ vs. ‘tirer’ / ‘pousser’ vs. ‘encourager’)
  - Indicators for sense disambiguation both ontological (type of arguments) and syntactic/semantic (presence/absence of arguments/adjuncts)
  - Representation, disambiguation and inference in a description logic framework (OWL DL) with Horn logic rule extension (SWRL)

- Plans until June 2010
Detailed formal lexical-semantic analyses of verbs

- **Different readings of **pousser**, e.g.**
  - *physical readings*
    - entailing movement of object, not entailing movement of object,...
  - *psychological readings*
    - assertive, presuppositional,...

- **Lexical-semantic representation**

  pousser $\sim\lambda y\lambda x\lambda e\lambda v[\text{Agent}(e, x) \land \text{Source}(e, v) \land$
  
  $\text{st-p}(v) = x \land \text{loc}(v) = y \land \text{dir}(v) = y \land m(v) > 0]$

- **pousser vs. encourager**, e.g.
  - 'encourager' is not derived from physical domain, therefore it is incompatible with spatial PPs.
    
    *Pierre a encouragé Marie vers le crime.*
  - 'pousser' implicates occurrence of an interacting force:
    the Pusher $x$ and $y$ (or the speaker) have inverse preferences, hence the following contrast:

    L'entraîneur a encouragé/?poussé l’équipe à gagner.
Different readings of *pousser*, e.g.

- *physical readings*
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- *psychological readings*
  assertive, presuppositional,...

Lexical-semantic representation

\[
pousser \mapsto \lambda y \lambda x \lambda e \lambda v \left[ \text{Agent}(e, x) \land \text{Source}(e, v) \land \right.
\]
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\left. \text{st-p}(v) = x \land \text{loc}(v) = y \land \text{dir}(v) = y \land m(v) > 0 \right]
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- *’encourager’* is not derived from physical domain, therefore it is incompatible with spatial PPs.
  
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- *’pousser’* implicates occurrence of an interacting force: the *Pusher* \(x\) and \(y\) (or the speaker) have inverse preferences, hence the following contrast:

  *L’entraîneur a encouragé/?poussé l’équipe à gagner.*
**Ontological type of arguments**

If the subject is inanimate, the physical reading is not available.

- *Les prix ont poussé les prix.* (figurative reading)

**Presence or absence of arguments or adjuncts**

If the subject is animate, no figurative readings (psychological/conceptual/social) in absence of any other arguments than subject and object are available.

- *Le pianiste a poussé Satie.* (physical reading)

*pousser* does not entail *per se* a movement of the object, except when combined with some directional PPs, e.g. *dans*:

- *Il a poussé la voiture (vers le garage), mais elle n’a pas bougé.*
- #*Il a poussé la voiture dans le garage, mais elle n’a pas bougé.*
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Representation, disambiguation and inference

Representation in OWL Description Logics
- Sense indicators represented as description logic axioms, e.g.
  \[ \forall \text{obj} (\exists \text{canDenote COGNITIVE\_INDIVIDUAL}) \]
  \[ \exists \text{pobj} (\exists \text{hasHead} (\exists \text{canDenote DISPOSITION})) \]
  \[ \forall \text{subj} (\exists \text{canDenote ANIMATE\_INDIVIDUAL}) \]
  \[ \ldots \]

Mapping from nouns in French EuroWordNet (EWN) to classes in SUMO (Suggested Upper Merged Ontology)
- ewn:prix₁ — maps to → subclass of sumo:CurrencyMeasure
- Partial integration of SUMO via this mapping

Disambiguation and inference
- Disambiguation through DL reasoner
- Inference calculation through Horn rules, e.g.
  \[ \text{pousser}(?e) \land \text{subj}(?e,?x) \land \text{obj}(?e,?y) \]
  \[ \rightarrow \text{PUSHING}(?e) \land \text{agent}(?e,?x) \land \text{theme}(?e,?y) \land \ldots \]
Plans until June 2010

- Extension of coverage within the following domains
  - Movement verbs
  - Psychological verbs
  - Verbs of social interaction

- Derivation of generalised descriptions for these domains and their attachment to the relevant concepts

- Full integration of SUMO classes and expression of sortal argument restrictions wrt. these

- Design of test suites containing the covered lexical items

- Evaluation of the methodology and the defined resource