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Online and offline processing in zeugma constructions is insensitive to argument order

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The Question In One Sentence

What can **zeugma** tell us about the interaction of polysemy, idiomaticity, and structural processing during incremental processing?

Background: Zeugma

Zeugma: a word or phrase has to be interpreted in two distinct ways simultaneously, triggering an incongruity effect



Compare to literal NP and NP coordination:

Literal The teacher bit the lime and the apple.

Zeugma The teacher bit the lime and _the dust.

Research questions:

- Is zeugma harder than standard “NP and NP” coordination?
- Is there an effect of argument order?
e.g. some theories of idiomatic processing would predict *figurative first* (“the dust and the lime”) to be harder...

Two Studies

Standard 2 x 2 design:

- Literal/Zeugma x Argument Order
- Forward: Figurative NP first (“the dust and the lime”)

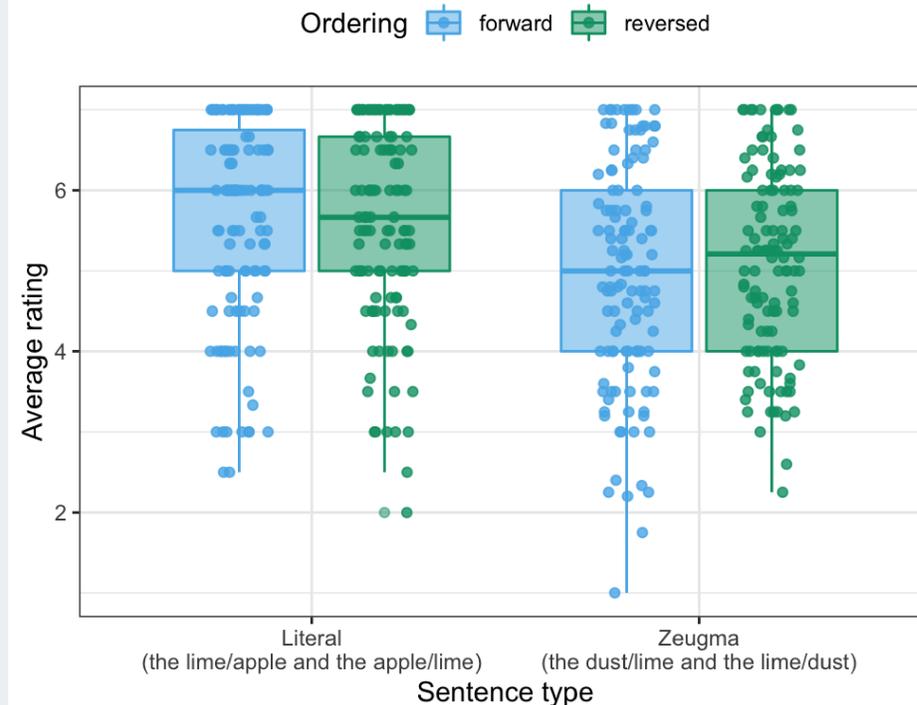
Stimuli:

- 14 target sentences in English
- highly familiar verbal idiomatic expressions
- Literal arguments selected with BERT (*The doctor bit the [MASK]*)
- Highly animate human beings as agents

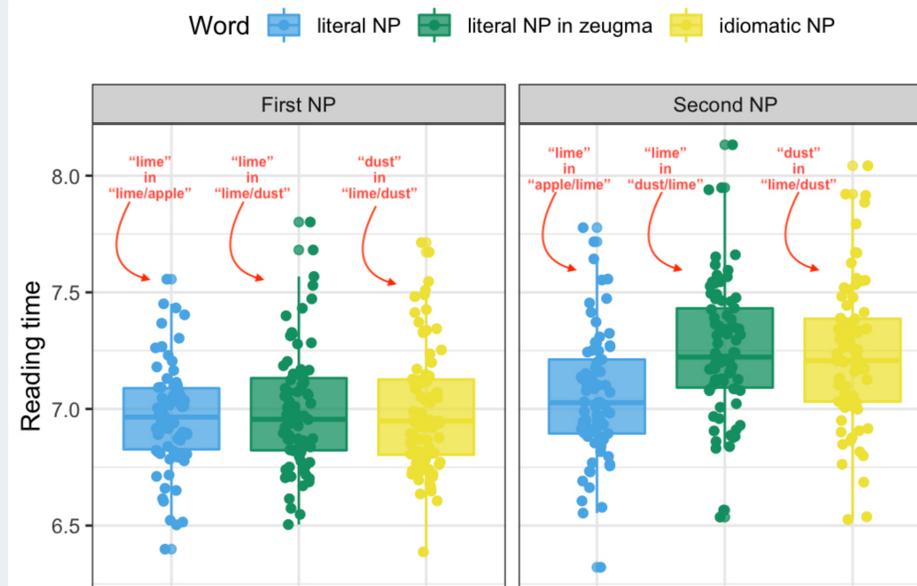
The teacher bit the dust and the lime.
The teacher bit the lime and the dust.
The teacher bit the apple and the lime.
The teacher bit the lime and the apple.

Zeugma/Forward
Zeugma/Reversed
Literal/Forward
Literal/Reversed

Acceptability Task (n= 120)



Maze (n = 80): RTs to Critical Nouns



References

Boyce, Veronica, Richard Futrell and Roger P. Levy (1st Apr. 2029). 'Maze Made Easy: Better and Easier Measurement of Incremental Processing Difficulty'. In: *Journal of Memory and Language* 111.
 Bulkes, Nyssa Z. and Darren Tanner (1st Apr. 2017). "'Going to Town': Large-scale Norming and Statistical Analysis of 876 American English Idioms". In: *Behavior Research Methods* 49.2.
 DeLong, Katherine A., Sean Trott and Marta Kutas (10th June 2022).
 "Offline Dominance and Zeugmatic Similarity Normings of Variably Ambiguous Words Assessed against a Neural Language Model (BERT)". In: *Behavior Research Methods*.
 Lascarides, Alex, Ann Copestake and Ted Briscoe (1st Jan. 1996). 'Ambiguity and Coherence'. In: *Journal of Semantics* 13.1.
 Mashal, Nira, Yeshayahu Shen and Debbie Kastel (3rd Apr. 2014). 'Element Order in Metaphorical and Literal Phrases'. In: *Metaphor and Symbol* 29.2.
 Solska, Agnieszka (2008). 'Accessing Multiple Meanings: The Case of Zeugma'. In: *Proceedings of the First Relevance Round Table Meeting*.

Ordinal Model of Acceptability

Variable	Estimate	SE	t	p
Sentence type	1.27	0.29	4.35	< .005
Position (first or second)	-0.03	0.15	-0.22	n.s.
Sentence type x Position	0.33	0.27	1.19	n.s.

- Likert Scale acceptability task (1-7)
- Fillers contained some VP + VP coordinations to off-set task effects
- Readers generally find zeugma less acceptable than literal sentences
- No meaningful difference between Literal-Figurative or Figurative-Literal orders

Models of Maze Reading Times

Variable	Estimate	SE	t	p
Sentence type	0.21	0.05	4.34	< .001
Position (first or second)	-0.09	0.05	-1.93	< .1
Sentence type x Position	-0.84	0.08	-10.11	< .001

Fig. 2: Reading time to literal NP (“Lime”) across sentence types

Variable	Estimate	SE	t	p
NP type (literal/idiomatic)	-0.05	0.07	-0.74	n.s.
Argument order	0.20	0.01	11.62	< .001
NP type x Argument order	-0.02	0.03	-0.55	n.s.

Fig. 3: Reading time to literal (“Lime”) and idiomatic (“dust”) NP in zeugma

- We used GPT-2 to generate low-probability continuations (foils)
- Critical regions are the positions (first or second) of the literal and idiomatic NPs in the literal or zeugmatic conditions
- Zeugma [green, yellow] are slower to read than literal coordination Literal NPs [blue, green] are harder when they come after an idiomatic NP
- Literal and Idiomatic NP both slower in second position within zeugma

Discussion

- Both online and offline, zeugma is harder than literal NP coordination
- Specifically, the second NP in zeugma is hard regardless
- No effect of argument order: inconclusive evidence for literal/zeugma over zeugma/literal

Open Questions/Future Steps?

- What does this tell us about theories of idiomatic processing?
- How does this interact with theories of structural revision?
- Collect norms for “forcing” of literal coordination interpretation
- Lexical bias tradeoffs
- Zeugma vs. literal VP and VP coordination?

