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How do different kinds of context affect people's interpretations of sentences? We (w/ Sarah Nathaniel, @raryskin @LanguageMIT) investigated this question at tinyurl.com/effectOfContext, a paper published in Cognition. A thread 1/11

The effect of context on noisy-channel sentence comprehension

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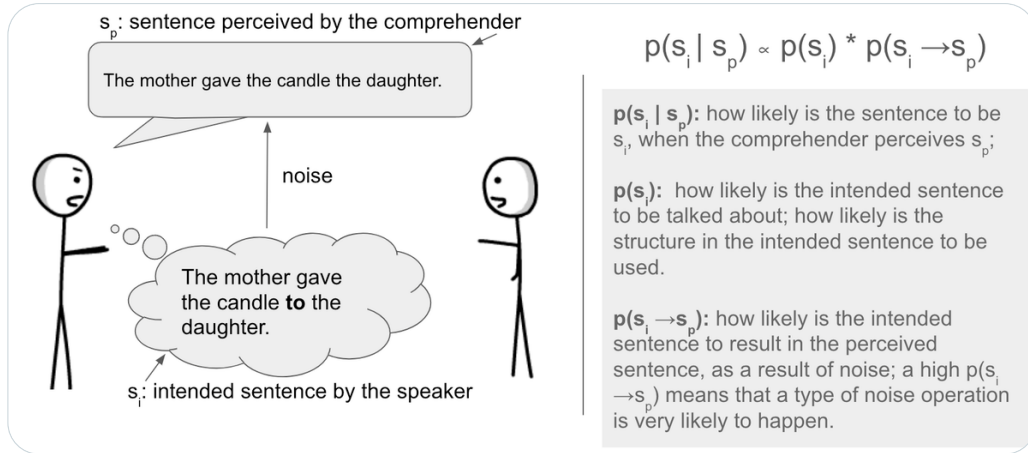
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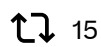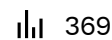
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The noisy-channel framework has been used to model how people interpret implausible sentences: people do so based on how likely the intended sentence is and how likely it is to be corrupted into the implausible one by noise. 2/11

s$_p$: sentence perceived by the comprehender

The mother gave the candle the daughter.

noise

The mother gave the candle **to** the daughter.

s$_i$: intended sentence by the speaker

$$p(s_i \mid s_p) \propto p(s_i) * p(s_i \rightarrow s_p)$$

p(s$_i$ | s$_p$): how likely is the sentence to be s$_i$, when the comprehender perceives s$_p$;

p(s$_i$): how likely is the intended sentence to be talked about; how likely is the structure in the intended sentence to be used.

p(s$_i$ →s$_p$): how likely is the intended sentence to result in the perceived sentence, as a result of noise; a high p(s$_i$ →s$_p$) means that a type of noise operation is very likely to happen.

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Previous studies tested the framework by having participants read sentences and answer comprehension questions. Participants could either answer the question based on a literal interpretation of the sentence they saw, or could do so based on an inference. 3/11

Sentence: The mother gave the candle the daughter.

Question: Did the sister receive anything?
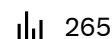
Yes: non-literal interpretation

No: literal interpretation

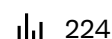**Sihan Chen** @cshnican · Jun 18

Gibson et al. (2013) found that the more edits it takes to fix an implausible sentence, the more likely people will interpret the implausible sentence literally. This finding has been replicated in subsequent studies. 4/11

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These studies had a common limitation: in each trial the participants were presented with just a single sentence, but in real life, sentences are rarely presented on their own: there is usually a context building up to that sentence. 5/11

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Hence, in our study, we tested how different kinds of context would affect people's likelihood to interpret a sentence literally. We had three conditions, where sentences were preceded by 1) a supportive context, 2) a non-supportive context, or 3) no context, respectively. 6/11

Condition	Supportive Context	Non-supportive Context	No Context
Context sentence	When the power outage happened, the daughter asked the mother for a candle.	The aunt told the nephew she would miss him while he was on vacation. The magician pulled his hat out of the trunk.	
Test sentence	The mother gave the candle the daughter		
Comprehension Question	Did the daughter receive anything?		

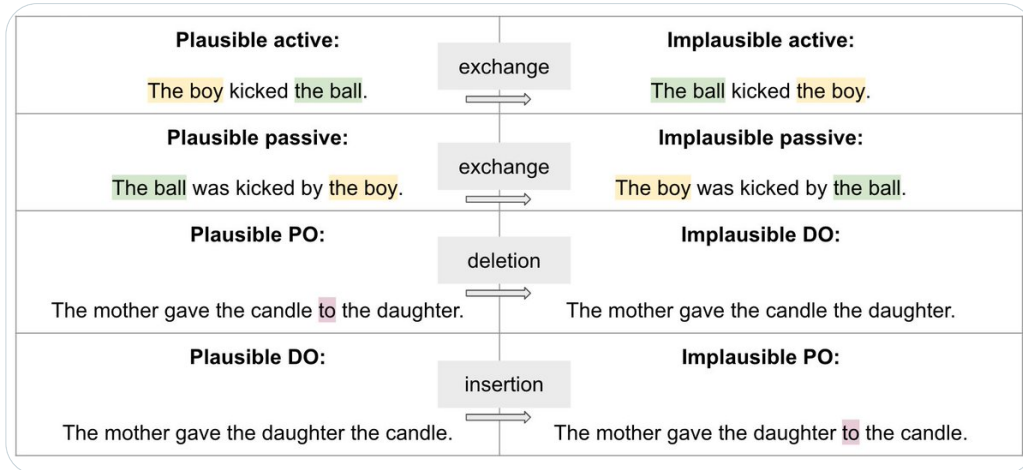💬 1   🔁   🤍 3   📊 225   ↑
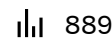
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Test sentences included 2 syntactic alternations: active/passive, direct-object (DO) / prepositional-phrase-object (PO). Act/pass sentences were likely made implausible by exchanges (a lower prob corruption), PO by insertions, and DO by deletions (a higher prob corruption). 7/11

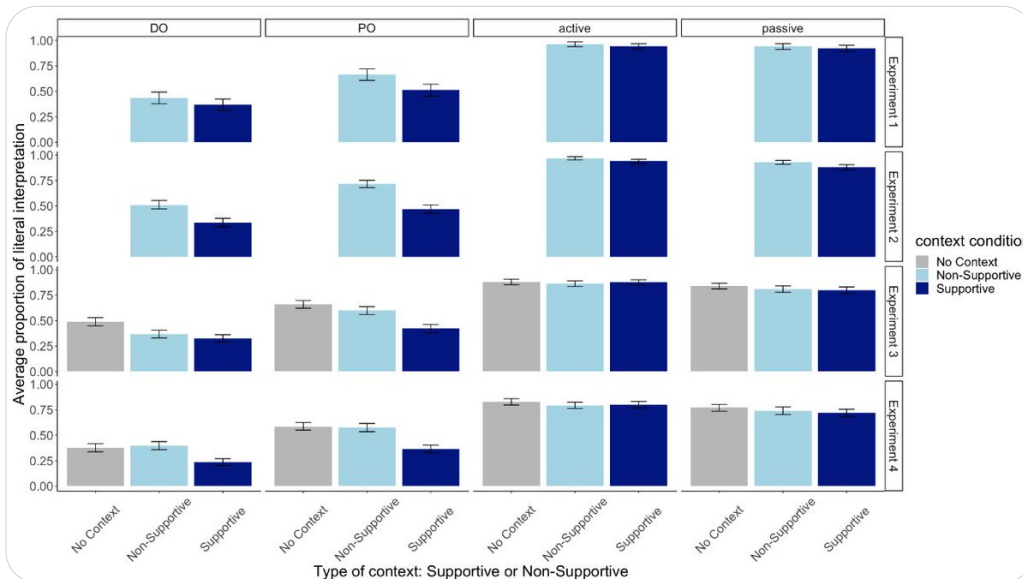| Plausible active: | exchange | Implausible active: |
The boy kicked the ball.		The ball kicked the boy.
Plausible passive:	exchange	Implausible passive:
The ball was kicked by the boy.		The boy was kicked by the ball.
Plausible PO:	deletion	Implausible DO:
The mother gave the candle to the daughter.		The mother gave the candle the daughter.
Plausible DO:	insertion	Implausible PO:
The mother gave the daughter the candle.		The mother gave the daughter to the candle.

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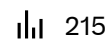

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Main result: When people read an implausible sentence, they were less likely to interpret it literally when it was preceded by a supportive context (dark blue in the figure), than when it was preceded by a non-supportive context (light blue), or no context (gray). 8/11

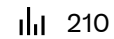💬 1   ⇄   ♡ 4   📊 215   ⬆

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We also replicated previous findings that people were more likely to interpret implausible active/passive sentences literally, than implausible DO/PO sentences, due to differences in edit probabilities. 9/11

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Our results suggest that previous work, where sentences were shown in isolation, underestimated the prevalence of nonliteral interpretations, since most sentences are part of a context, which can affect how they are interpreted. 10/11

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FYI, this paper started as a final project in Ted's psycholinguistics class. We are sincerely grateful to the editor and the four anonymous reviewers who helped us make our paper what it is. 11/11

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