



Interpreting implausible event descriptions under noise

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Speech production

The choice of anaphoric referring expressions is regulated by a complex interaction of factors that include the grammatical position of the antecedent, the length of the referring expression, and its predictability [1]. Here, we look at predictability as a cognitive category to investigate whether speakers prefer phonologically overt descriptions when they refer to agents of surprising events.

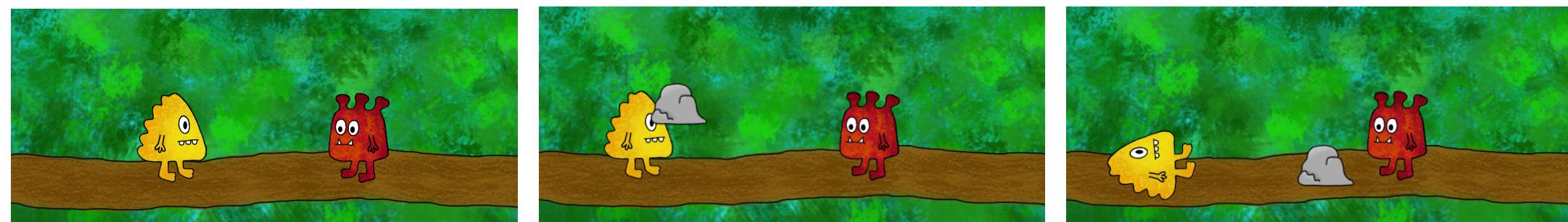
The yellow monster attacked the red monster ...

- ... and fell over. (zero)
- ... and it fell over. (pronoun)
- ... and the red monster fell over. (noun)

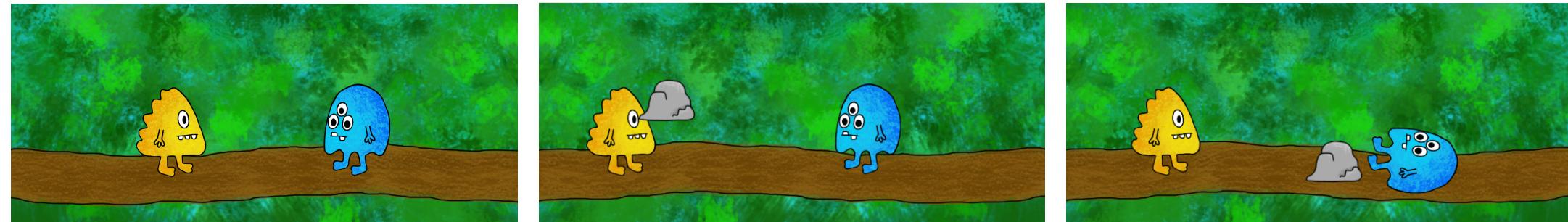
Experiment 1

1. Phase: Learn event patterns to establish which events are expected

Yellow monster attacks red monster → yellow monster falls

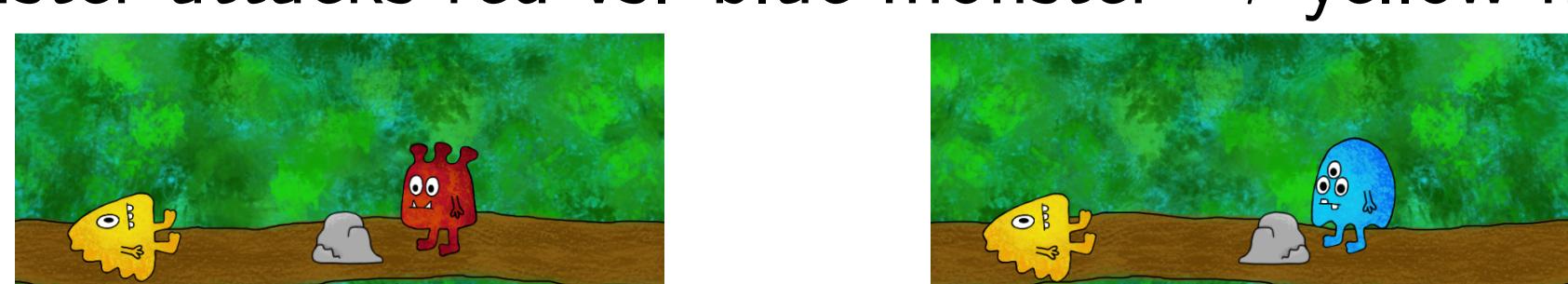


Yellow monster attacks blue monster → blue monster falls



2. Phase: Describe expected vs. surprising events

Yellow monster attacks red vs. blue monster → yellow monster falls



Yellow monster attacks blue vs. red monster → blue /red monster falls



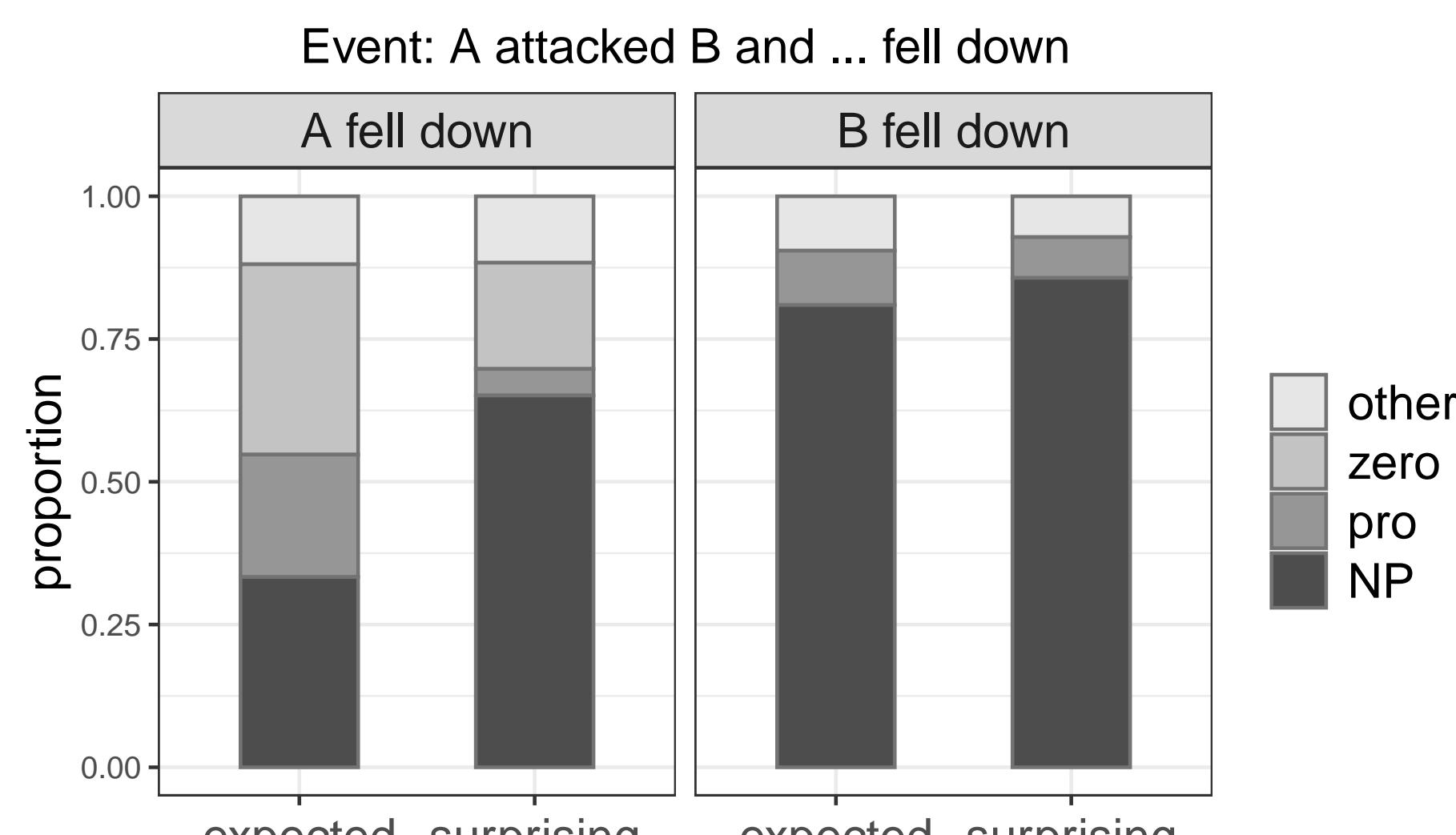
Expected

Surprising

Predictions

- If speakers avoid ambiguity, they will produce either a zero anaphor or a full noun phrase.
- If speakers also care about the noisy channel [2–5], they will also avoid zero anaphors, because they can be misinterpreted.

Results



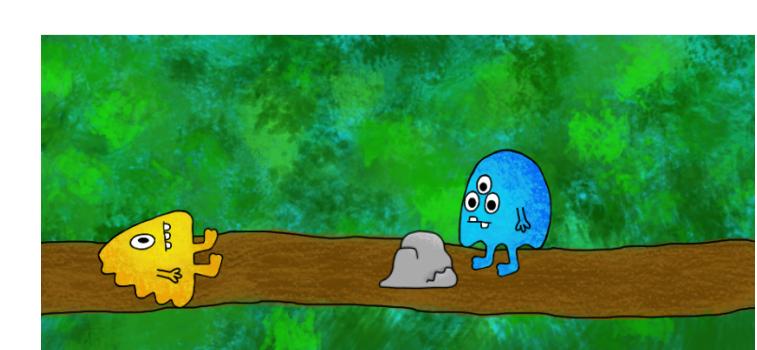
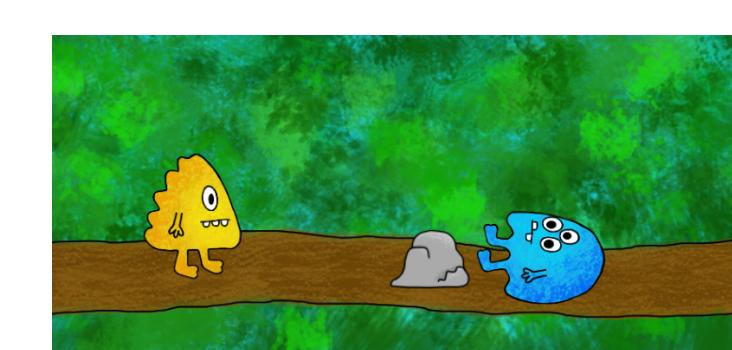
- Event predictability affects the choice of referring expressions: speakers prefer noun phrases (the yellow monster) to refer to agents of surprising events.
- This choice is also affected by the change in the thematic position of the agent.

Speech perception under noise

- Are listeners more likely to misinterpret unambiguous referring expressions when the described event succession is surprising?
- Do listeners rely on their prior expectations to decide what happened, when a referring description is ambiguous?

Experiment 2

Participants hear a partially noisy either unambiguous (zero) or ambiguous (pronoun) auditory description of an interaction (no learning here). They are asked to (i) choose the movie that best depicts the described interaction and (ii) type in the final part of the heard sentence.



Please watch both videos

► The yellow monster threw a rock at the blue monster and fell over

Please type what you heard

The yellow monster threw a rock at the blue monster and

Predictions

If listeners take their prior event expectations into account...

Ambiguous description:

... they will mainly choose the expected event outcomes.

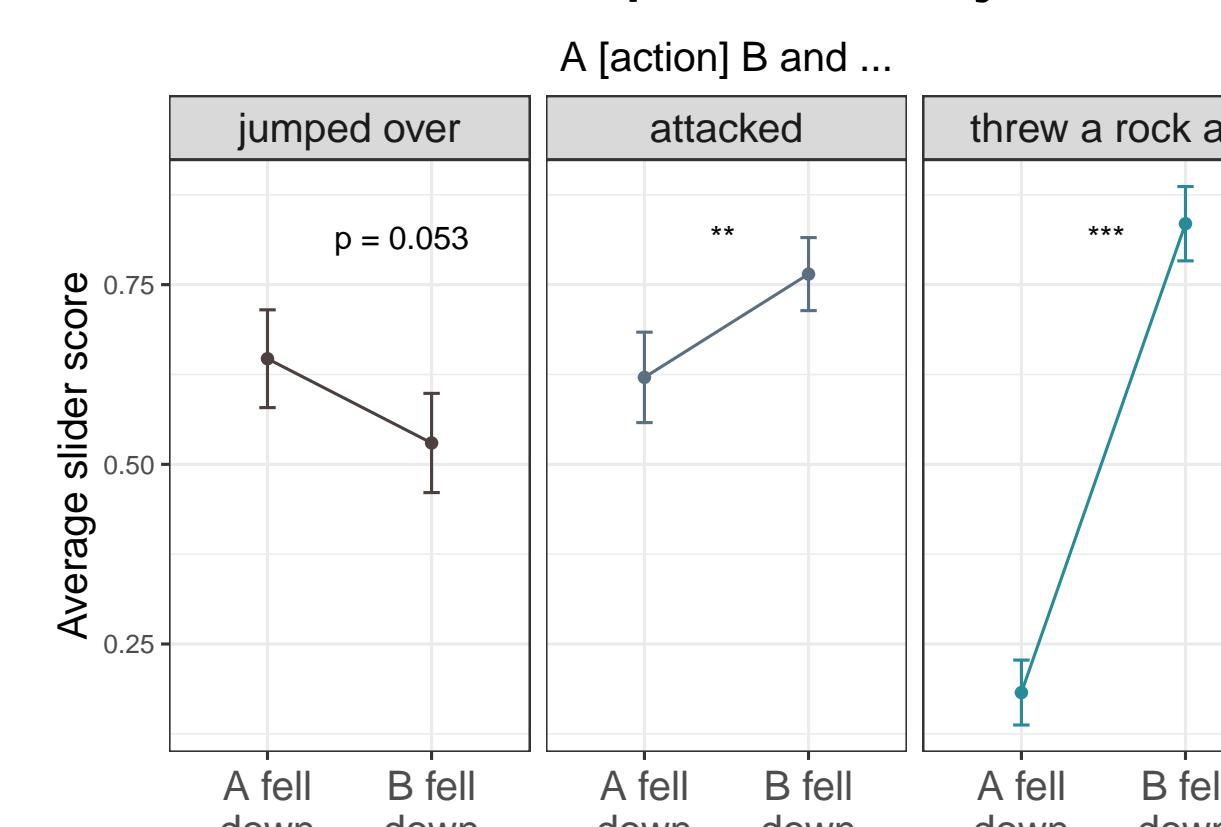
Unambiguous description:

... they will fill-in pronouns or even choose the expected event outcome erroneously.

Results

Separate evaluation:

Event succession plausibility:



Result 1: Choice of video

Prompt: A [action] B...

A fell down B fell down



Result 2: Typed referring expressions

and fell down and it fell down

NP	3%	4.8%
pro	10.2%	62.8%
zero	84%	28.5%
missing data	2.8%	3.8%

- The interaction type biases the plausibility of the consequent falling down event.

- This bias influences the best matching video choice—even in the unambiguous case.

- Referring expressions are sometimes adjusted—more often to one with pronoun.

→ Interpretations depend on expectations of event successions as well as the ambiguity of the utterances.

→ Noisy information increases the influence of expectation priors.

References

- [1] V. Demberg, E. Kravchenko, and J. E. Loy. A systematic evaluation of factors affecting referring expression choice in passage completion tasks. *Journal of Memory and Language*, 130:104413, 2023.
- [2] E. Gibson, L. Bergen, and S. T. Piantadosi. Rational integration of noisy evidence and prior semantic expectations in sentence interpretation. *Proceedings of the National Academy of Sciences*, 110(20):8051–8056, 2013.
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