Inferring Covert Events in Logical Metonymies: a Probe Recognition Experiment

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Outline

Logical metonymy and covert events

- The lexical hypothesis
- Event knowledge and logical metonymy

Probe recognition experiment

- Motivation
- Materials, design and procedure
- Results

3 Event knowledge and logical metonymy

The lexical hypothesis Event knowledge and logical metonymy

Logical metonymy and covert events

Logical metonymy

begin the newspaper enjoy the beer

 \rightarrow \rightarrow

begin **reading** the newspaper enjoy **drinking** the beer



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The lexical hypothesis Event knowledge and logical metonymy

Logical metonymy and covert events

Logical metonymy

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Logical metonymy and covert events

Logical metonymy

- begin the newspaper enjoy the beer
- begin **reading** the newspaper enjoy **drinking** the beer

Covert Events

- not realized on the surface, but understood
- influence reading times, available for inference
- a challenge to compositionality

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Logical metonymy and covert events

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Accounting for covert events

Where do covert events come from?

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The lexical hypothesis

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 - ▶ agentive quale (production): newspaper → writing
 - \blacktriangleright telic quale (purpose): newspaper \rightarrow reading
- qualia undergenerate the set of covert events:
 - John is a famous wrestler. He really enjoys a good fight (fighting)
 - John is a wrestling fan. He really enjoys a good fight (watching)
 - My goat eats anything. He really enjoyed your book. (eating
- "Pustejovsky's account doesn't predict the degree of variation of interpretations for a given noun" [Lapata and Lascarides, 2003] (ideally: ranked set of event interpretations)

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The lexical hypothesis Event knowledge and logical metonymy

Event knowledge and logical metonymy

Knowledge of typical event scenarios in language understanding

wash car

wash hair

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The lexical hypothesis Event knowledge and logical metonymy

Event knowledge and logical metonymy

Knowledge of typical event scenarios in language understanding

wash car

 \rightarrow hose, sponge, outdoor



wash hair

 \rightarrow shampoo, sink, bathroom



The lexical hypothesis Event knowledge and logical metonymy

Event knowledge and logical metonymy

Generalized event knowledge [McRae and Matsuki, 2009]:

Prototypical knowledge about typical events and their participants (first and second-hand experience, available in our memory)

- \blacktriangleright activated by words in isolation \rightarrow cue concepts from typical scenarios
 - ⟨arrest⟩ → cop
 ⟨arrest⟩ → crool

▶ words rapidly combine → expectations about upcoming input [Bicknell et al., 2010, Matsuki et al., 2011]

- Donna used the hose to wash her filthy...
- ▶ (journalist, check) → spelling
 - $\langle mechanic, check \rangle \xrightarrow{patient} car$

thematic fit: typicality of a filler for a given argument slot

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The lexical hypothesis Event knowledge and logical metonymy

Event knowledge and logical metonymy

- knowledge of typical event scenarios widely used in language understanding
- Iogical metonymies are ubiquitous

An alternative hypothesis to account for covert events:

- logical metonymies are not "special", but obey to the same constraints of predicate-argument composition
- covert event interpretation determined by generalized event knowledge

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Event knowledge and logical metonymy

He finished the icing ..

baker

child

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The lexical hypothesis Event knowledge and logical metonymy

Event knowledge and logical metonymy

He finished the icing ..

baker

 $\rightarrow \text{spreading}$



child \rightarrow eating



Motivation Materials, design and procedure Results

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Probe recognition experiment

Motivation

Can we find an effect of typicality / thematic fit on logical metonymy interpretation?

			\rightarrow AUFTRAGEN
	finished	the icing	\rightarrow SPREAD

→ prediction: inhibitory effect for cued events (high-typicality context)

Motivation Materials, design and procedure Results

Probe recognition experiment

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Motivation Materials, design and procedure Results

Evidence from self-paced reading

Der Konditor / das Kind The baker / the child hörte auf, finished die Glasur the icing $\frac{\mathsf{aufzutragen}}{\mathsf{to spread}}$

und fing mit.. and started with...



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Motivation Materials, design and procedure Results

Evidence from self-paced reading



position Alessandra Zarcone, Sebastian Padó, Alessandro Lenci

V+1

target V

Patient

Motivation Materials, design and procedure Results

Probe recognition experiment

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We found an effect of typicality in the self-paced reading experiment but...

- ... can we find an effect of typicality / thematic fit with real metonymies?
- when does the effect show up?
 - early: integration of event knowledge early on in processing
 - late: post-lexical inferences

Motivation Materials, design and procedure Results

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Probe recognition experiment

Materials, design and procedure



materials: 24 sets of 4 sentences (2 high-, 2 low-typicality) materials retrieved with web norming studies

what do you typically do with X?

Who does typically Y with X?

task: probe recognition task

conditions: 2x2 design (typicality: high vs. low x 100/900ms ISI)

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Probe recognition experiment

Results

Der Konditor / das Kind	hörte mit	der Glasur auf	\rightarrow	AUFTRAGEN
The baker / the child	finished with	the icing	\rightarrow	SPREAD



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Motivation Materials, design and procedure Results

Probe recognition experiment

Results



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Motivation Materials, design and procedure Results

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Probe recognition experiment

Results

		Short ISI	Long ISI
Latanay	low	969	1735
Latency	high	1026	1746
Difference (ms)		57	12

		ISI	Typicality
	F1(1,35)	111	7.76
E tost	F2(1,47)	2553	6.02
r-lest	p_1	< 0.001	0.009
	p 2	<0.001	0.015

Results from the probe recognition experiment

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Motivation Materials, design and procedure Results

Probe recognition experiment

Results

	Estimate	MCMC	HPD95	HPD95	рМСМС	Pr(> t)
		mean	lower	upper		
(Intercept)	7.4848	7.4766	7.3939	7.5584	0.0001	0.0000
ISIshort	-0.5490	-0.5452	-0.6342	-0.4624	0.0001	0.0000
TYPIClow	-0.0108	-0.0106	-0.0351	0.0155	0.4192	0.4062
PrecProbe	0.0000	0.0000	0.0000	0.0001	0.0282	0.0506
rtSent	0.0000	0.0000	0.0000	0.0000	0.0952	0.0879
order	-0.0039	-0.0039	-0.0046	-0.0031	0.0001	0.0000
ISI:TYPIC	-0.0360	-0.0366	-0.0735	-0.0019	0.0472	0.0505

Fixed effects for the mixed-effect model: $log(dl) \sim ISI * TYPICALITY + dIPrecProbe + rtSent + order + (1|subject) + (1|item)$

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Event knowledge and logical metonymy

What event is preferred?

The baker finished the using (spreading vs. eating)

covert events relevant to typical event scenarios are retrieved

Covert event retrieval:

- qualia provide good generalizations, but they are not enough
- expanding, not disproving the qualia hypothesis while providing a more dynamic account of covert event retrieval

Event knowledge and logical metonymy

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Event knowledge and logical metonymy

Accounting for logical metonymy:

Where do covert events come from? When do covert events arise?

- covert events retrieved when event-subcategorizing verbs are combined with entity-denoting objects (start the puzzle vs. start the fight)
- thematic fit can potentially provide a unique mechanism for both coercion and covert event retrieval:
 - metonymic verbs have a low thematic fit for entity-denoting objects
 - event-denoting nouns are better fillers for verbs like begin or enjoy

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Accounting for logical metonymy:

Where do covert events come from? \rightarrow generalized event knowledge When do covert events arise? \rightarrow low thematic fit

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