Modeling the compositional cost of logical metonymies with Distributional Semantics

The interpretation of the so-called *logical metonymy* has received an extensive attention in both theoretical linguistics and psycholinguistics. The phenomenon, considered as a non-trivial challenge for traditional theories of compositionality (Asher, 2015), is typically described as a type clash between an event-subcategorizing verb and an entity-denoting direct object, as in the sentence *The author began the book.* The mismatch triggers the retrieval of a hidden event (the event of *writing,* in the example above), expressing the activity that is actually performed on the object noun.

Past research work in psycholinguistics brought some evidence that such metonymic constructions determine extra processing costs during online sentence comprehension (McElree et al., 2001; Traxler et al., 2002), although such evidence is not uncontroversial (see Falkum, 2011). According to the interpretation by Frisson and McElree (2008), the retrieval of the covert event is caused by the violation of the type requirement, and the extra processing costs are due to the deployment of the operations to build a coherent semantic representation of the event expressed by the sentence. Therefore, logical metonymy raises two major questions:

- how is the hidden event recovered?
- What is the relationship between the retrieval mechanism and the increase of the processing costs?

In our contribution, we firstly introduce *a general model of sentence comprehension*, which combines insights from recent research in computational semantics, psycholinguistics and cognitive science. We assume that a *Generalized Event Knowledge* (GEK) about events and their typical participants is stored in the semantic memory (McRae and Matsuki, 2009), that this knowledge is activated by the lexical items during sentence processing and that the activated portions of the GEK are then unified to form a coherent representation of the event expressed by the sentence. The main idea is that the processing costs of a sentence are related to two main semantic factors, namely i) the availability of ready-to-use event information that is strongly activated by the lexical items, and ii) the semantic coherence of the described event, which is conceived in terms of the mutual typicality

between the event participants.

Secondly, within this general framework, we propose to use *Distributional Semantic Models* (Lenci, 2008; Turney and Pantel, 2010) to account for two different aspects of logical metonymies, i.e. the retrieval of the covert event and the higher processing costs for metonymic constructions.

By testing our model on the datasets from McElree et al. (2001) and Traxler et al. (2002), we show that it achieves a good performance in identifying the covert event in a classification task, and that it accurately reproduces the processing time differences across the experimental conditions of the original studies.

References

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