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When arguments don't fit with verbs: Interdisciplinary approaches to metonymy and coercion

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Invited speakers

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"The ontology of dual aspect nouns"

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"We don't coerce"

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"Processing of regular metonymy: computational and neurological studies"

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Project D6 "Lexical-semantic factors in event interpretation"
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Proceedings of

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Table of Contents

The ontology of dual aspect nouns

Alexandra Arapinis
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Among the various sorts of metonymy that have been studied in the literature, I will focus on the particular case of dual aspect nouns like 'book', 'school', 'lunch' etc. What is particularly interesting about them is that their polysemic behaviour appears to reflect the different ontological "aspects" making up the denoted entity. More importantly, though constitutive of a unified denotational entity, these aspects appear to have incompatible conditions of identity and individuation. Thus, any particular book is in a sense made up of an informational abstract content and a physical support; a lunch is an event that unfolds through time, but is also made up of edible stuff; a school is an abstract institution, but is also constituted of humans like teachers and students, and is most of the time located in a given building, etc. Now, all these phenomena have recently been analysed by computational linguists like Pustejovsky (1995) and Asher (2011) by means of a new sort of complex lexical types, viz. dot-types, made out of a number of simple disjoint types corresponding to each aspect of the denoted entity.

The issue is that, though such dot-types have proven very helpful in handling dual aspect nouns in a formal semantic framework, they are nevertheless conceptually puzzling and in need of further explanation and justification. Focussing on the particular case of institutional dual aspect nouns (e.g.
'church', 'school', 'bank', etc.), I will argue that looking at the ontology of the denoted entities can help attain a better conceptual grasp of such complex types. I will thus take a brief philosophical incursion into institutional ontology to introduce the notion of an ontologically stratified entity, viz. an
entity that depends on, is grounded in, heterogeneous ontological strata. As I will argue, the polysemic behaviour of dual aspect nouns reflects the stratified nature of the denoted entity, while the "dot" is a generic way of pinning the various ontological dependence relations cementing heterogeneous strata into a unified whole. Beyond the conceptual interest of adopting such an ontological prism, I will further show that ontological insights are crucial for solving a number of open co-predication puzzles.

We don’t coerce

Roberto G. de Almeida
Concordia University

In linguistics, psycholinguistics, and cognitive neuroscience, it is almost a consensus that understanding a putatively indeterminate sentence such as “The man began a book” entails a process by which the nominal complement is “coerced” into an activity performed with the book. Most studies have suggested that this coercion process relies to a large extent on the information contained in the lexical representation for “book”. In this talk I will argue against this view. I will show that psycholinguistic evidence for coercion is slim; that coercion effects stemming from psycholinguistic studies (e.g., longer reading times for “coerced” constructions) do not constitute evidence for lexical-semantic coercion; and that linguistic analysis of “coerced” sentences can account for much of the coercion effects in terms of structurally-determined positions for pragmatic enrichment.

I will also discuss two sets of experiments suggesting that coercion effects might be due to pragmatic processes, not lexical-semantic decomposition of complement nouns. The first shows that the interpretation of indeterminate sentences can be modulated by context and that context creates enriched (but false) memories for these sentences over time. The second shows that in both MEG and fMRI experiments alike neural mechanisms involved in higher-level pragmatic processes are also involved in processing indeterminate sentences—more so than in fully determined control sentences. These two lines of empirical work suggest that indeterminate sentences are first processed minimally as denotations and are enriched by possibly abductive pragmatic processes.

Processing of regular metonymy: computational and neurological studies

Katja Markert
University of Leeds

This talk will complement the workshop focus on logical metonymy by looking at "regular" metonymy, i.e. cases such as sentence (1) where "Lockerbie" stands for the air disaster near the Scottish town "Lockerbie"

(1) Because of Lockerbie, the United States still shun Qaddafi.

I will first present computational studies on the automatic recognition and interpretation of such metonymies, arguing that for a large portion of them no knowledge-intensive search or inference procedure is necessary. Instead they can be handled via classification algorithms in a machine learning paradigm. I will present a publicly available dataset annotated for metonymy, whose analysis supports that position. In addition, I will analyse the results of my own as well as 6 other systems for metonymy resolution on that dataset, showing that the machine learning approach can successfully resolve a substantial percentage of metonymies.
However, this evaluation will also make clear that, although successful to a certain degree, the state-of-the art in metonymy resolution has plateaued. I will discuss what is in my view necessary to push forward the state of the art in the future.

In the second part of my talk, I will present recent experiments on human processing of metonymies using event-related functional magnetic resonance imaging (fMRI). This is the first functional imaging study on metonymy, concentrating on healthy subjects. We show that reading metonymies relative to literal sentences reveal signal changes in a predominantly leftlateralized fronto-temporal network with maxima in the left and right inferior frontal as well as left middle temporal gyri. Activation of this network in our study might be a correlate of integrating semantic and world knowledge during comprehension of metonymies. We compare our results to the prediction of linguistic theories of lateralization of figurative language. Hemispheric lateralisation during metonymy processing is also of clinical interest, since some patient populations show altered metonymy comprehension skills. These are for example patients with autism or schizophrenia. A possible, still yet speculative assumption is that dysfunction or delayed development of the fronto-temporal network that was detected in our investigation plays a role in defective metonymy appreciation in these disorders. We are currently investigating the fMRI correlates of metonymy resolution in schizophrenia using an identical paradigm.

The computational work was conducted in collaboration with Malvina Nissim (University of Bologna) and the neurological work in collaboration with Alexander Rapp and colleagues (University of Tuebingen).

A Pragmatic Account of 'Logical Metonymy'

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Abstract

This paper discusses the computational linguistic account of 'logical metonymy' (*Susan began the book, Mary enjoyed the movie*) in which these constructions are analyzed as being interpreted by means of a lexicon-internal generative mechanism operating over information-rich lexical entries. It points out several empirical and theoretical problems with the theory, which it claims make it ultimately unworkable. The paper then suggests an alternative, pragmatic account of the logical metonymy phenomenon, where its interpretation is governed primarily by the operation of pragmatic inferential processes. It is argued that this provides a more explanatory, psychologically plausible account that is capable of avoiding the problems associated with the computational linguistic account.

Keywords: logical metonymy; computational linguistics; generative lexicon; inferential pragmatics; processing.

Introduction

Computational linguistic accounts have influentially argued that 'logical metonymy' of the kind in (1) is interpreted by means of a lexicon-internal generative mechanism that forces a non-conventional reading of the complement (Copestake & Briscoe, 1996; Lascarides & Copestake, 1998; Pustejovsky, 1995). [1]

(1) Susan began a book.

Constructions of this kind are seen as involving a verb that subcategorizes for an NP or a progressive VP syntactically, but which semantically requires a complement with an eventive interpretation. In cases where this requirement is not satisfied by the surface syntactic structure, as in (1) above, a coercion mechanism changes the denotation of the NP from an entity into an event consistent with eventive information stored as part of the lexical representation of the noun.

This type of approach was originally proposed by Pustejovsky (1991, 1995), whose main aim was to provide a more explanatory account of 'logical polysemy' (words with two or several "overlapping, dependent or shared meanings" (Pustejovsky, 1995: 28)) than a mere listing of senses in the lexicon. A more promising approach, he argued, which captures how word senses may partially overlap and be logically related to one another, is a lexicon where items are decomposed into information-rich templates, combined with a generative framework for the composition of lexical meanings. In Pustejovsky's generative lexicon theory (GLT) nouns encode so-called *qualia structures*, which specify four different aspects of meaning: (i) the *constitutive* role captures the distinction between an object and its constitutive parts; (ii) the *formal* role specifies what distinguishes the object within a larger domain; (iii) the *telic* role defines the purpose or function of the object; and (iv) the *agentive* role describes the factors involved in the origin or 'bringing about' of an object.

book	
ARGSTR =	ARG1 = **x:information**
	ARG2 = **y:phys_obj**
QUALIA =	**information.phys_obj_lcp**
	FORMAL: **hold(y,x)**
	TELIC: **read(e,w,x.y)**
	AGENTIVE: **write (e´,v,x.y)**

Figure 1: Qualia structure for the lexical concept BOOK, as presented in Pustejovsky (1995: 101).[2]

For logical metonymies such as (1), Pustejovsky posits a single lexical entry for the verb (instead of assuming that it is represented as different lexical entries, one for each syntactic complement type it may select for) which specifies that its internal argument must be of the type Event. The interpretation of the VP arises from a generative mechanism called 'type coercion', which is a "semantic operation that converts an argument to the type that is expected by a function, where it would otherwise result in a type error" (ibid. 111). In this way, the semantic processing of the VP in (1) involves the selection of appropriate event information encoded in the qualia structure of the noun (in this case its *telic* role: books are for reading (by humans)), which yields the interpretation 'Susan began reading a book'.

An advantage of the generative lexicon theory is that it accounts for clear interpretive tendencies for logical metonymies in uninformative contexts, e.g., that the preferred or 'default' interpretation of (1) in the absence of any further contextual cues would be that 'Susan began

[1] These constructions are referred to as a form of 'logical metonymy' because the 'logical' structure of the verb forces an interpretation upon the NP complement in which part of an event (*a book* in (1)) is used to 'stand for' the event as a whole ('reading a book').

[2] Pustejovsky treats the noun *book* as an instance of a 'lexical conceptual paradigm', or 'dotted type', in which its physical object sense, its information sense as well as the combination of the two are encoded.

reading a book' (and not that she, e.g., began ripping it up). In fact, the availability of such 'default' interpretations is often taken as evidence of a linguistic-semantic process; the claim is that if the lexicon does not propose such a sense (by providing a telic role in the lexical entry for the noun that allows for the compositional interpretation to be generated), it is unclear how it can arise since it is not otherwise indicated by the context.

Notwithstanding its intuitive appeal, there are several problems associated with this approach, as pointed out by a number of scholars (Asher, 2011; Blutner, 2002; de Almeida, 2004; de Almeida & Dwivedi, 2008; Fodor & Lepore, 2002). In what follows, I discuss some of these problems and suggest an alternative, pragmatic account of logical metonymy. I argue that a pragmatic approach is more explanatory and psychologically plausible and avoids the problems associated with GLT-based accounts.

Problems with GLT-Based Accounts

A common criticism of Pustejovsky's (1995) computational account of logical metonymy is that it lacks a distinction between linguistic knowledge and general world knowledge. For instance, there seem to be many cases in which a verb makes a demand on a complement that the lexical entry for that argument does not satisfy. Consider the utterances in (2) and (3):

(2) Peter enjoyed the nice weather.
(3) Karen enjoyed the children.

If the intended interpretations of (2) and (3) are that 'Peter enjoyed being outside in the nice weather' and 'Karen enjoyed playing with the children', it is difficult to see how they could be generated as there would arguably be no telic roles stored in the lexical representations for the nouns *weather* and *children* for the type coercion mechanism to take as input to the compositional process. So either one has to assume that in these cases the interpretations are derived entirely by pragmatic means, by contrast with, for instance, *Karen enjoyed the book*, which, if the intended interpretation is that 'Karen enjoyed reading the book', would be linguistically generated by the type coercion operator on the basis of the telic role for the lexical concept BOOK. Or, one could assume that there is in fact some eventive information stored as part of the lexical entries for *weather* and *children* that allows for the interpretations above to be generated. Indeed, there seems to be nothing in the theory that prevents this possibility, which opens up for a range of *ad hoc* solutions to the many cases in which a qualia structure is difficult to define for a lexical item. Moreover, if this route is taken, the lexical entries posited by the theory would seem to contain a considerable amount of information that is more likely to belong to the conceptual system than to the level of linguistic representation, and there would appear to be no way of constraining the amount of world knowledge entering into the lexical representation of a given lexical item.

A related criticism can be provided against the claim that the availability of 'default' interpretations in uninformative contexts is evidence of a linguistic-semantic process. It appears that this claim considerably underestimates the fact that hearers rarely come to the interpretation process 'empty-handed', as it were; utterances are not understood in a vacuum. Arguably there are hardly any context-free interpretations. This point is worth emphasizing since the existence of such clear interpretive tendencies is often seen as providing a prime motivation for a linguistic, lexicon-based analysis of logical metonymy and to provide a strong argument against the possibility of a pragmatic analysis. For instance, Asher (2011: 93) writes, "[p]ragmatic approaches … fail to say anything relevant about the cases of coercion like *John enjoyed his glass of wine* or *Mary enjoyed her cigarette* in out of the blue contexts". However, pragmatic theories of utterance comprehension emphasize that a crucial task for the hearer in utterance comprehension is to choose a set of contextual assumptions against which the utterance is to be understood (Sperber & Wilson, 1986/1995; Wilson & Sperber, 2004); this also goes for the interpretation of utterances in 'out of the blue contexts'. This set of assumptions – a subset of the hearer's assumptions about the world – may include assumptions derived from the observation of the physical environment, encyclopedic knowledge, memories and beliefs as well as the preceding context. When the assumptions that the hearer may derive from the linguistic and extra-linguistic context are scarce, he may rely more on information stored in his long-term memory in his interpretation of the utterance. Given this, it is possible that interpretive preferences observed for logical metonymies in the absence of further context could stem from highly accessible real-world knowledge about the denotations of the lexical concepts in the utterance, and not from lexically stored information. At least it seems clear that in its generation of compositional interpretations the type coercion mechanism posited by the GLT makes heavy use of information that might just as well count as general world knowledge, and no justification seems to be given for why certain information is considered linguistic knowledge while other types of information would be considered part of our general world knowledge.

It has also has also been held against the GLT that it cannot avoid making wrong predictions about many compositional interpretations. For instance, it predicts that the VPs *begin the car* and *begin the thermometer* should be interpreted as 'begin driving the car' and 'begin measuring the temperature', due to the telic roles that would be associated with the complement nouns (cars are for driving; thermometers are for measuring temperatures) (Fodor & Lepore, 2002). It is unclear what would prevent such interpretations from being constructed as 'default' on the computational account.

A related problem that has been pointed out in connection with a GLT-based account of logical metonymy is that, by modeling the processing of such constructions entirely in terms of a lexicon-internal process, it is unable to account

for its inherently flexible nature. For instance, while its true that the tendency to interpret the VP *begin a book* as 'begin reading a book' holds when the VP is considered in isolation (in a 'null' context) a more specific context may easily point the hearer toward a different interpretation. Consider the utterance in (4) below, being interpreted in the following context:

Context: *Mary, John and Sue work as book conservators at the British Museum. They are working on restoring a collection of medieval books, all of which are in a poor condition after having been stored on the shelves for many years. Since they are completely covered in dust, each book has to be carefully dusted before being rebound. One day, after hours of hard work, John asks if they should all take a break and go for coffee. Sue has just finished her pile of books and is ready to follow John to the coffee bar in the Great Court when Mary utters:*

(4) [Mary]: Hang on a minute! I've just begun a huge old book.

The most accessible interpretation of the last part of Mary's utterance above is clearly that she has begun *dusting* a huge old book, not reading it, as would be the default interpretation predicted by the GLT, and which would have to be computed and then overridden by context in this case. It does not take much imagination to think of other contexts in which the correct (i.e. speaker-intended and easily retrieved) interpretation of the VP *begin a book* would be 'begin binding a book', 'begin designing a book', 'begin mending a book', 'begin ripping up a book', and so on. The problem for the GLT is that it is unable to predict such interpretive flexibility (which would involve taking speaker intentions into account), even if the predictions it makes are in many cases correct. Furthermore, the treatment of compositional interpretations generated by the linguistic system as being defeasible, which would be required by examples such as (4), raises the question as to whether we want our semantics to include defeasibility when we have already got it as part of our pragmatic system. At least, some justification has to be given for why we could not just leave this to pragmatics, using information from the immediate context as well as general world knowledge to construct speaker-intended interpretations.

A final theoretical consideration is the significant amount of work that the computational linguistic account leaves for the pragmatic interpretive system to do, in overriding default interpretations in the absence of linguistic cues and correcting the wrong interpretations generated by the system. In principle, a pragmatic theory that can serve this purpose should also be capable of handling that part of the interpretive work that the computational linguistic account does adequately (see Žegarac, 2006 for a similar argument). In the next section, I give the outlines of such a pragmatic account.

A Pragmatic Account

My proposal for a pragmatic account of logical metonymy is grounded within the relevance-theoretic approach to pragmatics (Carston, 2002; Sperber & Wilson, 1986/1995; Wilson & Sperber, 2004), which is fundamentally a cognitive account of utterance interpretation. Sperber and Wilson's (1986/1995: 260) central claim about human information processing is stated in their *Cognitive Principle of Relevance*: "Human cognition tends to be geared to the maximization of relevance". Relevance is defined as a potential property of all types of input to cognitive processes, and may be assessed in terms of the amount of effort it takes to process the input, and the 'positive cognitive effects' the individual may derive from it (where a positive cognitive effect is described as a 'worthwhile difference to the individual's representation of the world'). Other things being equal, the more cognitive effects an input yields to an individual and the less effort it takes to process it, the higher the degree of relevance of that input to that individual at that time.

Sperber and Wilson (1986/1995) further claim that ostensive stimuli in the form of utterances create expectations of relevance not raised by other types of stimuli, which are precise and predictable enough to guide the hearer toward the communicator's meaning. This is stated in their *Communicative Principle of Relevance*: "Every act of ostensive communication communicates a presumption of its own optimal relevance" (ibid. 260). By requesting the addressee's attention, the communicator conveys that her ostensive act is more relevant than alternative stimuli competing for his attention at the time. An utterance is optimally relevant if (a) it is at least relevant enough to be worth processing and (b) it is the most relevant one compatible with the speaker's abilities and preferences (ibid. 270). To make her utterance optimally relevant, the speaker should achieve at least enough cognitive effects to make the utterance worth processing while avoiding causing the hearer any gratuitous effort in achieving those effects. The hearer's goal in communication is to find an interpretation of the speaker's meaning that meets the expectations of relevance raised by the ostensive stimulus itself.

In this framework, the distinction between linguistic semantics and pragmatics is seen as corresponding to different processes involved in utterance comprehension: linguistic decoding of the utterance into a 'logical form' (a 'template' or 'schema' for a range of possible propositions), and pragmatic inference, which develops the logical form into a full proposition (Carston, 2002; Sperber & Wilson, 1986/1995; Wilson & Sperber, 1993).[3]

On this pragmatic account, the speaker-intended event associated with the VP in instances of logical metonymy

[3] This is, of course, a kind of abstraction since in actual on-line processing the decoded words/morphemes are delivered rapidly to the pragmatic processing system (which does not 'wait' to get the logical form as a whole).

(e.g. 'begin *reading* a book') would be derived entirely by means of a pragmatic process. Either the interpretation of these constructions could be analyzed as instances of 'free' enrichment (e.g., Carston, 2002; Recanati, 2002), where a constituent not expressed in the linguistic form of the utterance is supplied in forming a hypothesis about the proposition that the speaker intended to communicate. Or, as de Almeida and Dwivedi (2008) suggest, the pragmatic derivation of speaker-intended meanings for logical metonymies could be analyzed as being structurally driven, that is, as a form of *saturation* (or linguistically mandated completion).[4] On this approach, which I tend to favor due to the mandatory character of this process, the syntactic structure of sentences such as *Susan began a book* could be seen as containing an extra VP with an empty verbal head, as shown by (5) (de Almeida & Dwivedi, 2008: 316):

(5) Susan began $[_{VP}\ [_{V}{}^{0}\ \mathbf{e}]\ [_{NP}$ a book]]

The verbal gap that remains in the logical form of such constructions would have to be filled in (saturated) using information from the discourse context. The process itself would be linguistically mandated and consist in supplying a missing constituent to the proposition expressed, but the relevant event associated with the VP would be supplied entirely on pragmatic grounds. Returning to the example in (4), where the intended interpretation of the last part of Mary's utterance is that she 'just began *dusting* a huge old book', this would be the most relevant interpretation that the hearer could derive. It would be the one that requires the least processing effort as well as the one that is relevant in the expected way (by offering an adequate explanation for the content of Mary's previous utterance of 'Hang on a minute!'). At no stage in the interpretation process, therefore, is it assumed that a 'default' interpretation is computed and then cancelled by context.

Now consider again the VPs *begin the car* and *begin the thermometer*, for which the computational linguistic account makes wrong interpretive predictions ('begin driving the car', 'begin measuring the temperature'). The pragmatic account proposed here would, of course, come with no such interpretive predictions, but it would equally require that an event be supplied when the VPs are embedded within an utterance in a context. Consider the context of a garage where Bill is employed as a mechanic. In this context, it is easy to imagine the most relevant interpretation of an utterance of *Bill began the car* being that 'Bill began repairing the car' (that is, the least effort demanding interpretation which yields the expected sort of cognitive effect(s)). However, a speaker using the VP *begin a car* to describe a situation in which someone began *driving* a car would (in most cases, at least) not be optimally relevant, as the choice to use this expression rather than the more conventional *start the car* would, in most circumstances, due to the extra effort of processing it would induce, send the hearer off searching for additional effects, which would not be part of the speaker's intended meaning.

However, there is not much doubt that computational linguists are right in claiming that certain interpretations come more readily to mind than others in uniformative contexts. Returning to the example in (1), it is true that it would probably most often be interpreted as meaning that 'Susan began reading a book' in the absence of any real-life contextual constraints. As I have already mentioned, the 'default' character of this interpretation could, rather than arising from the operation of a linguistic-semantic process, stem from highly accessible real-world knowledge about books, activated by the decoding of the lexical concept BOOK. In the processing of this utterance in an 'out of the blue' context, this could be seen as an instance of hearers favoring the least effort-consuming conceivable interpretation. A person reading a book may be regarded as a stereotypical event, which may be stored in encyclopedic memory as a chunk and accessed as a single unit of information. Retrieving this information from encyclopedic memory during the interpretation of (1) would require little processing effort, whereas deriving an interpretation according to which she began, e.g., dusting, designing, mending, or ripping up a book would involve accessing several units of information and hence be more costly in processing terms. In this way, it is possible to provide an account of why certain interpretations are often favored over others without being committed to the view that these are always computed first as a result of default inferences associated with lexical items.

A crucial difference between the relevance-theoretic pragmatic analysis of logical metonymy and computational linguistic accounts is the status of the information used to derive compositional interpretations; whether it is seen as being encoded as part of the semantics of the VP or merely contingent, stored as part of the hearer's encyclopedic knowledge and made accessible by the decoding of the lexical concepts in the utterance. As I see it, a clear advantage of the latter analysis is that, instead of postulating default interpretations that can be overridden in the case of explicit contextual evidence pointing to a different ('non-default') interpretation, it allows for, in fact predicts, the necessary flexibility in lexical interpretation (which is constrained, however, by the hearer's expectation of relevance).[5]

[4] Either way, however, the recovery of the specific activity associated with the VP would be a matter for context and pragmatic inference.

[5] Within the cognitive linguistic framework, logical metonymy has been discussed by Langacker (1984, 2000) as a so-called 'active-zone phenomenon', in which "[t]hose portions of an entity which participate most directly in a relationship … constitute its *active zone* with respect to that relationship" (2000: 62). In a logical metonymy such as *I started my dissertation – planning it, that is.*, Langacker's claim is that the event of *planning* constitutes the active zone of *my dissertation* with respect to *start*. Words, in this theory, are thought to provide a point of access to the entire knowledge inventory associated with a particular lexical concept, and the active zone can be seen as that part of this knowledge which is relevant or active within a particular utterance on a given

Recently, Asher (2011; Asher & Pustejovsky, 2006) has proposed a formal account of word meaning and semantic composition that builds on the central ideas of the GLT as developed by Pustejovsky (1995) and others, but which, unlike the GLT, is capable of integrating context dependence at the discourse level. In short, in Asher's 'type composition logic' each word stem is assigned a type. Predicates place type presuppositions on their arguments, which their arguments must satisfy, or at least be compatible with, if the predication is to be semantically well-formed. Logical metonymy is analyzed as an instance of coercion, or a type conflict, where there is an adjustment in predication due to the justification of a type presupposition (for instance, the internal argument type presupposition for *enjoy* is of the type EVENT). Unlike the GLT, however, the coercion mechanism in Asher's framework is more flexible in that it is able to make use of arguments other than the internal argument of the licensing verb, as well as of world knowledge and discourse information, in specifying the relevant event associated with it. However, the account retains the idea in GLT of default interpretations of logical metonymies being generated by the linguistic system by postulating defeasible 'type specification rules', which predict, for instance, that if the subject of the construction *Susan enjoyed the book* is specified as HUMAN, and we, by coercion, derive the interpretation that Susan enjoyed an event associated with the book, that event is by default one of reading the book (similarly, if the subject is specified as AUTHOR this event would by default be one of writing the book). Such default readings can be overridden if there's another reading made salient by the context.

Psycholinguistic Studies of Logical Metonymy

The different predictions made by computational linguistic accounts and the pragmatic account I have proposed in this paper have, to some extent, been subject to psycholinguistic experimental testing. Recently there has been a string of publications investigating the processing of logical metonymy, addressing the issue of whether it involves the application of lexicon-internal generative mechanisms to a semantically complex lexical entry or the operation of a general pragmatic-inferential process to atomic concepts. Several studies have been taken to provide support for so-called 'type-shifting effects', that is, an extra processing lead hypothesized to result from the operation of a type coercion mechanism (McElree, Frisson, & Pickering, 2006; McElree, et al., 2001; Pickering, McElree, & Traxler, 2005; Traxler, Pickering, & McElree, 2002). For instance, using a self-paced reading experiment, McElree et al. (2001) found that logical metonymy (e.g., *The secretary began the memo before the annual sales conference*) induced longer reading times, hence were associated with greater processing complexity, compared to preferred constructions (e.g., *The secretary typed the memo before the annual sales conference*) and non-preferred constructions (e.g., *The secretary read the memo before the annual sales conference*). Others, however, are more skeptical (de Almeida, 2004; de Almeida & Dwivedi, 2008) about the existence of such effects. For instance, McElree et al.'s result was not replicated by de Almeida (2004), who, in two self-paced reading experiments did not obtain any 'type shifting effects' in cases where no context was provided before the sentence and where the sentences where embedded in contexts that specified the nature of the activity performed over the complement VP. In a recent survey of empirical studies of the processing of logical metonymy, de Almeida and Dwivedi (2008) argue that the empirical results favoring the existence of a type coercion mechanism are at best weak, and that even if there exist such 'coercion' effects, there are other possible explanations for them (for instance, they could result from verbal gaps in the logical form of such constructions which require contextual saturation, as suggested above). As this shows, the available experimental evidence is far from conclusive. Not only are the results obtained to some extent conflicting, but if there were to be found evidence of an extra processing load in the interpretation of logical metonymies it seems that it would be compatible with both a computational approach and a pragmatic approach, thus offering no support for either over the other. Thus, more research, using more fine-grained experimental techniques, would be needed in order to settle this debate.

However, as I have already mentioned, an important theoretical motivation for a re-analysis of logical metonymy in pragmatic terms is the fact that computational linguistic accounts, in spite of their incorporation of considerable amounts of world knowledge into the lexicon (in the form of, e.g., 'qualia structures'), still leave a lot of work for the pragmatic system to do in finding the interpretation that was intended by the speaker on a given occasion (specifically, in overriding 'default' interpretations in contexts where another 'non-default' interpretation was clearly intended). I claim that the wholly pragmatic, relevance-theoretic account is able to do this work, *as well as* that part of the interpretive work that a computational account does adequately. The question, then, becomes whether anything is to be gained in deriving some interpretations in one way (via a lexicon-internal mechanism) and others in a distinct way (via a pragmatic mechanism). Certainly, considerations of theoretical economy would favor the unitary pragmatic approach.

Conclusion

The central question in this paper has been whether logical metonymy should be seen as being processed by means of

occasion of use. Thus, this approach resembles, in several respects, the relevance-theoretic account of logical metonymy that I have given above. However, a crucial difference is the status of linguistic knowledge within the two approaches: while the encyclopedic semantics generally adopted in cognitive linguistics posits no discrete boundary between linguistic and extralinguistic knowledge, relevance theory takes a modular view on language (cf. Fodor, 1983) and the pragmatic-interpretive system (Sperber & Wilson, 2002).

the operation of linguistic processes or as being governed by pragmatic inferential processes. As the question indicates, it is possible to see the difference between these two types of accounts as one of degree only. While computational linguistic accounts maintain that a considerable amount of linguistic knowledge is involved in the processing of logical metonymy, the pragmatic inferential account that I have been defending here downplays the linguistic aspect and claims that logical metonymy is mainly interpreted by means of pragmatic inferential processes operating over underspecified logical forms, taking contextual information and encyclopedic assumptions about the denotation of the concepts involved as input to the inferential process. However, more than being a matter of degree, the difference between these two types of approaches is, in reality, to do with two fundamentally different conceptions of what a language is. While computational linguistic accounts see the language as providing a rich code that enables speakers to encode and decode their thoughts in much detail, and pragmatics as a useful add-on to the linguistic capacity, operating primarily when some interpretation other than the default interpretation generated by the linguistic system is indicated by the context, the pragmatic account pursued here sees the role of the linguistic system as being that of providing a minimal output or clue, which the inferential system uses as evidence to yield hypotheses about occasion-specific, speaker-intended meanings. As I have argued in this paper, the assumption that a large part of the interpretive work involved in logical metonymy should be attributed to the linguistic system itself requires further justification, given that we have an independently motivated pragmatic interpretive system which is capable of rapidly generating new meanings in different contexts.

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References

Asher, N. (2011). *Lexical Meaning in Context*. Cambridge: Cambridge University Press.

Asher, N., & Pustejovsky, J. (2006). A type composition logic for generative lexicon. *Journal of Cognitive Science, 6*, 1-38.

Blutner, R. (2002). Lexical semantics and pragmatics. In F. Hamm & T. E. Zimmermann (Eds.), *Semantics*. Hamburg: Helmut Buske Verlag.

Carston, R. (2002). *Thoughts and Utterances: The Pragmatics of Explicit Communication*. Oxford: Blackwell Publishers.

Copestake, A., & Briscoe, T. (1996). Semi-productive polysemy and sense extension. In J. Pustejovsky & B. Boguraev (Eds.), *Lexical Semantics: The Problem of Polysemy*. New York: Clarendon Press.

de Almeida, R. G. (2004). The effect of context on the processing of type-shifting verbs. *Brain and language, 90*(1-3), 249-261.

de Almeida, R. G., & Dwivedi, V. D. (2008). Coercion without lexical decomposition: Type-shifting effects revisited. *Canadian Journal of Linguistics, 53*(2/3), 301-326.

Fodor, J. A. (1983). *The Modularity of Mind: An Essay on Faculty Psychology*. Cambridge, Massachusetts: The MIT Press.

Fodor, J. A., & Lepore, E. (2002). *The Compositionality Papers*. Oxford: Clarendon Press.

Langacker, R. W. (1984). Active zones. *Proceedings of the annual meeting of the Berkeley Linguistics Society, 10*, 172-188.

Langacker, R. W. (2000). *Grammar and Conceptualization*. Berlin: Mouton de Gruyter.

Lascarides, A., & Copestake, A. (1998). Pragmatics and word meaning. *Journal of Linguistics, 34*, 387-414.

McElree, B., Frisson, S., & Pickering, M. J. (2006). Deferred interpretations: Why starting Dickens is taxing but reading Dickens isn't. *Cognitive Science: A Multidisciplinary Journal, 30*(1), 181-192.

McElree, B., J., M., Traxler, M. J., Pickering, M. J., Seely, R. E., & Jackendoff, R. (2001). Reading time evidence for enriched composition. *Cognition, 78*, 17-25.

Pickering, M. J., McElree, B., & Traxler, M. J. (2005). The difficulty of coercion: A response to de Almeida. *Brain and Language, 93*, 1-9.

Pustejovsky, J. (1991). The generative lexicon. *Computational Linguistics, 17*(4), 409-441.

Pustejovsky, J. (1995). *The Generative Lexicon*. Cambridge, Massachusetts: The MIT Press.

Recanati, F. (2002). Unarticulated constituents. *Linguistics and Philosophy, 25*(3), 299-345.

Sperber, D., & Wilson, D. (1986/1995). *Relevance: Communication and Cognition*. Oxford: Blackwell.

Sperber, D., & Wilson, D. (2002). Pragmatics, modularity and mind-reading. *Mind & Language, 17*, 3-23.

Traxler, M. J., Pickering, M. J., & McElree, B. (2002). Coercion in sentence processing: evidence from eye-movements and self-paced reading. *Journal of Memory and Language, 47*, 530-547.

Wilson, D., & Sperber, D. (1993). Linguistic form and relevance. *Lingua, 90*, 1-25.

Wilson, D., & Sperber, D. (2004). Relevance theory. In L. R. Horn & G. L. Ward (Eds.), *The Handbook of Pragmatics*. Oxford: Blackwell.

Žegarac, V. (2006). Believing in: A pragmatic account. *Lingua, 116*(10), 1703-1721.

Covert Events and Qualia Structures for German Verbs

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Abstract

Sentences like *The author began the book* (logical metonymies) involve the interpretation of covert events which are not explicitly realized on the surface (→ *The author began writing the book*). Qualia-based accounts of logical metonymies (Pustejovsky, 1991, 1995) account for such covert events using complex lexical entities (qualia structures) for the objects. We present a corpus study for the German verbs *geniessen*, *anfangen (mit)*, *beginnen (mit)*, *aufhören (mit)*, based on data obtained from the deWaC corpus. In order to evaluate to what extent covert events in logical metonymies can be accounted for by qualia structures, instances of logical metonymies for these verbs were collected; paraphrases for the covert events were then manually annotated and compared with the qualia structures of the objects. We also analyzed sentences where the event was made explicit (long forms: *The author began writing the book*), comparing those events with the qualia events. We contrasted results for the two structures (metonymies - long forms) and across verbs, evaluating what sort of contribution qualia can make to logical metonymy resolution and what issues it poses.

Keywords: Logical metonymy; qualia; corpus study; German.

Introduction

Covert Events (**CEs**) are events which are not explicitly realized on the surface of a sentence, but play a key role in the understanding of some linguistic constructions. Classic examples are sentences like (1) or (2) - note that the CE can be formulated explicitly through an appropriate paraphrase (**long form**):

1. The author began the book → The author began writing the book
2. She enjoyed the film → She enjoyed watching the film

Typical situations for the occurrence of CEs are constructions (as these examples), where event-subcategorising verbs are combined with entity-denoting objects (**logical metonymies**). According to Pustejovsky's theoretical approach, a (semantic) type conflict triggers the recovering of CEs, which are in many cases derived from the so-called **Qualia Roles** (QRs), contained in the qualia structures of the respective objects (Pustejovsky, 1995).

Qualia structures and Logical Metonymy

Qualia structures can be viewed as complex lexical entries, representing aspects of meaning of a word, its semantic relations and the roles involved in its understanding. They consist of four QRs, corresponding to four aspects of meaning (*constitutive quale*, *formal quale*, *agentive quale*, *telic quale*), although not all four need be present for each lexical unit. For the scope of our study, only the agentive quale and the telic quale are relevant, because they are seen as those responsible for the understanding of logical metonymies (Pustejovsky, 1995; Briscoe, Copestake, & Boguraev, 1990):

agentive quale (AQ) contains information about the factors and causal chains involved in the coming about of the object (*book* → *writing*)

telic quale (TQ) denotes the purpose / function of an object (*book* → *reading*)

In logical metonymies, QRs of nouns make it possible to specify the semantics of the governing verbs by selecting an event from the QRs of the corresponding argument (Konerding, 2006):

3. Julia enjoyed the film [TQ = 'watch'; AQ = 'make']
4. Susanne began her first novel [TQ = 'read'; AQ = 'write']

In sentence 3, the VP *to watch the film* is formed by extending the meaning of the object *film* (type: entity) to a phrase (type: event) by integrating it with the missing information extracted from the QRs of the object (*to watch*, TQ of the object *film*). Which quale is used (AQ or TQ), depends primarily on the metonymic verb itself and on the QRs of the object, but often also on the context and on the subject.

Briscoe et al. (1990) and Verspoor (1997) observed that the QRs provide default CE interpretations, which can be overridden if a different interpretation is inferred from the context. For example, the lexicon entry for *to enjoy* should indicate by default that in cases of type coercion the specification of the CE comes from the QRs of the object (with a strong preference for its TQ). However, in cases where the default interpretation is overridden by contextual information, this leads to a pragmatically more appropriate interpretation. Lascarides and Copestake (1995), though arguing that the lexicon must contain generalizations, claimed that world knowledge (pragmatic knowledge) has priority over these general rules. If, as in the example 5, the object of *to enjoy* is an artifact, then the general rule is that the CE should be determined by the TQ of the object (*reading*).

5. The goat enjoyed the book. → eating

6.(a) The publisher began a series of books. → issuing
(b) The author began a series of books. → writing

However, the knowledge that goats do not usually read results in an exception to this rule and leads to the CE *eating* in 5. Even when different contexts suggest different predicates for paraphrasing CEs (examples 6a and 6b), even then they can both clearly be attributed to the AQ of *book* (see also Zarcone and Padó (2010)).

Qualia as prototypical concepts

For almost every noun there is a large number of verbs that can take it as an object, and all these verbs are in principle available for paraphrasing of CEs. For example, see the most frequent verbs for the object *Buch* (*book*):

Buch (101241): 5006 lesen, 3468 schreiben, 1561 geben, 1092 kaufen, 1018 veröffentlichen, 893 empfehlen, 619 machen, 581 finden, 566 nehmen, 464 legen, 435 vor#stellen, 385 kennen, 370 lassenI, 357 bestellen, 350 finden, 331 verfassen, 326 machen, 301 verkaufen, 267 führen, 261 halten, 259 aus#leihen, 236 bringen, 233 erscheinen, 229 heraus#geben, 215 bekommen, 200 ab#runden, 186 sehen, 182 vor#legen, 176 heraus#bringen, 164 brauchen, 162 verschlingen, 161 auf#schlagen, 160 nennen, 154 durch#lesen, 151 erhalten, 149 schenken, 140 besitzen, 138 suchen, 126 publizieren, ...

If we assume that the QRs model conceptual knowledge, then the QRs can be considered prototypical concepts, bundling all these relations into four roles. If QRs were to be identified with single predicates, many metonymies could not be satisfyingly treated by qualia-based theories. If we now select the most common verbs for *Buch* which we could assign to the AQ and the TQ, the following picture emerges:

AQ: schreiben, veröffentlichen, machen, verfassen, vorlegen, publizieren, herausbringen, drucken, ...

TQ: lesen, durchlesen, studieren, ...

Depending on context or on the style, a variety of predicates can be assigned to each of the QRs, provided that these can be interpreted as instances of the corresponding concepts. On the other hand, some metonymies pose problems when looking for an appropriate paraphrase or chosing among different possible formulations, while still making sense to the speaker:

7. If the owner is not there, the employees can enjoy his boat.

While we are able to understand sentence 7, it would still be difficult to give a CE paraphrase for it.

Previous empirical studies

To what extent then can CEs be explained by a qualia-based theory? For the English language, Briscoe et al. (1990) and Verspoor (1997) carried out corpus-based studies for metonymic verbs. Briscoe et al. (1990) labelled as "pragmatic" those cases in which the CE does not arise from the QRs, but must be inferred from the context; their study on the LOB (Lancaster-Oslo/Bergen) corpus found that on average 17% of metonymies for the following verbs are pragmatic cases: *enjoy*, *prefer*, *finish*, *start*, *begin*, *miss* and *regret*. Verspoor (1997) found in a BNC corpus-based study that the CEs for the verbs *begin* and *finish* are determined by the QRs in about the 95% of the cases, and in about the 5% by the context - again, a prevalence for AQ or TQ interpretations.

The aim of our study

The aim of our study was to evaluate the role of QRs in the interpretation of logical metonymies by estimating to what extent the interpretation of instances of logical metonymy from a very large corpus can be accounted for by QRs. Compared to earlier studies, we provide an investigation for a different language (German), that is based on a much larger corpus (deWac, 1.7 billion words, compare with BNC, 100 million words, and LOB, a million words).

We present a study for four German verbs, based on data obtained from the deWaC corpus: we harvested subject-verb-object combinations involving logical metonymies (**metonymic sentences** e.g. *Er fing einen Brief an - He began the letter*).CE paraphrases were then manually annotated, in the attempt to find the appropriate paraphrase in a specific context. The objects for the extracted sentences were then annotated with their AQ and TQ. From these annotations, we could determine the percentage of matches between the paraphrases and the QRs.

A second innovation of our study is an analysis of instances of **long forms**, where the event is made explicit with a dependent verb (e.g. *Er fing an, einen Brief zu lesen - He began reading the letter*), in order to compare them with the corresponding metonymies and to evaluate how close to the QRs such explicit events are.

Method

In order to facilitate comparisons with previous studies (Briscoe et al., 1990; Verspoor, 1997), the following German verbs were selected: *geniessen* (*to enjoy*), *anfangen (mit)* (*to start (with)*), *beginnen (mit)* (*to begin (with)*), *aufhören (mit)* (*to stop (with)*), and *beenden* (*to finish*). We used a dependency parsed version of the deWaC corpus, a very large collection of German sentences of about 1.7 billion words, gathered from the Internet and made available by the WaCky project (Baroni, Bernardini, Ferraresi, & Zanchetta, 2008). The corpus was parsed with the BitPar parser (Schmid, 2004) and the FSPAR parser (Schiehlen, 2004). Since the number of occurrences of the selected verbs is very large in deWaC corpus and only a relatively small number of them are examples of logical metonymy, we developed a Python script to heuristically select instances of logical metonymy. Our method consisted of the following steps:

1. **Sentence extraction -** appropriate instances of metonymy (metonymic sentences) and corresponding long forms (where the event was explicit) were extracted;
2. **Sentence annotation -** both metonymic sentences and long forms were annotated with regard to the type of implicit CE or explicit event, and (when possible) with the AQ and TQ of the corresponding object;
3. **Evaluation of CE-QRs matching -** evaluation of the matches between CEs and QRs in the metonymic sentences and between the explicit events and the QRs in the long forms.

Table 1: Frequencies of the extracted sentences from the deWaC Corpus

verb	**Occurrences (raw data)**	**+ dependent NP**				**+ dependent VP**			
		total NP occurr. (raw data)		from total NP artifacts **(metonymic sentences)**	events	total VP occurr. (raw data)		from total VP artifacts **(long forms)**	events
geniessen	20749	20477	98.7%	5.5% (*)	6.4% (*)	272	1.3%	29.6% (*)	15.7% (*)
anfangen	5463	2571	47.1%	4.1% (*)	0.04% (*)	2892	52.9%	15.7% (*)	7.8% (*)
anfangen mit	4015	3691	91.9%	9.4% (*)	1.1% (*)	324	8.1%	14.5% (*)	10.5%
beginnen	41288	30111	72.9%	0.8% (*)	– (*)	11177	27.1%	9.8% (*)	9.7%
beginnen mit	36853	34858	94.6%	1.2% (*)	2.2%	1995	5.4%	5.2% (*)	9.2% (*)
aufhören	1223	13	1.1%	7.7% (*)	– (*)	1210	98.9%	8.2% (*)	8.7%
aufhören mit	1223	1188	97.1%	3.9% (*)	0.8% (*)	35	2.9%	14.3% (*)	13.8%
beenden	12014	12014	100.0%	2.0% (*)	0.02% (*)	—	—	—	—

Some cells are marked with asterisks (*): the corresponding sentence sets were manually checked for correct classification.
Due to the large number instances, not all of them were individually checked.

1. Sentence extraction

We selected instances where both a subject and either an NP object (metonymic sentences) or a VP complement (long forms) were present, thus excluding a very large number of sentences where, for instance, the verb *begin* was used as intransitive (e.g. *Der Film begann - the movie began*). The drawbacks of this approach are (a) the loss of passives and (b) a reliance on accurate parsing results, increasing precision at the expense of recall; however, automatization of this step is crucial to analyse our large corpus. +NP and +VP instances are listed in Table 1.

Alongside metonymic sentences, long forms were also selected, where the event is explicit and has the form of a dependent verb (e.g. *Er fing an, einen Brief zu lesen - He began reading the letter*).

Resolution of underspecifications: Morphosyntactic information was used to distinguish subjects and objects; the FSPAR parse trees however allow for alternatives (e.g. underspecified case, 'Nom|Akk') for a large proportion of nouns. In such cases, if the script had not encountered a subject left to the verb yet, the underspecified noun was considered as a subject, otherwise as an object[1].

Selection based on semantic types: Since only artifacts have an AQ and a TQ and since CEs only occur if the subject is able to have intentions (and in the case of *enjoy* to have emotions, too), 'humans' and 'artifacts' are the most relavant categories for discovering CEs. We compiled lists of nouns for three semantic classes, namely humans, artifacts, and events, based on GermaNet 5.1 (Lemnitzer & Kunze, 2002). A large proportion of subjects and objects was automatically assigned categories during extraction, nouns not included in GermaNet were annotated manually. Also, the semantic categories helped to exclude a large number of non-metonymic sentences. For example *geniessen*, besides the reading "get pleasure from", has a very common reading of "have the benefit of", which does not evoke metonymic interpretations (*die Partei geniesst Vertrauen - The party enjoys trust*). Sentences with this non-metonymic reading were excluded, because their objects were not artifacts. Percentages of artifacts, events and other objects are listed in Table 1. Some cells are marked with asterisks (*): the corresponding sentence sets were manually checked for correct classification. Due to the large number instances, not all of them were individually checked.

[1] In German (a relatively free constituent order language) the subject is still more likely to be left of the object.

2. Sentence annotation

Incorrectly extracted sentences were removed. Some errors were due to parsing errors in the sentence structure or in the subject annotation. Also, sentences with metaphoric readings were excluded, such as the word *Seiten* (pages) as an object of *geniessen* (enjoy) in *die schönen Seiten des Lebens* (*the good sides of life*). Also, many nouns were ambiguous between an entity and an event reading, e.g. *Malerei (painting)*, *Bericht* (*report*), *Frühstück* (*breakfast*). Unless the context clearly suggested an artifact reading, these sentences were omitted. The proportion of discarded sentences for the above mentioned reasons was between 30% and 50%.

The selected metonymic sentences were then analyzed and annotated with CE paraphrases, and the QRs for their objects were determined. For long form sentences, the QRs for the objects were determined.

Context-dependent interpretation: In many cases, the paraphrase of a CE was so trivial that the explicit formulation would sound strange in a sentence, for example when the CE for objects of *geniessen* (*to enjoy*) refer to *eating* and *drinking*. On the other hand, many cases were not so trivial, due to lack of context; nevertheless, since the sentences were collected from the web, it was sometimes possible to find the original source, as in example 8:

8. *Wir haben mit einem traditionellem Brett angefangen und es lief recht gut.*
   We started with a traditional board and it went quite well.

From the original website it was apparent here that a mother wants to teach her 8-years-old son to play chess.

Table 2: Annotator's interpretations vs. Qualia interpretations (N.B. this table only refers to the artifacts column in Table 1)

	+ dependent NP (metonymic sentences)						+ dependent VP (long forms)			
verb	TQ	AQ	sum(AQ,TQ)	other	undetermined qualia	insufficient context	TQ	AQ	sum(AQ,TQ)	other
geniessen	89.7%	0%	89.7%	1.6%	6.9 %	1.9%	31.3%	28.1%	59.4%	40.6%
anfangen	21.7%	61.3%	83.0%	1.9%	3.8 %	11.3%	14.1%	24.0%	38.1%	61.8%
anfangen mit	33.7%	17.9%	51.6%	23.9%	1.7 %	22.8%	14.9%	0%	14.9%	85.1%
beginnen	5.6%	88.7%	94.3%	2%	0%	3.6%	12.1%	27.4%	39.5%	60.5%
beginnen mit	31.0%	35.4%	66.4%	20.3%	0%	13.3%	21.2%	0%	21.2%	78.8%
aufhören	100.0%	0%	0%	0%	0%	0%	33.0%	25.0%	58%	42.0%
aufhören mit	60.9%	23.9%	84.8%	6.5%	2.2%	6.5%	20.0%	0%	20.0%	80.0%
beenden	35.0%	49.8%	85.8%	8.4%	0%	6.8%	–	–	–	–

Insufficient context: If only little context was available, finding a suitable paraphrase was often not easy. For example, *Ich fange nochmals mit diesem Brief an* (*I'm starting again with this letter*) could be paraphrased with *to read*, *to write*, but also with *to talk about this letter*'. In many cases "we start with X" means something like "we begin contemplating X" or "we begin enumerating X", neither of which corresponds to the AQ or to the TQ. If only a short single sentence was available, it was often impossible to choose among several possible alternatives. Such instances were annotated with the label **insufficient context**.

PP attachment: *Anfangen* (*to begin*) without any object mostly means "to begin to work", often with a PP as an adjunct. Therefore, with *anfangen mit* (*to start with*), *beginnen mit* (*to begin with*) and *aufhören mit* (*to stop with*), we must consider whether the PP is a verb argument, or whether it is only an adjunct:

9. *Er fängt mit dem Geschirr an.* → *Er fängt an, das Geschirr zu spülen.*
   He begins with the dishes → He begins washing the dishes.
10. *Das Kind beginnt mit dem Ball* → *Das Kind beginnt mit dem Ball zu spielen.*
    The child begins with the ball → the child begins to play with the ball .

In 9, *Geschirr* (*the dishes*) is the direct object of *spülen* (*washing*); however, in 10, the PP *mit dem Ball* is an oblique argument of *spielen* (*to play*) also in the paraphrase.

Undetermined qualia: For some general terms (e.g. *board*, *machine*) it was difficult to find an AQ or a TQ. Some of these cases could be solved by replacing the more general term with a more specific one (*chessboard*, *aircraft*), if suggested by the context (see also example 8), but some others (*city*, *garden*) were annotated as **qualia undetermined**.

Transparent nouns: In cases of transparent nouns such as *a cup of coffee* (Fillmore, Baker, & Sato, 2002), the content was regarded as the real object of interest (*coffee*), instead of the direct object of the verb (*cup*).

Specificity of Qualia: Often in Pustejovsky's Generative Lexicon, it seems as if only two individual predicates can be assigned to the AQ and to the TQ respectively. In this study, it was assumed, in contrast, that the QRs are more likely to be understood as general concepts and therefore represented by a whole set of predicates. This was particularly problematic for long forms, when deciding whether a given verb is equivalent to a QR. Our strategy was rather generous, for example we considered *verschlingen* (*devour*) to be included in the TQ of *book*. Ultimately, the label **TQ** was given when the verb expressed a typical use of the object in the given context, and similarly the label **AQ** was given when the verb denoted a typical way to bring the object into being. For the verbs *kaufen* (*to buy*), *verkaufen* (*to sell*), *handeln mit* (*to trade with*), *sich beschäftigen mit* (*to deal with*), *experimentieren mit* (*to experiment with*), however, was consistently given the label **other**.

3. Evaluation of CE-QRs matching

We counted cases where a paraphrase for a CE matched (a) the AQ, (b) the TQ, or (c) neither ("other"), (d) cases where the qualia was undetermined ("undetermined quale") or (e) the context was not sufficient to determine a paraphrase ("insufficient context") - see table 2. For long forms, the match between the explicit event and the QRs for the objects were determined.

Results

Table 2 shows the relative frequencies (percentages) of CE paraphrases for the categories used: AQ, TQ, sum(AQ,TQ), other, undetermined qualia and insufficient context. Note that here we are only considering artifact objects both for metonymic sentences and for long forms.

Anfangen and *beginnen* yielded a similar profile: both "*anfangen* + direct object" and of "*beginnen* + direct object" have a strong preference for the AQ of the object. However, the corresponding combinations with *mit* (*anfangen mit* and *beginnen mit*) did not show this tendency (*beginnen mit* actually showed an opposite tendency towards the TQ).

In particular, two prominent groups of objects contributed to that high proportion of TQ for *anfangen mit*: 26 references

Table 3: Comparison with the Results of Briscoe et al. (1990) and Verspoor (1997)

	Briscoe et al. (1990)								
	tot.	tot. occurrences		NP		interpretation			
verb	occ.	tot. VP	tot. NP	Event	Entity			sum(AQ,TQ)	non-QRs
enjoy	65	6 (9.2%)	59 (90.8%)	21 (32.3%)	25 (38.5%)			21 (84%)	4 (16%)
start	136	73 (53.7%)	63 (46.3%)	42 (30.1%)	21 (15.4%)			21 (100%)	0 (0%)
begin	69	58 (84.1%)	11 (15.9%)	8 (11.6%)	3 (4.3%)			1 (33.3%)	2 (66.7%)
finish	39	8 (20.5%)	31 (79.5%)	8 (20.5%)	23 (59%)			17 (73.9%)	6 (26.1%)
	Verspoor (1997)								
	tot.					interpretation			
	occ.		tot. NP		Entity	AQ	TQ	sum(AQ,TQ)	Context
begin	40407		4470 (11.1%)		164 (0.4%)	65 (39.6%)	91 (55.5%)	156 (95.1%)	8 (4.9%)
begin on					25	4 (16%)	5 (20%)	9 (36%)	16 (64%)
finish	11072		2799 (25.3%)		319 (2.9%)	94 (29.5%)	211 (66.1%)	305 (95.6%)	14 (4.4%)

were related to medications and drugs with the paraphrase *nehmen* (*to take*) (or *verabreichen*, *to administer*, if the subject is a doctor), 16 were related to the domain of feeding infants with several types of baby food (*Beikost*, *Milchbrei*, *Karottenbrei*) as objects.

Geniessen (*to enjoy*) is different from the first two verbs in many ways: a strong tendency for the TQ, a large number of trivial paraphrases among those TQ interpretations (the most frequent paraphrases are *to eat* and *to drink*), and a correspondingly low proportion of cases in which the context was not sufficient to determine a CE (1.9%). In contrast, the long form "*geniessen*(V(object))" occurred in very few instances. For example, *Film* occurred in more than 30 instances for *geniessen* as a direct object and in all these cases the CE was *to watch* (TQ), but only once with "*geniessen*(V(*Film*))", contrastively referring to the AQ of the object:

11. *Ich habe es wirklich genossen, diesen Film zu drehen wenn man von den Szenen absieht, die ich bis zur Hüfte im Sumpf zubringen musste.*
I really enjoyed making this film apart from the scenes I had to spend up to the hip in the swamp.

The default interpretation of "*geniessen* + direct object" clearly corresponds to the TQ of the object, and it seems that the preferred way to express the AQ activity instead is to explicitly formulate it (as with *drehen* and *Film*). Similar patterns (TQ in the metonymic sentence, AQ or other in the long form) were found for *Haus* (*house*) and *Song* (*song*).

The verbs *aufhören* and *beenden* showed a complementary behavior: while *aufhören* has a very strong preference for VP-complements, *beenden* accepts only NP complements, and while metonymies with *aufhören* prefer the TQ, *beenden* shows a preference for the AQ.

The majority of interpretations for the metonymic sentences fall into the QR categories (sum(AQ,TQ)). More than 80% (and in some cases over 90%) of the CEs for *geniessen*, *anfangen*, *beginnen* und *beenden* correspond to the AQ or the TQ of the object, if this is an artifact. For *anfangen mit* and *beginnen mit*, this proportion is much lower (between 50% and 70%) and more than a fifth of the CEs in these cases differ from the AQ and from the TQ. In contrast, the long forms, where the event is explicit, yielded a majority of context-based or "other" interpretations, which do not correspond with the QR events. This result is particularly interesting, because it confirms the observations in Lapata and Lascarides (2003) and Egg (2004) that metonymy is strongly related to Grice's conversational maxims (Grice, 1975). If the QRs capture some basic/default event interpretation attached to the lexical representation of an artifact (e.g. *book* → *reading/writing*), we tend to omit that explicit information in a logical metonymy where the CE is retrievable from the QR (e.g. *John began the book* → *reading/writing*). If, on the other hand, the event is not a basic/default interpretation, but is a less typical one (e.g. *binding*), then we need to make it explicit in communication (e.g. *John began binding the book*).

Comparison with the results of Briscoe et al. (1990) and Verspoor (1997)

Table 3 provides a summary of the results of Briscoe et al. (1990) and Verspoor (1997) for the corresponding verbs to the German equivalents analyzed here. Their references were initially classified according to whether the complement of the verb was a VP or a NP. Furthermore, entity-denoting NPs that have metonymic interpretations were selected[2].

Briscoe et al. (1990) labelled as "pragmatic" those cases where the interpretation of the metonymy differed from the QRs of the object, but must be inferred from the context. We understand that this category must include what we called "other", but not our "undetermined qualia" and "insufficient context" categories, since the authors report to have taken into consideration only those instances of logical metonymy where a paraphrase could clearly be determined. Unclear cases have been omitted in their study. Only two verbs (*begin (on)* and *finish*) were examined in Verspoor (1997) and a different reference value was used: the relative frequencies in percent refer to occurrences of the verb lemma in the corpus and not to the extracted examples (as we did).

[2]Note that our study only takes into consideration artifacts, whereas Briscoe et al. (1990) discuss *sea* and *river* have the TQ *to swim*, and Verspoor (1997) mentions *have family* and *do business* among her paraphrases for instances of metonymy.

Although any comparison between the results of such studies is problematic due to differences in corpus sizes and in the extraction methods, some interesting similarities emerge as well. Lexical differences were noted by all three studies. *Enjoy* matched the low non-QR interpretations of *geniessen*. *Beginnen* and *anfangen* have a strong AQ preference, while the English *begin* has more TQ interpretations. *Begin* and *begin on* in Verspoor (1997) respectively showed a preference for QR-interpretations and for context interpretations, and a similar contrast holds for our analysis of *anfangen (mit)*, *beginnen (mit)* and *aufhören (mit)*: the versions with *mit* have a significantly larger proportion of non-QR interpretations.

The general claim from Briscoe et al. (1990) and Verspoor (1997), that QRs can account for up to 80% of the reported metonymic instances, seems to be quite consistent with the results of the present work, which yielded values above 80% for *geniessen*, *anfangen*, *beginnen*, *aufhören* and *beenden*. For the combinations *anfangen mit*, *beginnen mit*, and *aufhören mit*, the number of non-QR interpretation is significantly higher than for the former mentioned verbs, though not as high as the value for *begin on* in Verspoor (1997).

Conclusions

We examined to what extent CEs in the metonymic use of some German verbs (*geniessen*, *anfangen (mit)*, *beginnen (mit)*, *aufhören (mit)*, *beenden*) can be explained by the QRs of the respective objects, using references extracted from the deWaC corpus. Our estimation was limited to artifacts, because they are the only entities that have an AQ and a TQ. For instances of logical metonymy, we estimated the frequencies for CE interpretations which could be accounted for by the QR of the object. For long forms, where the event was explicit, the subordinate verb was compared with the QR of the object.

CEs for *geniessen*, *anfangen*, *beginnen*, *aufhören*, *aufhören mit* and *beenden* are accountable for by either the AQ or the TQ of the object in more than 80% of the instances. This proportion was much lower for *anfangen mit* and *beginnen mit* (between 50% and 70%). More than a fifth of the CEs in these cases could not be recovered either from the AQ or the TQ. Also, different preferences among verbs for one or the other QR seem to emerge: *beginnen* and *anfangen* show a preference for the AQ, *geniessen* for the TQ.

In the long forms, a majority of these infinitives corresponds to non-QR interpretations, thus confirming the observations in Lapata and Lascarides (2003) and Egg (2004) that metonymy is strongly related to Grice's conversational maxims (Grice, 1975) (implicit CE, basic/default QR-interpretation; explicit event, non-QR interpretation).

A direct comparison between German and corresponding English verbs is difficult, also because the methods of selection and processing of the references are different. Nevertheless, some common patterns seemed to emerge: in particular, between *begin* and *begin on* in Verspoor (1997), and between our analysis of the constructions with *mit*: *begin on* and the *mit*-constructions both have a significantly bigger proportion of non-QR interpretations than their versions without *on* and *mit*. The general claim from Briscoe et al. (1990) and Verspoor (1997), that QRs can solve up to 80% of the reported metonymic instances, was mirrored by our results, which include percentages of QR interpretations between 83% and 94% for *geniessen*, *anfangen*, *beginnen*, *beenden*.

References

Baroni, M., Bernardini, S., Ferraresi, A., & Zanchetta, E. (2008). The wacky wide web: A collection of very large linguistically processed web-crawled corpora. *Language Resources and Evaluation*, *43*(3), 209–226.

Briscoe, T., Copestake, A., & Boguraev, B. (1990). Enjoy the paper: Lexical semantics via lexicology. In *Proceedings of the 13th COLING* (Vol. 2, pp. 42–47).

Egg, M. (2004). Metonymie als phaenomen der semantik-pragmatik-schnittstelle. *metaphorik.de*, *6*, 37–53.

Fillmore, C. J., Baker, C. F., & Sato, H. (2002). Seeing arguments through transparent structures. In *Proceedings of the third LREC* (pp. 787–791). Las Palmas, Spain: International Computer Science Institute.

Grice, H. P. (1975). Logic and conversation. In P. C. et al. (Ed.), *Syntax and semantics* (Vol. 3). New York: Academic Press.

Konerding, K.-P. (2006). Schichten, grenzen, gradationen. In E. W. Kirstel Proost (Ed.), *Von intentionalitaet zur bedeutung konventionalisierter zeichen, festschrift* (pp. 65–102). Tuebingen: Institut fuer deutsche Sprache.

Lapata, M., & Lascarides, A. (2003). A probabilistic account of logical metonymy. *Computational Linguistics*, *29*.

Lascarides, A., & Copestake, A. (1995). The pragmatics of word meaning. *Journal of Linguistics*, 387–414.

Lemnitzer, L., & Kunze, C. (2002). Germanet – representation, visualization, application. In *Proceedings of the third LREC* (pp. 1485–1491).

Pustejovsky, J. (1991). The generative lexicon. *Compuational Linguistics*, *17*(4), 409–441.

Pustejovsky, J. (1995). *The generative lexicon*. Cambridge: MIT Press.

Schiehlen, M. (2004). Annotation strategies for probabilistic parsing in german. In *Proceedings of the 20th COLING* (pp. 390–396). Geneva, Switzerland.

Schmid, H. (2004). Efficient parsing of highly ambiguous context-free grammars with bit vectors. In *Proceedings of the 20th COLING* (pp. 162–168). Geneva, Switzerland.

Verspoor, C. M. (1997). *Contextually-dependent lexical semantics*. Doctoral dissertation, University of Edinburgh.

Zarcone, A., & Padó, S. (2010). I like work: I can sit and look at it for hours - type clash vs. plausibility in covert event recovery. In *Proceedings of the VERB 2010 workshop*. Pisa, Italy.

Reading Brecht and *talking to the espresso*: Electrophysiological investigations of conventional and novel metonymy

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Abstract

We present a series of three experiments on the comprehension of metonymy that sought to tease apart the role of contextual information and conventionality during the processing of expressions that require a transfer of meaning for proper interpretation. Event-related brain potentials (ERPs) were recorded while participants read or listened to sentences including metonymic expressions and literal controls. The ERP data indicate that contextual support facilitates early processing stages (reflected by context-induced N400 modulations) but cannot block subsequent processes of pragmatic enrichment (reflected by a Late Positivity for the metonymies relative to literally interpreted expressions). This implies that enriched composition occurs independently from contextual licensing. In addition, conventionality did not have a bearing on the ERP signals, indicating that conventional and novel metonymies are subjected to pragmatic enrichment.

Keywords: Metonymy; context; conventionality; ERPs.

Introduction

Many different processes and information sources are engaged in the construction of meaning. To investigate their particular contribution to meaning composition, metonymy and coercion have received increasing attention in the literature. The current paper presents electrophysiological data from language comprehension, drawing a distinction between context-induced language processing and the use of pragmatic mechanisms during the composition of figurative meaning. To this end, we present a series of three experiments that investigated the comprehension of metonymy and explored the role of context (Experiment 1 & Experiment 2) and conventionality (Experiment 3).

Previous psycho- and neurolinguistic research has reported processing demands for mismatches between verbs and their arguments in complement and aspectual coercion as well as in metonymy (for an overview see Pylkkänen & McElree, 2006). There is a general consensus that the costs observed may be viewed as enrichment of the interpretation either from a literal to a figurative meaning or from an underspecified to a context-specific meaning. Furthermore, the experimental research has identified numerous factors that influence composition – for instance that context can guide interpretation (e.g., Traxler et al., 2005) or that different types of metonymy may come with varying processing demands (e.g., McElree et al., 2006). Yet, the exact nature and locus of the involved operations is controversial, and enriched composition has either been discussed with reference to lexical-semantics (qualia structure), extra-lexical semantic rules, or pragmatically motivated principles (cf. e.g., Asher & Lascarides, 1995; Copestake & Briscoe, 1995; Pustejovsky, 1995; Egg, 2004). In the present investigation, we wanted to tease apart some of these aspects and also focus on the time course of the processing of metonymies by measuring event-related brain potentials (ERPs).

When looking at typical metonymies – as in *the waitress talked to the espresso* or *the student read Brecht* – the literature lists numerous features that support – and might even be necessary for – interpretation, including noteworthiness, salience, distinctness, functional correspondences between expressions and their intended referents, contextual licensing, and so on (see Nunberg, 1995; Jackendoff, 1997). In the current investigations, we addressed the influence of contextual support and the strength of the functional correspondence in conventionalized (*Brecht*) and non-conventionalized usages (*espresso*).

Electrophysiological Background

Based on previous ERP research in semantics and pragmatics, there are two central processes that may reflect processing costs associated with metonymies. The first one can be characterized to reflect expectation-driven parsing that is guided by all kinds of information associated with context. The second one reflects operations related to the maintenance and organization of discourse representation structure (see Schumacher, 2009 for more details about this two-stage model of discourse processing including linking and updating mechanisms).

N400 ("Discourse Linking") The first mechanism is reflected in a negative potential peaking around 300 ms after the presentation of a critical stimulus, and its amplitude is modulated by the fit of the stimulus with prior context. This N400 signature is highly correlated with the expectations

generated by prior discourse and also reflects lexical-semantic demands (cf. e.g., Kutas & Federmeier, 2000; Schumacher, 2009). Crucially, while the early N400-research has generated a lot of evidence for lexical-semantic influences, more recent investigations point towards a broader conception of the N400, whereby contextual information (including cotexts, interlocutors, genres, tasks, etc.) feeds into the expectations for upcoming words.
Accordingly, if processing costs associated with metonymies are primarily driven by the lexical mismatch between verbs and arguments, an N400 should be observable. Context effects may further modulate the N400 during the comprehension of metonymic expressions.

Late Positivity ("Discourse Updating") A subsequent positive deflection has been associated with the maintenance and reorganization of the discourse representation structure. This Late Positivity has for instance been observed when event structures must be updated during complex inferencing, and the underlying processes have been suggested to result from conflicting information sources, which are resolved in a cooperative manner (Burkhardt, 2007; Schumacher, 2009; cf. also Bornkessel & Schlesewsky, 2006 for generalized mapping).
In this respect, the processing decisions reflected by the Late Positivity may reflect compositional demands beyond lexical processing. If arriving at a metonymic interpretation requires such extra-lexical composition, a Late Positivity may be observable during the processing of metonymies.

Experiment 1

In Experiment 1 (cf. Schumacher, 2011), we compared the processing of non-conventional metonymies (*the espresso*) to their literal controls (see (1) and (2) below). The metonymies were expressions that represented a salient characteristic of the individual they referred to. To this end, context sentences set up a scene (e.g., restaurant) to license the metonymic use. Our predictions were as follows. First, if context information served as a necessary cue for interpretation (as suggested for this type of metonymy), metonymic expression might engender a more pronounced N400 than their literal controls. Second, if the processing of metonymies was driven by pragmatic processes, a Late Positivity for metonymies should be observable.

Methods and Materials

Pairs of forty German passages consisting of two sentences each were constructed. The first sentence set up a specific situation to license the metonymic use of an expression by introducing two individuals typically found in a certain context (e.g., *waitress* and *barkeeper* introduce a restaurant context, in which a customer may be referred to by a salient and distinct property such as *the espresso*). The context sentence included a *wh*-word to generate an expectation for either a person-denoting expression (1) or an object-denoting expression (2). This allowed us to measure potential costs arising from the metonymic interpretation at the noun phrase.

(1) Die Kellnerin fragt den Barkeeper, wer gerne bezahlen möchte. Der Barkeeper antwortet, dass **der Espresso** gerne bezahlen möchte.
*The waitress asks the barkeeper who wanted to pay. The barkeeper says that **the espresso** wanted to pay.*

(2) Die Kellnerin fragt den Barkeeper, was heute ausverkauft ist. Der Barkeeper antwortet, dass **der Espresso** heute ausverkauft ist.
*The waitress asks the barkeeper what was out of stock today. The barkeeper says that **the espresso** was out of stock today.*

The experimental passages (2x40 in total) were interspersed with 120 filler passages and presented visually in a pseudo-randomized order in five blocks of 40 passages each. Passages were presented in segments at the center of a computer screen. The critical expression (e.g., *the espresso*) was presented as one segment, and ERPs were time-locked to the onset of this segment.
Twenty-three monolingual native speakers of German participated in this study (mean age 22.5 years). Their task was to read the passages for comprehension and to respond to a comprehension question after each passage. This task allowed us to assess whether participants processed the stimuli attentively and accurately.

Results

ERP responses to metonymic expressions (1) were contrasted with those to the literal control expressions (2). Only trials with correctly answered comprehension questions entered the analyses. Statistical analyses were computed for mean amplitude values in predetermined time windows. To this end, we calculated repeated measures analyses of variance (ANOVAs) for the time windows between 300-500 ms (N400 window) and 650-800 ms (Late Positivity window) after the onset of the critical expression (e.g., *the espresso*). Figure 1 illustrates the grand average ERPs at a selected scalp electrode.

N400 window The analysis of the ERP data revealed no reliable differences between 300-500 ms (all Fs<1). This suggests that the situation set up by the context sentence was sufficiently strong to generate an expectation for an expression such as *the espresso* in both the metonymic context (1) and the control context (2). In other words, lexical-semantic support allowed for a metonymic continuation without any further computational costs.

Late Positivity window Between 650-800 ms, the analysis registered a main effect of condition ($F(1,22)=9.11$, $p<.01$), which was reflected in a more pronounced positive deflection for the metonymic (1) relative to the control condition (2). This finding indicates that the computational

mechanisms required for the metonymic interpretation of an expression exert demands above and beyond contextual integration, which are considered to reflect processes of enriched composition.

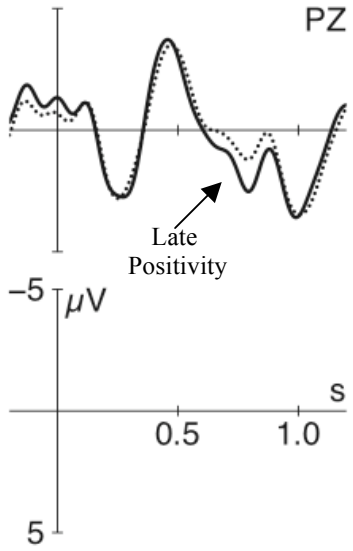

Figure 1: Grand average ERPs for contextually licensed metonymy at an exemplary electrode sites (PZ – posterior midline electrode). Metonymic expressions (1) are plotted in solid line; the literal control (2) is plotted in dotted line. The onset of the critical expression is at the vertical bar. Time axis ranges from 200 ms before until 1200 ms after the critical expression. Here and in all further figures, negative voltage is plotted upwards.

Discussion

The electrophysiological data obtained in Experiment 1 revealed a Late Positivity for the processing of metonymic expressions, but no differences with regard to the N400 signature. Under the assumption that N400 differences reflect contextually driven expectations and lexical-semantic processes, the absence of an N400 modulation suggests that metonymic expressions are as easily integrated as their non-metonymic counterparts at this early processing stage. The subsequently observed Late Positivity demonstrates that additional processing demands are exerted during the processing of metonymies. To assess whether these demands are independent from context-induced processes, Experiment 2 investigated the processing of metonymies in passages without strong contextual support.

Experiment 2

The literature on metonymy and other enrichment processes diverges when it comes to the contribution of lexical-semantics, context-driven expectations and pragmatic inferencing. Experiment 2 therefore sought to explore the role of context in more depth. The data from Experiment 1 may be taken to suggest that context has an important facilitatory role during the integration of referential expressions. However, it is not evident whether context is a necessary prerequisite for the comprehension of metonymy. We therefore examined what happened when the predictive power of the context was reduced. We hypothesized to find N400 modulations for more difficult contextual integration. Regarding the Late Positivity, the predictions were two-fold. On the one hand, if context is a necessary requirement, later processes might be blocked in its absence. On the other hand, if costs for enriched composition – reflected by the Late Positivity – were independent from context driven processes, the Late Positivity effect should remain independent of the contextual manipulation.

Methods and Materials

The passages from Experiment 1 were modified to include more neutral context sentences by replacing the professional terms with proper names.

(3) Kristen fragt Geoff, wer gerne bezahlen möchte. Geoff antwortet, dass **der Espresso** gerne bezahlen möchte.
*Kristen asks Geoff who wanted to pay. Geoff says that **the espresso** wanted to pay.*

(4) Kristen fragt Geoff, was heute ausverkauft ist. Geoff antwortet, dass **der Espresso** heute ausverkauft ist.
Kristen asks Geoff what was out of stock today. *Geoff barkeeper says that **the espresso** was out of stock today.*

Twenty-four monolingually raised native speakers of German took part in this investigation (mean age 25.3 years). Except for the changes in the context sentence, all parameters and procedures were kept as in Experiment 1. ERPs were time-locked to the critical noun phrase (e.g., *the espresso*).

Results

ERP signals to metonymic expressions (3) were compared with those to the literal control expressions (4). Only trials with correct answers to the comprehension questions were analyzed. ANOVAs were computed for mean amplitude values in the time windows tested in Experiment 1, i.e. 300-500 ms (N400 window) and 650-800 ms (Late Positivity window) after the onset of the critical expression. Grand average ERPs are exemplified in Figure 2 at a selected electrode site.

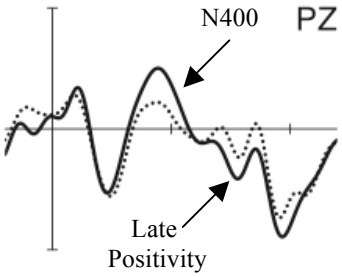

Figure 2: Metonymy with neutral context at a selected electrode (PZ – posterior midline site). Metonymic expressions (3) are plotted in solid; the literal controls (4) are displayed in dotted line. The vertical bar marks the onset of the critical expression.

N400 window Statistical analysis registered a main effect of condition in the temporal window spanning from 300-500 ms post-onset, with a more pronounced negative amplitude for metonymic expressions compared to their non-metonymic counterpart ($F(1,23)=15.99$, $p<.001$). This difference indicates that the integration of a metonymic expression like *the espresso* is encumbered when the context does not make available a supporting scenario that clearly situates the exchange in a licensing environment (such as a restaurant setting).

Late Positivity window As in Experiment 1, the analysis revealed a significant difference between 650-800 ms ($F(1,23)=6.52$, $p<.02$), which was evidenced by a more positive-going signal for the metonymic expressions (3) relative to their literal controls (4). This difference confirms the findings from Experiment 1 and suggests that the observed computational demands are independent from processes that are guided by contextual information.

Discussion

Experiment 2 investigated whether context effects could be dissociated from processes of pragmatic enrichment. Metonymy – especially the type of reference transfer investigate in this study – has been considered by a number of accounts as a pragmatic operation that is highly contingent on contextual support (cf. e.g., Nunberg, 1995). This was confirmed by the present data, where in the absence of facilitating contextual information, an enhanced N400 was observable for the metonymies relative to their literal controls. Given that both conditions lack supporting context, the N400 differences indicate that metonymies indeed rely on contextual information for integration to a larger extent than non-metonymic expressions. However, even though the data demonstrate that contextual support facilitates integration, they also show that this is not a necessary prerequisite for enriched composition. This is evidenced by the fact that a Late Positive potential was evoked by the metonymies in Experiment 2 as well, despite the absence of rich contextual support.

Experiment 3

The comparison of Experiment 1 and Experiment 2 indicates that context information is an important, yet not sufficient, ingredient for the processing of metonymy. While referring to a person with a salient property such as *the espresso* may depend on a particular situation of utterance, be constrained by the unique identifiability of this property, and be constructed ad hoc, there are more conventional metonymies such as producer-for-product metonymies, where for instance the author (*reading Brecht*) or composer (*playing Mozart*) refers to a book or piece of music and must be enriched. In Experiment 3, we tested whether conventional metonymies pattern with the novel metonymies investigated in the previous two experiments. Such an investigation can shed further light on the nature of the two processes observed in the previous experiments. On the one hand, the novel metonymies tested there, may be considered highly marked and one might argue that some of the processes observed reflect unacceptability rather than enriched composition. In contrast, producer-for-product metonymies are frequently used in everyday conversation and are highly conventionalized. Finding similar patterns for novel and conventional metonymies would then strengthen the interpretation of the data laid out above. On the other hand, the notion of conventionality poses additional questions for our conception of metonymy and enriched composition, since previous research reported no costs for conventional metonymies and their literal counterparts, supporting the view of underspecified representation at least with respect to conventional metonymies (e.g., Frisson & Pickering, 1999; McElree et al., 2006).

Methods and Materials

Forty pairs of sentences were created, including the name of an author, composer, painter, etc. In one condition this name was used as a producer-for-product metonymy (5); in the other it referred to the person (6).

(5) Tims Onkel lass einst **Brecht** während einer Vorlesung.
*Tim's uncle once read **Brecht** during a lecture.*

(6) Tims Onkel traf einst **Brecht** während einer Vorlesung.
*Tim's uncle once met **Brecht** during a lecture.*

The sentences were auditorily presented[1] and ERPs were time-locked to the onset of the recognition point of the

[1] Note that we switched to the auditory modality in Experiment 3 because it was embedded in a study utilizing a masked priming paradigm, which made it necessary to present sentences auditorily.

famous name (e.g., *Brecht*). The experimental trials (2x40 in total) were mixed with 200 filler trials and presented in eight blocks to the participants.

Twenty-four monolingual native speakers of German participated in this study (mean age 24 years). Their task was to listen to the sentences for comprehension and perform a word recognition task afterwards.

After EEG recording, participants were asked to fill out a questionnaire in which they had to identify the profession of the famous people used in the experiment. All critical names from the ERP study were included in this questionnaire. 88.8% of the names were correctly categorized. Participants who failed to identify *Brecht* as author or *Mozart* as composer and so on in more than 25% of the cases were discarded from the ERP analysis. This amounted to the exclusion of one participant.

Results

ERP responses to conventional metonymies (5) were contrasted with those to the literal referential expressions (6). Only trials with correct answers to the word recognition task were analyzed. Since auditorily evoked responses typically show an earlier onset latency, statistical analyses were calculated for the windows between 200-350 ms and 400-600 ms for the N400 and Late Positivity respectively. Grand average ERPs are depicted in Figure 3.

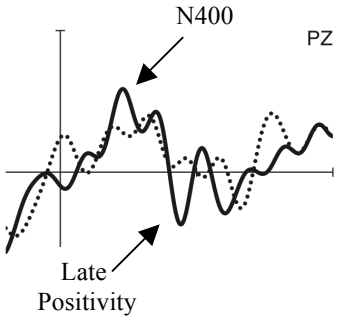

Figure 3: Conventional metonymy at an exemplary electrode location (PZ – posterior midline site). Solid line represents metonymic expressions (5), dotted line the literal controls (6). The onset of the critical expression is at the vertical bar.

N400 window Between 200-350 ms after the onset of the critical expression, the statistical analysis registered a main effect of condition ($F(1,22)=4.45$, $p<.05$), which was reflected by a more enhanced negativity for the conventional metonymies (5) relative to their literal control expression (6). This effect suggests that comprehending a conventional metonymy such as *Brecht* exerts processing effort during the integration with information from the sentential context and lexical-semantics. It further does not support strict accounts of underspecification.

Late Positivity window Statistical analysis for the time window from 400-600 ms post-onset further demonstrated a reliable difference ($F(1,22)=4.96$, $p<.05$), which was reflected by a more enhanced positivity for the metonymy (5) compared with the literal reference (6). This finding converges with the data obtained in Experiment 1 and Experiment 2, indicating that enriched composition exerts processing demands, and crucially, that these are independent from notions of conventionality or context.

Discussion

The findings from conventional metonymy in Experiment 3 converge with those from the processing of novel metonymy. The biphasic N400 – Late Positivity pattern indicates that irrespective of the degree of conventionality, weak contextual support hampers the processing of metonymies, but cannot block subsequent enrichment. Interestingly, while one might expect that a verb like *to read* is sufficiently strong to license a conventional metonymic interpretation, the N400-differences – together with the findings form Experiment 2 – indicate that this is not the case.[2] Moreover, in contrast to findings from eye movement measures that did not register differences between conventional metonymies and their literal controls, the present data show that ERPs are sensitive to subtle processing differences.

The comparison of conventional and novel metonymies further indicates that the source of the Late Positivity cannot be the apparent anomaly of the referential expression. While the novel metonymies may sound unusual in certain contexts, and possibly anomalous following a neutral, unsupported context sentence, the conventional metonymies occur frequently in everyday conversation and are perfectly acceptable. Yet, the fact that similar Late Positive potentials were observed in all three experiments, irrespective of their apparent adequacy and conventionality, strongly suggests that this signal reflects a common mechanism during the processing of metonymies.

General Discussion

The electrophysiological data presented here confirm the general idea that the processing of metonymies is computationally demanding. The fact that this is observable in two dissociable ERP signatures indicates that distinct information sources are recruited at discrete moments in time, and therefore extends previous findings from other

[2] We are currently conducting a fourth investigation that contains more context information – in analogy to Experiment 1 – to determine whether the N400 difference can be reduced. This would further substantiate our claims of context-induced N400-modulations.

experimental paradigms. The ERP data show first that contextual information eases the processing of metonymies (see N400 attenuation in Experiment 1), but that it does not suffice for proper integration. Rather, extra-lexical costs are exerted for all kinds of metonymies, reflected in a Late Positivity (Experiment 1-3). Crucially, the corresponding mechanism is activated irrespective of context or conventionality. Thus, the fact that all three experimental manipulations generated a Late Positivity is strong evidence for a powerful, uniform mechanism of pragmatic enrichment that is initiated whenever the parser encounters a mismatch between a verb and its arguments. It also speaks against a strict lexically-based account of metonymy.

The data further converge with previous ERP research in semantics and pragmatics, which has identified the N400 as a measure of context-induced expectations and the Late Positivity as a reflection of discourse updating costs (cf. e.g., Burkhardt, 2007; Schumacher, 2009). They indicate that contextual influences must be dissociated from mechanisms of enrichment in models of language comprehension.

The ERP findings thus support the idea that the observed costs arise from the online construction of a discourse representation (i.e. discourse updating). Previous work has shown that the construction and reorganization of event structures is costly. Crucially, this has been demonstrated in the literature on coercion (cf. e.g., Piñango et al., 1999; McElree et al., 2001), but also on complex inferencing (Burkhardt, 2007). The current data add to these findings and suggest that the underlying mechanisms are generalizable across a range of phenomena at the syntax-semantics-pragmatics interface.

Future work can make use of this methodology to assess whether other interface phenomena are subjected to pragmatic enrichment to the same extent as the metonymies investigated here, or whether some mismatches may in fact be resolved via semantic pathways alone.

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Selected References

Asher, N., & Lascarides, A. (1995). Lexical disambiguation in a discourse context. *Journal of Semantics*, *12*, 69-108.

Bornkessel, I., & Schlesewsky, M. (2006). The extended argument dependency model: A neurocognitive approach to sentence comprehension across languages. *Psychological Review*, *113*(4), 787-821.

Burkhardt, P. (2007). The P600 reflects cost of new information in discourse memory. *Neuroreport*, *18*(17), 1851-1854.

Copestake, A., & Briscoe, T. (1995). Semi-productive polysemy and sense extension. *Journal of Semantics*, *12*, 15-67.

Egg, M. (2004). Metonymie als Phänomen der Semantik-Pragmatik-Schnittstelle. *Metaphorik*, *6*, 36-53.

Frisson, S., & Pickering, M. J. (1999). The processing of metonymy: Evidence from eye movements. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *25*(6), 1366-1383.

Jackendoff, R. S. (1997). *The architecture of the language faculty.* Cambridge, MA: MIT Press.

Kutas, M., & Federmeier, K. D. (2000). Electrophysiology reveals semantic memory use in language comprehension. *Trends in Cognitive Sciences*, *4*(12), 463-470.

McElree, B., Frisson, S., & Pickering, M. J. (2006). Deferred interpretations: Why starting Dickens is taxing but reading Dickens isn't. *Cognitive Science*, *30*(1), 181-192.

McElree, B., Traxler, M. J., Pickering, M. J., Seely, R. E., & Jackendoff, R. (2001). Reading time evidence for enriched composition. *Cognition*, *78*(1), B17-B25.

Nunberg, G. (1995). Transfers of meaning. *Journal of Semantics*, *12*, 109-133.

Piñango, M. M., Zurif, E., & Jackendoff, R. (1999). Real-time processing implications of enriched composition at the syntax-semantics interface. *Journal of Psycho-linguistic Research, 28*(4), 395-414.

Pustejovsky, J. (1995). *The generative lexicon.* Cambridge/London: MIT Press.

Pylkkänen, L., & McElree, B. (2006). The syntax-semantics interface: On-line composition of sentence meaning. *Handbook of psycholinguistics,* New York: Elsevier.

Schumacher, P. B. (2009). Definiteness marking shows late effects during discourse processing: Evidence from ERPs. *Lecture Notes in Artificial Intelligence*, *5847*, 91-106.

Schumacher, P. B. (2011). *The hepatitis called...*: Electro-physiological evidence for enriched composition. In J. Meibauer & M. Steinbach (Eds.), *Experimental Pragmatics/Semantics* (pp. 199-219). Amsterdam: John Benjamins.

Traxler, M. J., McElree, B., Williams, R. S., & Pickering, M. J. (2005). Context effects in coercion: Evidence from eye movements. Journal of Memory and Language, 53(1), 1-25.

Metonymy Determining the Type of the Direct Object

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Abstract

This paper discusses the parallel between transitive locative alternations and logical metonymy, as in *he began the book*. It will be explained that both kinds of argument shifts can be considered as predicative metonymies, which cause a figure/ground effect of the direct object within the frame evoked by the verb.

Keywords: locative alternation; coercion; FrameNet; frame semantics; logical metonymy

Metonymy and Logical Metonymy

Metonymy is based on contiguity, that is conceptual closeness in reality. A contiguity relation between two concepts can cause an enriched interpretation of a word used in a certain context. Examples are *to read Goethe* (i.e. 'his work'), *to drink a bottle* (i.e. 'the liquid in it') or *to hire a longhair* (i.e. a 'person with long hair'). Metonymy cannot only lead to occasional re-interpretations, but also to conventionalised interpretational shifts, such as metonymical polysemy and diachronic meaning changes (cf. e.g. Koch, 2001).

Over the last twenty years linguists have become interested in a specific type of metonymy, which they have dubbed 'logical metonymy' (LM). Sentences (1)-(3) illustrate this phenomenon.

(1) Mary began the book.
[*i.e.:* to read / to write (the book)]
(2) Mary finished the book.
[*i.e.:* reading / writing (the book)]
(3) John enjoyed the sandwich.
[*i.e.:* eating (the sandwich)]

Given that one cannot begin or finish an object as such, we infer for sentences (1) and (2) an activity in which the book plays a central role. Similarly, enjoying an object presupposes some experience with the object. Therefore, we understand that John enjoyed eating the sandwich. In all three examples, we interpret some implicit event in which the explicitly expressed object is involved.

Pustejovsky describes the difference between these examples of LM and metonymy proper by stating that in the latter "a subpart of a related part of an object stands for the object itself" (Pustejovsky, 1991: 424) whereas in cases of LM "a logical argument of a semantic type (selected by a function) denotes the semantic type itself" (Pustejovsky, 1991: 425).

In line with this, the metonymical shift is visible within the syntactic structure in English: The shift from an activity to a concrete object seems to co-occur with a shift between a verb phrase (VP) and a nominal direct object (NP) (cf. Egg, 2003: 163; Lapata & Lascarides, 2003: 1; Verspoor, 1997: 166). In examples (1)-(3), possible VPs have been given within the square brackets.

It is verb-dependent whether verbs are combined with infinitive clauses or gerunds. In English for instance, *enjoy* and *finish* can only be combined with gerunds, whereas *begin* occurs with gerunds as well as an infinitival clause (cf. Egg, 2003: 163). Similarly, in Dutch and German infinitives can occur with Dutch *beginnen* and German *beginnen* or *anfangen* ('to begin'), but not with Dutch *beëindigen* / German *beenden* ('to finish') and

Dutch *genieten van* / German *genießen* ('to enjoy'). An obvious difference with English is that Dutch and German lack gerunds. In consequence, Dutch and German have use a real noun derived from a verb, i.e. an NP, instead of a gerund. This makes it problematic to define LM as a shift between a function and an argument of this function, which is reflected in the syntactic structure by a VP-NP shift.[1]

However, also other reasons are given why this type of metonymy is called logical. Sometimes, it is said that this metonymy is logical, since apart from the metonymical shift, an additional shift in the interpretation takes place, viz. a shift from a concrete object to an additionally interpreted abstract event. This additional shift is a type shift (also called a logical shift) triggered by requirements of the main verb (Verspoor, 1997: 166; cf. also Lapata & Lascarides, 2003: 306).

The logical shifts in sentences (1)-(3) are all based on the contiguity relation between an object and an action in which the object is involved (OBJECT-ACTION). If LM is defined as a shift between a concrete object and an event in general, one could raise the question whether there are also logical shifts on the basis of other contiguity patterns.

Such LMs can indeed be found. Some verbs, which require an event from a strictly semantic point of view, allow the agent of this event as their direct object (AGENT-ACTION). Consider in this respect example (4):

(4) Mary interrupted John
[*i.e.* John's talk(ing)]

From a semantic point of view, it is only possible to interrupt events, such as, for instance, presentations, conversations or lectures. Therefore, we understand that there must be some obvious connection between the expressed direct object *John* and an interrupted event (i.e. 'John's talking').

[1] Additionally, in English some NPs also denote events, which can be started, finished or enjoyed.

As far as I know, such examples are mostly not taken into account in the existing literature.[2] This is probably the case, because they follow a different metonymical pattern than the examples (1)-(3), which make it difficult to explain them in terms of qualia structures and semantic roles (cf. Pustejovsky, 1991). However, an explanation in terms of highlighted frame elements perfectly applies to such type shifts as well (cf. Sweep, 2010a).

Interestingly, metonymy-based type clashes also occur without eventive interpretations of the direct object (cf. especially Waltereit, 1998). Relevant in this respect is, for instance, the locative alternation. Sentences (5)-(7) illustrate transitive locative alternations.

(5) a. Mary planted roses (in a garden)
b. Mary planted a garden (with roses)
(6) a. John emptied water (from the bottle)
b. John emptied the bottle (of water)
(7) a. Alex plucked feathers (off/from a duck)
b. Alex plucked a duck (*from feathers)

Besides the fact that these argument shifts have been analysed as metonymy-based (cf. Sweep, 2009; Waltereit, 1998; 1999), the parallel with LM has also explicitly been noted (cf. Asher, 2010).

The present paper will discuss all these metonymy-driven type shifts in the direct object. First, it will be explained in line with Waltereit's research that locative alternations are metonymical, because they can be analysed as a highlighting effect within a frame. The same analysis applies to logical metonymy. Secondly, the metonymical shifts will be

[2] However, they have been recognised as special instances of metonymy by Dutch lexicographers (cf. Van Dale's *Groot woordenboek van de Nederlandse taal* (2005) lemma "objectsverwisseling"). According to Van Dale, other Dutch verbs, such as *afvlaggen* (lit.: off-flag, 'to flag down'), *afkussen* (lit.: off-kiss, 'to make up') and *bestraffen* (lit.: *be*-punish, 'to punish'), also shift between an action and a metonymically related agent.

clarified by means of the frames developed by FrameNet (http://framenet.icsi.berkeley. edu/). It will be shown that a uniform frame-semantic analysis applies to locative alternations and to all above examples of LM. Although frames do not provide an exact and rigid formalism, they can be used to explain some subtleties in language pretty well.

Metonymical Object Change (MOC)

This section will clarify the parallel between logical metonymy and locative alternations. The metonymy in locative alternations, as in (5)-(7) has in detail been investigated by Waltereit (1998; 1999). Although the metonymical shift is clearly based on the contiguity relation between the two possible direct objects, the shift is not a prototypical kind of metonymy, given that the direct objects do not seem to be reinterpreted.[3] Waltereit therefore considers such shifts to be caused by a diachronic development based on classical metonymy. As he puts it: "The occasional metonymic use is likely to be fixed later as a new meaning of the verb, when a metonymic shift is no longer involved." (1999: 235). Apart from the complicated question to which extent we are dealing with polysemous verbs (cf. Iwata, 2005; Sweep, 2010b) there are some other fundamental problems with this claim.

First of all, the consequence of Waltereit's analysis is that the above syntactic patterns must be born out of an occasional use of *roses* in the meaning of 'garden', *water* for 'bottle', or *feathers* referring to 'duck' (or the other way around?) (cf. Waltereit, 1999: 56). One might question whether this is really plausible.

Secondly, the contiguity relations between the two possible direct objects, such as location and what is in that location (i.e. the locatum), is no longer supposed to play a role. From a synchronic perspective, Waltereit only considers the two possible direct objects standing in a metonymical relation on a semantic role level. He writes: "die beiden Rollen sind kontig zu einander" ['both roles are contiguous to each other'] (Watereit, 1998: 56, cf. also 1999: 235). However, his actual analysis of specific instances of alternations contradicts this claim, since he explains object changes by taking into account relations such as CONTAINER-CONTENT (Waltereit, 1998: 26), which cannot be considered as a contiguity of semantic roles.

Also, the idea that the semantic roles are contiguous to each other is problematic, since it is not exactly clear what these semantic roles are. With respect to examples such as (5)-(7), some scholars speak about 'locatum' and 'location' or 'theme' and 'goal', but others consider all above direct objects as 'themes' (cf. the discussion in Rappaport & Levin, 1988) or as 'patients' (cf. e.g. Laffut, 1998: 129), irrespective of whether they refer to locations or things in a location. It does not make sense to claim that a contiguity relation between 'patient and patient' causes a shift in the type of direct object.

Of course, Waltereit is right in that the metonymy involved in the above sentences must be of a specific kind, given that the direct object does not, as in classical metonymies, seem to be metonymically re-interpreted. I therefore follow Waltereit's analysis that shifts as illustrated in (5)-(7) show a metonymical figure/ground effect (a highlighting of elements) within the conceptual-semantic frame evoked by the verb (Waltereit, 1998: 25-26, 56; Waltereit, 1999: 238; cf. also Koch, 2001).

Within the context of the verb, both direct objects form one conceptual unity or gestalt. The gestalt character or contiguity relation between both possible direct objects plays an essential role in the combining process of verb and direct object. Hence, the interpretation of the direct object slot (i.e. the argument place) is metonymically changed, rather than the direct object or the verb as such. Such shifts

[3] This can be illustrated by co-predication or anaphoric reference. The same issue has been discussed for LM, as illustrated in (1)-(3) (cf. Godard & Jayez, 1993).

could therefore be called Metonymical Object Changes (MOCs).

Following the work of Stallard (1993), one could consider MOCs as 'predicative metonymies' (cf. also Sweep, 2009: 107ff). A predicative metonymy is described as "a coercion of a predicate argument place, rather than of the argument NP itself" (Stallard, 1993: 89). This description applies exactly to examples (5)-(7): Based on contiguity relations between both possible direct objects, the argument slot can be occupied by the location or by what is in the location (i.e. the locatum). In other words, neither the verb's lexical meaning nor the expressed direct object is metonymically shifted, but only the combination of the two, i.e. the class (cf. Waltereit, 1999: 235) or type of argument connected as a direct object to the verb.[4] Obviously, this description also applies to examples of LM, as (1)-(4).

Highlighting within Frames

Although metonymy is often considered as a highlighting effect or figure/ground effect within a conceptual structure (CS) (cf. e.g. Koch, 2001), most research on metonymy does not define the CSs involved (cf. the criticism in Peirsman & Geeraerts, 2006: 270-271).

Independently of theoretical research on metonymy there is a tradition of researching semantic-conceptual structures: Based on Fillmore's concept of a frame, FrameNet (http://framenet.icsi.berkeley.edu/) is a project which tries to design as precisely as possible such structures on the basis of real linguistic data. Such a structure, a semantic frame, is seen as "a script-like conceptual structure that describes a particular type of situation, object or event" (Ruppenhofer et al., 2010: 5). If metonymy is considered as a highlighting effect within a CS, it must be possible to analyse a shifted direct object as a highlighted part of a frame.

Frames are evoked by words or, more precisely, by lexical units (LUs). Each frame, and in particular frames describing verbs and events, is connected with participants that are necessary for the conceptualisation of the meaning. These participants, or roles, are called frame elements (Ruppenhofer et al., 2010: 5). Frame elements can be divided into core elements and non-core elements. Core elements are "conceptually necessary components of a frame" (Ruppenhofer et al., 2010: 19).

The realisation of frame elements can be explained by an example, such as (8).

(8) Mary began to read.

According to FrameNet, the verb *begin* evokes the Activity_Start frame, which includes two core elements: An 'agent' and an 'activity' (cf. http://framenet.icsi.berkeley.edu/). In (8) both elements are realised: *Mary* is the agent (*x*) of the started activity *reading* / *to read* (*y*). This activity of course evokes its own frame. The verb *read* evokes a Reading frame with a 'reader' (*v*) and a 'text' (*z*) as core elements. Therefore, one can say that in (8) the frame of the reading activity is combined with or embedded within the Activity_Start frame.

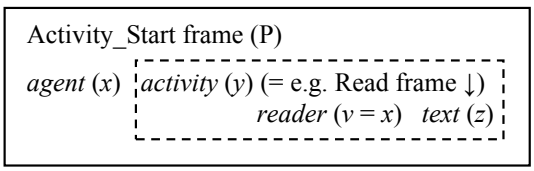

Figure 1: Activity_Start with embedded frame

This idea of multi-layered CSs (cf. Figure 1) can explain what is going on in (1), the metonymical counterpart of (8). Again the verb *begin* evokes the CS of starting an activity which normally needs an agent and an activity. An expression for the activity is

[4] This could be compared with the passive voice, in which a different type of subject is realised, without changing semantic roles and without a change in the interpretation of the verb meaning or nominal referent (Sweep, 2010b).

missing in (1), but instead some element of an activity can be found: The object that plays a key role in the activity. We understand that the activity frame has not been expressed, but a core element of the embedded frame (i.e. *z*). The semantics of *to begin the book* is metonymically enriched with a default activity interpretation, because *book* is the LU that corresponds to the core element 'text' (*z*) of the embedded Reading (or Writing) frame (*y*).

In the case of *to enjoy*, as in (3), the same mechanism occurs, although another main frame is evoked: The frame corresponding to *to enjoy* contains an experiencer (*x*) and an experience (*y*) (cf. Sweep, 2010a: 19ff). Core elements of the embedded experience-frame can also be highlighted. This is, for instance, the case in example (3), in which only the core element (*z*) of the intended *eating*-experience has been expressed as the direct object. The fact that *to enjoy* must be interpreted as involving a kind of exposure or experience rather than an activity in general explains why other interpretations with *to enjoy* are inferred as compared to the interpreted events with *to begin* and *to finish* (cf. Verspoor, 1997: 186-195).

Logical shifts that are based on an AGENT-ACTION contiguity work in the same way. In these cases, the agent of the interpreted event is not co-referential with the subject ($v \neq x$) and this agent can therefore be expressed as a direct object. In sentence (4), for instance, the 'process'-core element (*y*) of the evoked Interrupting_process frame (cf. http: //framenet.icsi.berkeley.edu/) is left implicit. Instead of the event itself, the agent (*v*) of this event is highlighted within the sentence.

FrameNet also reflects that locative alternations show a figure/ground effect of the direct object within a frame evoked by the verb. Locative alternations show a similar shift in the expression of the core elements of a frame as LM. The only crucial difference is that no embedded activity frame is involved.

The verbs in (6) and (7), for instance, both evoke the Removing frame (cf. http://framenet.icsi.berkeley.edu/). This frame has an 'agent'/ 'cause' (*r*), a 'theme' (*t*) and a 'source' (*s*) as its core elements. The latter two core elements are closely connected. They can be seen as a single gestalt within the frame (illustrated by the dashed oval in Figure 2). Therefore, the direct object can metonymically shift between the theme-element and the source-element, depending on which part of the gestalt involved is highlighted.

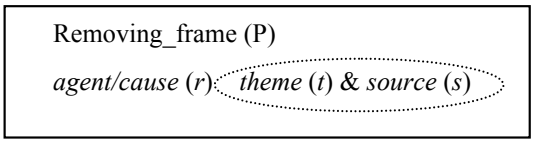

Figure 2: Schematic Removing Frame

A comparable analysis applies to (5). This main verb evokes the Planting frame. This frame has an 'agent' (*r*), a 'theme' (*t*) and a 'ground' (*s*) as its core elements. Again, the realisation of the direct object can differ between the two latter core elements, depending on which part of the gestalt is highlighted within the Planting frame.[5]

This frame-based analysis reveals the parallel between all kinds of MOCs and shows how verb and object can keep their literal meaning, while the combination of them is metonymically changed.

Conclusions

Predicative metonymies or metonymical object changes are contiguity-based shifts of a verb's argument slot. Logical metonymy should not be considered as a metonymical shift from a VP to an NP, but rather as a specific type of predicative metonymy, shifting from an event to a concrete object. These shifts can follow the contiguity pattern OBJECT INVOLVED-

[5] The gestalt character can be supported by the fact that both participants (i.e. *s* and *t*) can often be expressed by a single NP in combination with the verb, i.e. *to plant a rose garden* or *to pluck duck feathers*.

ACTION or AGENT-ACTION. Locative alternations illustrate predicative metonymies that shift between two concrete objects, which are in a LOCATUM-LOCATION relation.

All predicative metonymies can be analysed as a highlighting of related core elements within a frame. Rather than the separate elements as such, the combination of them is metonymically shifted. The frame-semantic analysis advocated in this paper provides a uniform analysis of different types of predicative metonymies, without denying the semantic differences between them.

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References

Asher, N. (2010). *Lexical Meaning in Context: A Web of Words*. Cambridge: Cambridge University Press.

Egg, M. (2003). Beginning Novels and Finishing Hamburgers. Remarks on the Semantics of *to Begin*. *Journal of Semantics*, *20*, 163-191.

Godard, J. & Jayez, D. (1993). Towards a Proper Treatment of Coercion Phenomena. *Proceedings of the Sixth Conference of the European Chapter of the ACL* (pp. 168-177), Utrecht.

Iwata, S. (2005). Locative Alternations and two Levels of Verb Meaning. *Cognitive Linguistics*, *16*, 355-407.

Koch, P. (2001). Metonymy: Unity in Diveristy. *Journal of historical pragmatics*, *2*, 201-244.

Laffut, A. (1998). The Locative Alternation: A Contrastive Study of Dutch vs. English. *Languages in Contrast*, *1*, 127-160.

Lapata, M. & Lascarides, A. (2003). A Probalistic Account of Logical Metonymy. *Computational Linguistics*, *29*, 261-315.

Peirsman, Y. & Geeraerts, D. (2006). Metonymy as a Prototypical Category, *Cognitive Linguistics*, *17*, 269-316.

Pustejovsky, J. (1991). The Generative Lexicon. *Computational Linguistics*, *17*, 409-441.

Rappaport, M. & Levin, B. (1988). What to Do with Theta-Roles. In W. Wilkins (Ed.) *Syntax and Semantics 21: Thematic Relations*. New York: Academic Press.

Ruppenhofer, J., Elsworth M., Petruck, M.R.L., Johnson, C.R. & Scheffczyk, J. (2010). *FrameNet II: Extended Theory and Practice*. <http://framenet2.icsi.berkeley.edu/index.php?option=com_wrapper&Itemid=126>

Stallard, D. (1993). Two Kinds of Metonymy. *Proceedings of the 31st annual meeting on ACL* (pp. 87-94). Stroudsburg, PA: ACL.

Sweep, J. (2009). Metonymy without a Referential Shift. Adding Evidence to the Discussion. In B. Botma & J. van Kampen (Eds.) *Linguistics in the Netherlands.* Amsterdam / Philadelphia: John Benjamins Publishing.

Sweep, J. (2010a). A Frame-semantic Approach to Logical Metonymy. *Constructions and Frames*, *2*, 1-32.

Sweep, J. (2010b). Metonymical Object Changes in Dutch: Lexicographical choices and verb meaning. *Proceedings of the XIV Euralex international congress* (pp. 1428-1435). Ljouwert: Fryske Akademy/Afuk.

Verspoor, C. M. (1997). *Contextually-Dependent Lexical Semantics*. Doctoral dissertation, University of Edinburgh.

Waltereit, R. (1998). *Metonymie und Grammatik: Kontiguitätsphänomene in der französischen Satzsemantiek.* Tübingen: Niemeyer.

Waltereit, R. (1999). Grammatical Constraints on Metonymy: the Role of the Direct Object. In K.-U. Panther & G. Radden (Eds.) *Metonymy in Language and Thought.* Amsterdam / Philadelphia: John Benjamins Publishing.

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Notes

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