

An expectation-based account of logical metonymy interpretation

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Logical metonymies (e.g. *the student began the book*) have often been treated as a case of type-clash (Pustejovsky 1995): an event-subcategorizing verb (*begin*) is combined with an entity-denoting object (*the book*), leading to (1) extra processing costs, ascribed to coercion, a compositional operation needed to construct an event sense for the object (Frisson and McElree 2008) and (2) the recovery of a covert event from complex lexical entries (*object* → *reading, writing*). Nevertheless, Lascarides and Copestake (1998) have observed that lexical information is not enough to account for the range of interpretations in logical metonymy (for example, to retrieve the interpretation for *My goats eat anything. He really enjoyed your book*). They claim that pragmatic inference is often needed to retrieve discourse-relevant interpretations, and thus advocate for an interaction between lexicon and pragmatics. While focusing on the role of type clash, previous experimental studies on logical metonymy have only marginally considered effects of discourse in logical metonymy interpretation (but see de Almeida and Dwivedi 2008) and their interaction with type.

Selectional preferences are shaped by generalized event knowledge (Matsuki et al. 2011), which can be described in terms of thematic fit, that is, the typicality of a filler for an argument slot (e.g., the fact that *eat* requires a [+edible] object or that *thief* is a more fitting object for *arrest* than *policeman*). Thematic fit can be influenced by inter-sentential context but also by a wider discourse context; psycholinguistic studies have shown how people make extensive use of knowledge of typical scenarios to exploit contextual cues and build expectations about upcoming input in language (that is, input with the highest thematic fit with previous context, McRae et al. 1998; Matsuki et al. 2011).

We propose a first step towards an expectation-based account of logical metonymy interpretation, where processing costs for logical metonymies are modulated by discourse-driven expectations about upcoming input. We suggest that thematic fit plays an important role in logical metonymy interpretation, by (1) distinguishing metonymic contexts (*begin* has a low thematic fit for entity-denoting objects such as *book*, making *book* a less expected object for *begin* than an event-denoting object), and (2) determining the most expected interpretation (the interpretation with the highest thematic fit with the context: *the author began the book* → *writing*, *the student began the book* → *reading*, Zarccone and Padó 2011).

In order to investigate the role of thematic fit in logical metonymy interpretation, we designed a self-paced reading study, by exploiting German sentence structure and manipulating the object type (entity- vs. event-denoting) and its thematic fit (high vs. low) with the upcoming metonymic verb:

Das Geburtstagskind hat **mit den Geschenken / der Suppe / der Feier / der Schicht** sofort angefangen, obwohl seine Mutter nicht da war.

The birthday boy has **with the presents / the soup / the party / the shift** straight away started, although his mother was not there.

Each participant saw a version of each sentence with one of four possible objects (entity-denoting and high-thematic fit, entity-denoting and low-thematic fit, event-denoting and high thematic fit, event-denoting and low thematic fit). This design allows us to disentangle effects of thematic fit and type-clash, and to evaluate if the coercion cost triggered by the type clash (at the verb region and post-verbal regions) can be modulated by varying the thematic fit of the objects. Traditional accounts of logical metonymy predict an effect of object type (entity-denoting vs. event denoting object), whereas a pure thematic fit based account would predict an effect of thematic fit, regardless of object type.

Compared to previous studies on logical metonymy, our study presents several novel elements. We manipulate thematic fit / typicality in a different way than Frisson and McElree 2008, by contrasting high- and low- typicality objects, and high- and low-typicality interpretations. Previous studies like Traxler et al. 2002 compared reading times of entity- and event-denoting objects (e.g. *fight*, *puzzle*) as objects of metonymic objects (*begin*), whereas the structure of our test sentences allows us to present the same lexical part of the verb (*angefangen*), after one of four different objects (*Geschenken*, *Suppe*, *Feier*, *Schicht*)

	Entity-denoting object		Event-denoting object	
	high them. fit	low them. fit	high them. fit	low them. fit
Obj. (<i>mit der Feier</i>)	642 (285)	667 (317)	655 (262)	710 (356)
Adv (<i>sofort</i>)	656 (280)	693 (292)	644 (275)	682 (275)
V (<i>angefangen</i>)	819 (533)	802 (470)	736 (525)	806 (459)
V+1 (<i>obwohl</i>)	508 (166)	520 (525)	473 (143)	505 (162)

Table 1: Mean reading times (ms) and standard deviation for the critical regions.

We analyzed our results (N=48, see Table 1) by means of mixed-effect models. No effects of object type and thematic fit were yielded before the object position and beyond the V+1 position. At the object region reading times were longer for event-denoting objects ($t = -2.197, p < 0.05$) and for objects with low thematic fit (2.284, $p < 0.05$), and no significant interaction. The effect of thematic fit lingered at the adverb position ($t = 2.193, p < 0.05$), where no effect of object type or interaction were found. At the V position event-denoting objects yielded shorter reading ($t = 2.193, p < 0.05$) - the effect qualifies as an interaction with thematic fit ($t = 2.04, p < 0.05$). At the V+1 position, where traditionally the coercion effect was found (see McElree et al 2001 and Traxler et al 2002), we found that both object type ($t = 2.83, p < 0.01$) and thematic fit ($t = -3.325, p = 0.01$) influence reading times, with the lowest processing costs for sentences with event-denoting objects and high object-verb thematic fit.

Interestingly, the event-denoting objects, which are not supposed to give rise to type clash for the metonymic verbs, did not prevent the extra processing costs coming from their low thematic fit with the subject-verb combination: the coercion costs due to the coercion operation can be modulated by varying the thematic fit of the object for the subject-verb combination. At the verb region expectations for a metonymic verb were eased by event-denoting objects, but only if the thematic fit of the object was high.

For the moment, the scope of our study is limited to intra-sentential context, but acknowledging the role of generalized event knowledge and thematic fit in logical

metonymy advocates for a more dynamic model of lexical access in context (in the fashion of the word-as-cues paradigm, Elman 2011), where logical metonymy can provide an interesting test case for building expectations based on contextual cues.

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