

Logical metonymy from type clash to thematic fit

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Outline

1 Logical metonymy and type clash

- Logical metonymy
- Logical metonymy as an instance of type clash
- Why thematic fit?

2 A similarity-based model of type clash

- A similarity-based model: Distributional Memory
- Thematic fit models of logical metonymy
- A different take on logical metonymy

Logical metonymy

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



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Logical metonymy

- ▶ **covert events** not realized, but available for inference
- ▶ extra processing costs

Logical metonymy

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Accounting for logical metonymy

- ▶ **Why** are covert events triggered?
- ▶ **Where** do covert events come from?

Logical metonymy as an instance of type clash

Why are covert events triggered?

event-denoting objects (EV) vs. entity-denoting objects (EN)

EV: *begin the afternoon*

→ ✓ *begin(afternoon)*

EN: *begin the newspaper*

→ ✗ *begin(newspaper)*

→ ✓ *begin(CE(newspaper))*

⇒ *begin reading the newspaper*

- ▶ **type clash** [Pustejovsky, 1995, Jackendoff, 1997]:
covert events are triggered by a type mismatch
(EV-subcategorizing verb + EN-denoting object)

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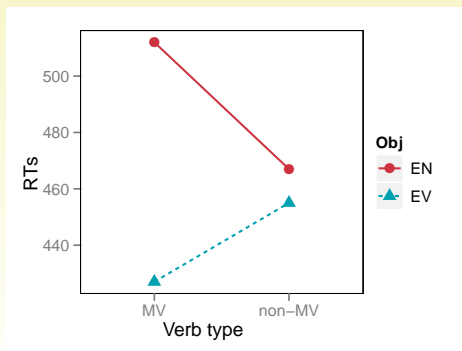
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Evidence in favor of the type clash hypothesis

	EV	EN
meton. v.	✓ The boy started the fight	✗ The boy started the puzzle
non-meton. v.	✓ The boy saw the fight	✓ The boy saw the puzzle

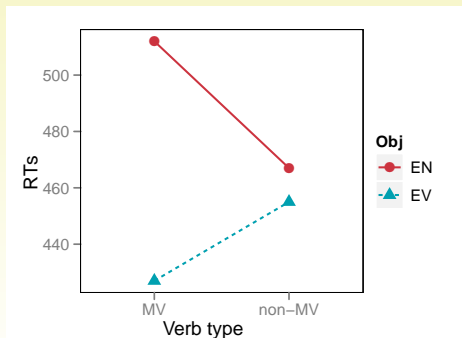


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 - * main effect of Obj.
 - * Obj. x Verb interactionsecond-pass and total time measures at the obj.
- ▶ **SPR:**
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 - ** Obj. x Verb interactionone word after the obj.

[Traxler et al., 2002]

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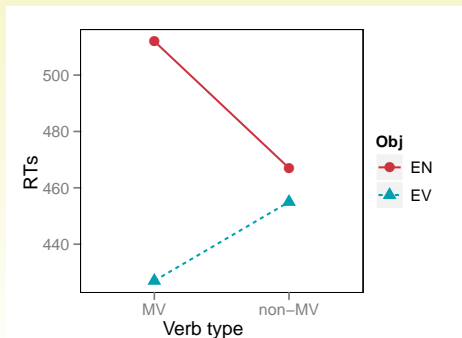
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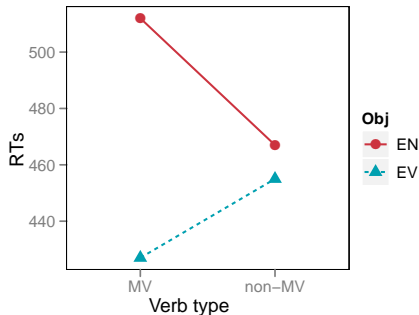


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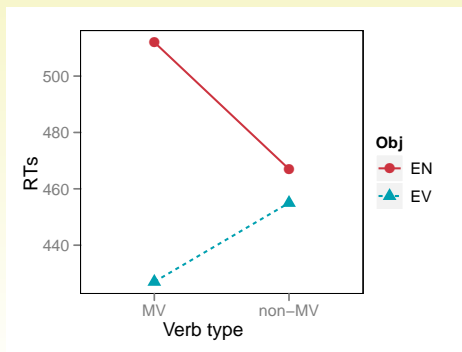


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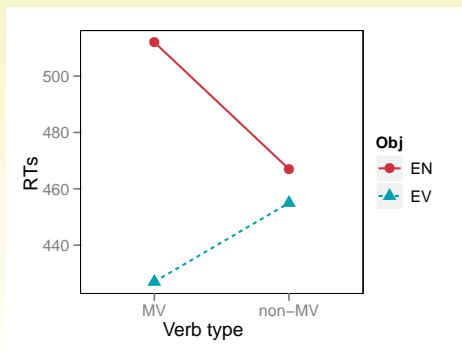


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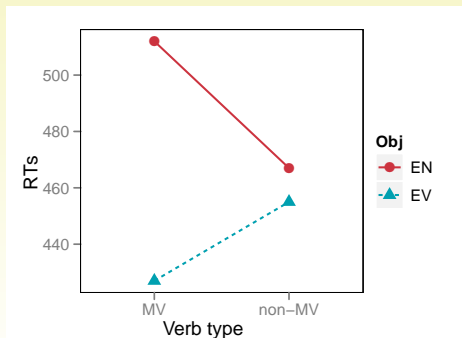


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Why thematic fit?

Generalized event knowledge:

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

- ▶ activated by words in isolation → cue concepts from typical scenarios
 - ▶ $\langle \text{arrest} \rangle \xrightarrow{\text{agent}} \text{cop}$
 $\langle \text{arrest} \rangle \xrightarrow{\text{patient}} \text{crook}$
- ▶ words rapidly combine → expectations about upcoming input
[Bicknell et al., 2010, Matsuki et al., 2011]
 - ▶ $\langle \text{journalist, check} \rangle \xrightarrow{\text{patient}} \text{spelling}$
 $\langle \text{mechanic, check} \rangle \xrightarrow{\text{patient}} \text{car}$
- ▶ **thematic fit**: typicality of a filler for a given argument slot

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Why thematic fit?

Recent work in psycholinguistics :

selectional restrictions

binary

The child ate the cake

[+edible]

The child convinced the cake

[-convincible?]

→

selectional preferences

graded

The cop arrested ... the crook

[high-typicality]

The cop arrested ... by the crook

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A similarity-based model: Distributional Memory

Distributional Hypothesis [Harris, 1954, Miller and Charles, 1991]

- ▶ word's **distributional behavior** → semantic content
(words occurring in similar contexts → semantically similar)
- ▶ vector of features of its linguistic context → semantic content
(vector similarity → semantic similarity)

Distributional Memory (DM) [Baroni and Lenci, 2010]

- ▶ a structured distributional semantic model
 - ▶ word-link-word triples (e.g. *marine-subj-shoot* or *marine-shoot-gun*)
- ▶ a multi-purpose framework in distributional semantics
 - ▶ similarity-based model of thematic fit

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- ▶ **Off-line:** corpus-extracted weighted *word-link-word* tuples

marine	own	bomb	40.0	sergeant	use	gun	51.9
marine	use	bomb	82.1	sergeant	own	book	8.0
marine	own	gun	85.3	sergeant	use	book	10.1
marine	use	gun	44.8	teacher	own	bomb	5.2
marine	own	book	3.2	teacher	use	bomb	7.0
sergeant	own	gun	73.4	teacher	use	book	53.6

- ▶ **On-line:** 2-way spaces generated on demand, depending on task

	<i>⟨own,bomb⟩</i>	<i>⟨use,bomb⟩</i>	<i>⟨own,gun⟩</i>	<i>⟨use,gun⟩</i>	<i>⟨own,book⟩</i>	<i>⟨use,book⟩</i>
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Thematic fit models of logical metonymy

	EV	EN
meton. v.	✓ The boy started the fight	✗ The boy started the puzzle
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Expectation Composition and Update, [Lenci, 2011]:

compute the thematic fit for an obj. of a subj.-verb pair

- 1 weighted set of vectors of typical objects (from DM)
 - ▶ for each verb (*start, see*)
 - ▶ for each subj. (*boy, pastor*)
- 2 compose the sets and update the vector weights (sum)
- 3 **prototypical object**: centroid vector of the 20 most typical obj.
- 4 **object thematic fit**: for each obj., similarity with the prototype
boy-see-toy > *boy-see-engine*

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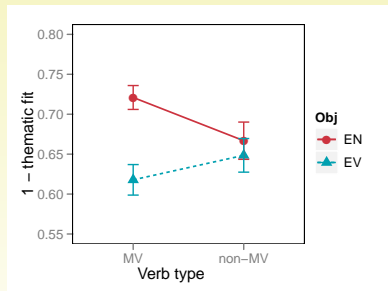
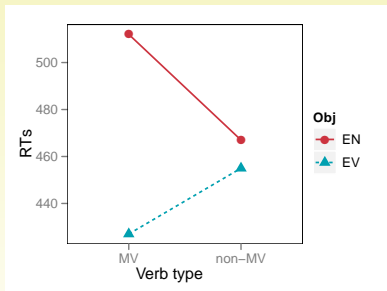
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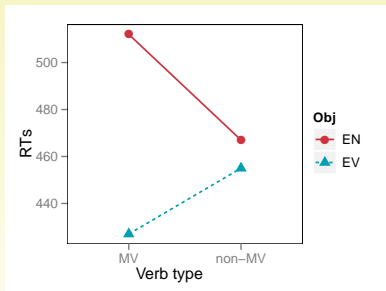


[Traxler et al., 2002]
main effect of Obj.
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Sum model:
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Thematic fit models of logical metonymy

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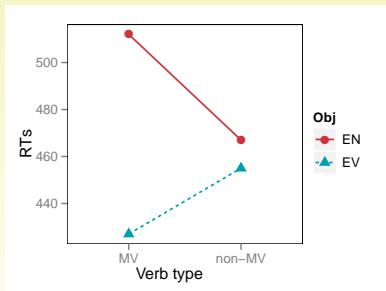
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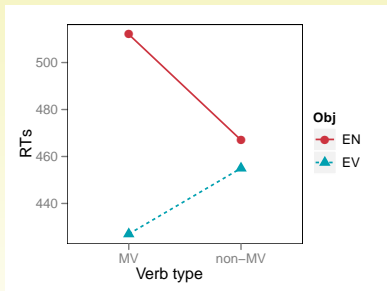
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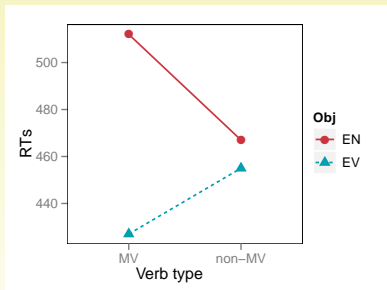
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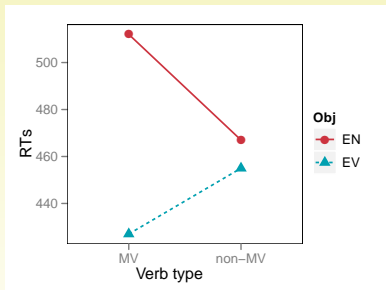
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 - ▶ for each verb (*start*, *see*)
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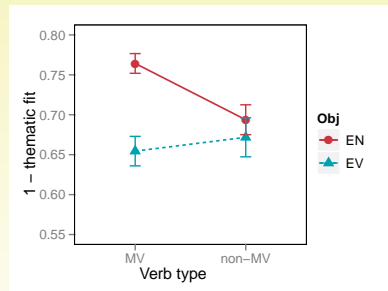
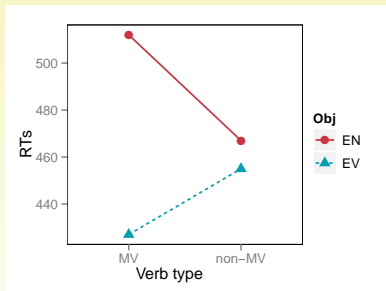
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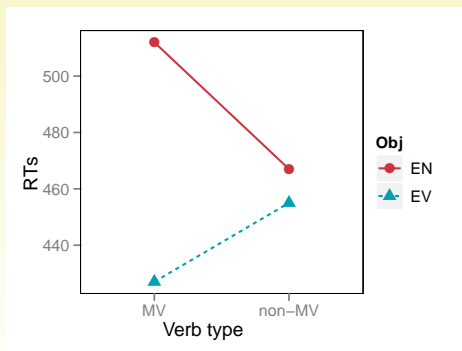


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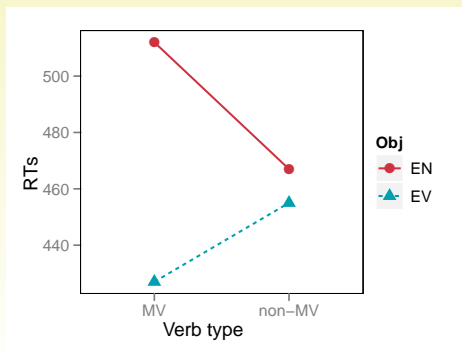
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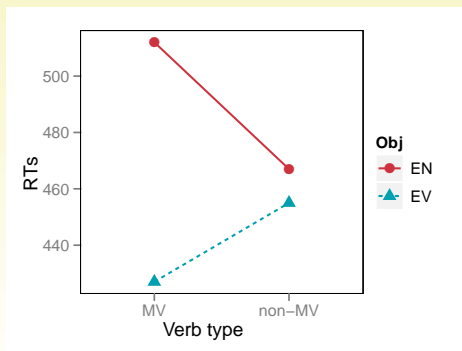
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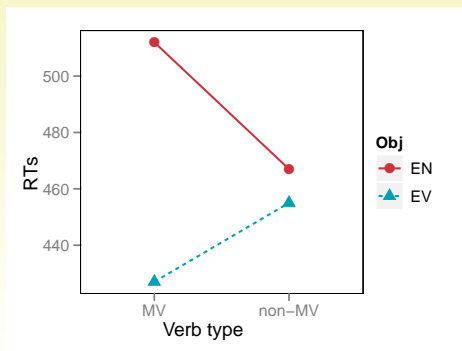
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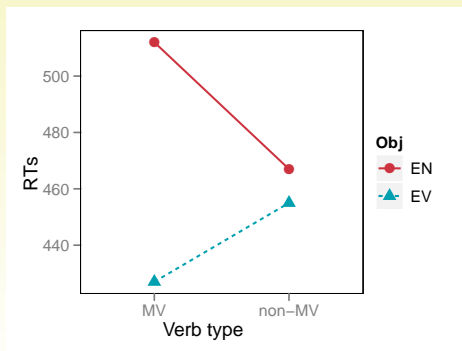
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A different take on logical metonymy

- ▶ **Where** do covert events come from?

	high thematic fit	low thematic fit
The baker finished the icing	✓ SPREAD	× EAT
The child finished the icing	✓ EAT	× SPREAD

→ **generalized event knowledge / thematic fit** affects covert event retrieval in logical metonymies (probe recognition, [Zarcone et al., 2012])

- ▶ **Why** are covert events triggered?

	high thematic fit	low thematic fit
The pastor finished	✓ the funeral	× the sandwich

two mechanisms
for triggering (type-clash) and
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(complex lexical entries)

one mechanism
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Acknowledgements

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Thank you!

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