Fitting, Not Clashing!
A Distributional Semantic Model of Logical Metonymy

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1. Type-clash in logical metonymy

* *The boy **started** the puzzle ⇨ to solve*
↕
* *The boy **started** the fight*

* linguistics (Pustejovsky 1995):
  * **type clash** between an event-selecting verb and an entity-denoting object
  * **recovery** of a covert event from the lexicon

* psycholinguistics (McElree et al, 2001, Traxler et al. 2002):
  * extra processing costs for metonymic constructions

29+104 **sentence triplets** (McElree et al. 2001, Traxler et al. 2002)	*the writer **finished** / **wrote** / **read** the novel* (**metonymy** vs. **high-** vs. **low-** typicality) • **main effect of verb type on reading and eye tracking times** • **highest processing costs for the metonymic condition** • **no significant differences between high- vs. low- typicality conditions**
31 **sentence quadruplets** (Traxler et al. 2002)	*the boy **started** / **saw** the **puzzle** / **fight*** (**metonymic** vs. **non-metonymic** verb; **entity-denoting** vs. **event-denoting** object) • **main effect of object type on reading and eye tracking times** • **verb * object interaction** • **highest processing costs for the metonymic condition**

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***
  * ***the child finished the icing ⇨ to eat***

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 *obj.* (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

	metonymy	*high-typicality*	*low-typicality*
	***finished** the novel*	***wrote** the novel*	***read** the novel*
RT	385	360	361
1-thfit	0.763	0.484	0.571

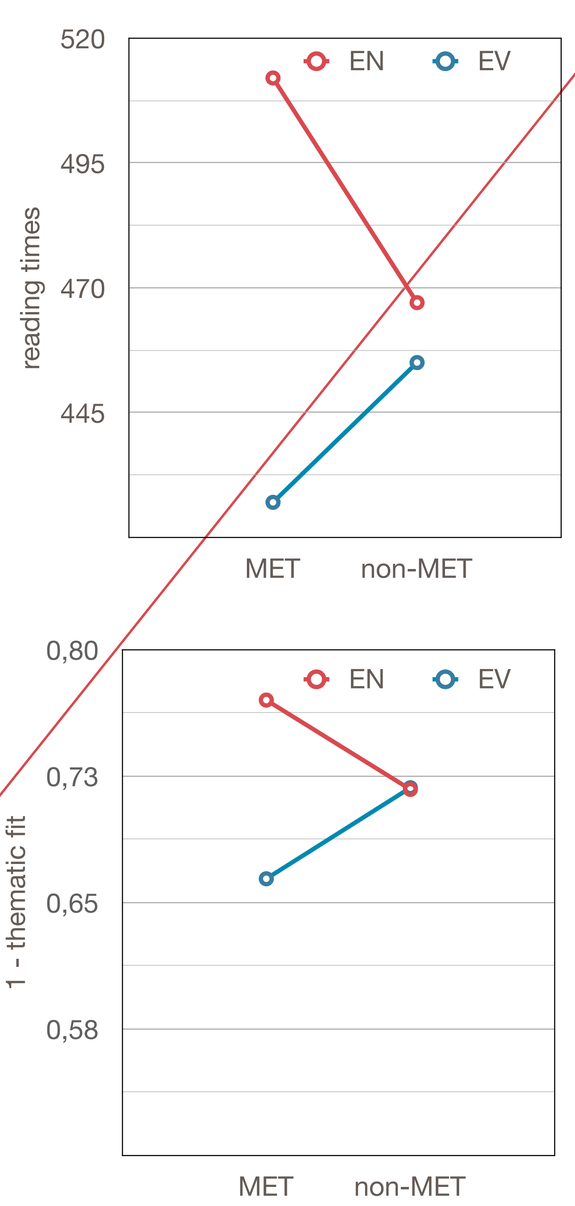
* main effect of object type ($F = 20.247$, $p < 0.001$)
* significant differences:
  * metonymic vs. high-typicality condition ($W = 877$, $p < 0.001$)
  * metonymic vs. low-typicality condition ($W = 740$, $p < 0.001$)
* no difference: high- vs. low- typicality

7. Sentence quadruplets

	*metonymic verb **start***		*non-metonymic verb **see***	
	*EN **the puzzle***	*EV **the fight***	*EN **the puzzle***	*EV **the fight***
RT	512	427	467	455
1-thfit	0.770	0.664	0.717	0.718

* main effect of object type ($F = 8.0039$, $p < 0.01$)
* verb*object type interaction ($F = 8.3455$, $p < 0.01$)
* significant differences:
  * metonymic verbs: EN vs. EV objects ($W = 208$, $p < 0.01$)
  * EN-obj.: metonymic vs. non-metonymic v. ($W = 300$, $p < 0.05$)

reading time study (Traxler et al. 2002)



thematic fit model

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

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The research for this paper has been funded by the German Research Foundation (DFG) as part of the Graduate school of the SFB 732 at the University of Stuttgart.