A Distributional Semantic Model of Logical Metonymy

1. Type-clash in logical metonymy

- The boy started the puzzle to solve it.
- The boy started the fight to win.

- thematic model (Erk et al. 2010, Lenci 2011)
- linguistic processes (Pustejovsky 1995)
- type clash between an event-selecting verb and an entity-denoting object
- recovery of a covert event from the lexicon
- extra processing costs for metonymic constructions

2. Thematic fit: an alternative account

- “classical” selectional restrictions (binary): eat apple ([+edible] obj.)
- our take:
  - selectional preferences (graded): arrest cop vs. arrest crook (thematic fit) (McRae et al. 1998)
- Zarcone et al. 2012: thematic fit central for event recovery in logical metonymy
- the baker finished the icing to spread it
- the child finished the icing to eat it

3. Research question

Can thematic fit also predict when logical metonymy is triggered without relying on a notion of type?

- broadens type-clash accounts
- theoretical economy
- logical metonymy closer to “normal” online language comprehension process

4. A distributional model of thematic fit

- Distributional Memory (Baroni and Lenci 2010): weighted corpus-extracted <word relation word> tuples
e.g. <book obj. read> → 90
<label obj. read> → 30
<chair obj. read> → 1
- Given a <verb, obj.> pair (e.g. <begin book>)
- for each verb (e.g. begin, read), expectations for object computed as: centroid of the context vectors of the 20 most typical objects (Erk et al. 2010, Lenci 2011)
- for each object (e.g. book, story): thematic fit defined as the cosine between its context vector and the object expectation centroid

5. Evaluation method

- compute thematic fit for <verb, obj.> pairs relying only on distributional information (no information about semantic types)
- compare thematic fit differences across conditions and processing cost differences (high processing cost → low thematic fit, corresponding to 1-thematic fit in the model)
- verify if the computational model yields the same main effects and pairwise differences reported by the psycholinguistic studies

6. Sentence triplets

<table>
<thead>
<tr>
<th>metonymy</th>
<th>high-typicality</th>
<th>low-typicality</th>
</tr>
</thead>
<tbody>
<tr>
<td>finished</td>
<td>the novel</td>
<td>wrote the novel</td>
</tr>
<tr>
<td>RT</td>
<td>385</td>
<td>360</td>
</tr>
<tr>
<td>1-thfit</td>
<td>0.763</td>
<td>0.484</td>
</tr>
</tbody>
</table>
- main effect of object type (F = 20.247, p < 0.001)
- significant differences:
  - metonymic vs. high-typicality condition (W = 877, p < 0.001)
  - metonymic vs. low-typicality condition (W = 740, p < 0.001)
- no difference: high- vs. low-typicality

7. Sentence quadruplets

<table>
<thead>
<tr>
<th>metonymic verb</th>
<th>start</th>
<th>non-metonymic verb</th>
<th>see</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN the puzzle</td>
<td>EV the fight</td>
<td>EN the puzzle</td>
<td>EV the fight</td>
</tr>
<tr>
<td>RT</td>
<td>512</td>
<td>427</td>
<td>467</td>
</tr>
<tr>
<td>1-thfit</td>
<td>0.770</td>
<td>0.664</td>
<td>0.717</td>
</tr>
</tbody>
</table>
- main effect of object type (F = 8.0039, p < 0.001)
- verb/object type interaction (F = 8.3455, p < 0.001)
- significant differences:
  - metonymic vs. EN vs. EV objects (W = 208, p < 0.01)
  - EN-obj.: metonymic vs. non-metonymic v. (W = 300, p < 0.05)

8. Conclusions and future work

- the distributional model successfully replicated the results pattern from the psycholinguistic experiments (without any information about type)
- theoretical economy: thematic fit can provide a single mechanism to account for both the type-clash and the covert event recovery in logical metonymy interpretation
- future work: ECU model (Lenci 2011) integrating expectations from the grammatical subject

Bibliography


