

Updating predictions in the presence of a local competitor: A visual-world study

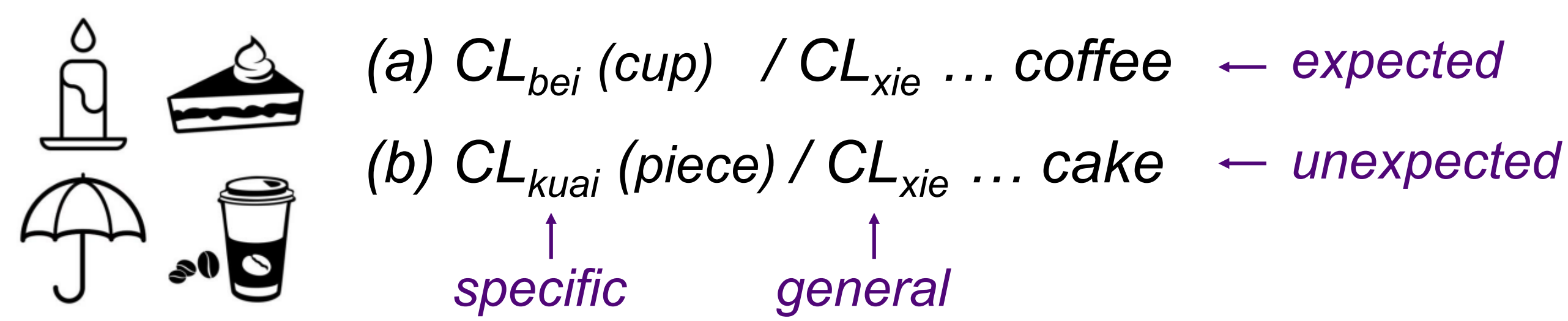
Kayla Keyue Chen, Jingyi Gao, Wing-Yee Chow
University College London, London, United Kingdom (contact: keyue.chen.19@ucl.ac.uk)



INTRODUCTION

- Comprehenders use contextual information to predict upcoming words [1].
- They also dynamically revise their predictions when encountering information that is inconsistent with their initial predictions [2].

e.g., *Anna went to Starbucks to buy one*



Upon hearing a prediction-inconsistent classifier (*piece*), Mandarin Chinese listeners were able to rapidly redirect their eye gaze from the expected object (*coffee*) towards a previously unexpected object (*cake*).

→ Do comprehenders consider only nouns that are congruent with the global context?

e.g., *Anna went to Starbucks to buy one CL_kuai (piece) ...*
☞ *cake (plausible)* ☞ *soap (implausible)*

- Irrelevant representations may be activated through the spread of activation from bottom-up cues, even when these representations conflict with the global context [3-4].

e.g., *She will eat the red ...*

After hearing the adjective (*red*), listeners were more likely to fixate on the local competitor (*heart*) than on the unrelated control object (*igloo*) even if *heart* was incongruent with the verb (*eat*).

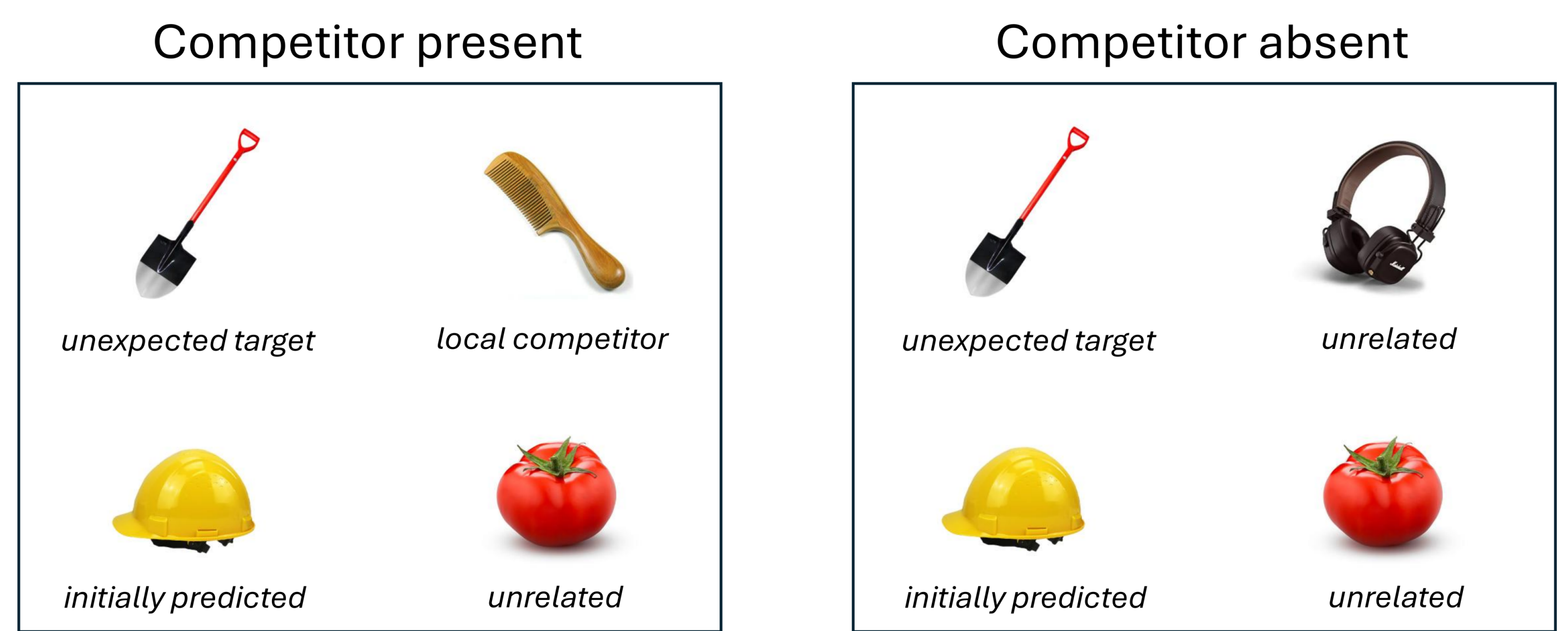
THE PRESENT STUDY

Is prediction revision influenced by the presence of a luring competitor that is compatible with a local cue but implausible in the global context? How?

- Would prediction revision be slower?
- Would listeners suppress looks to the competitor rapidly?

METHODS

Native Mandarin Chinese speakers ($n = 63$) listened to sentences while viewing a display of four objects.



e.g., *When workers enter the construction site to work, they must bring one {CL_ba (specific) / CL_ge (general)} high-quality shovel. — unexpected*

The study used a 2×2 design, manipulating Classifier in the auditory sentence and Competitor in the visual display.

Classifier (specific vs. general)

- Specific classifiers were incompatible with the initial prediction (*helmet*) but compatible with both the target and competitor (*shovel* and *comb*).
- General classifiers were compatible with all of the nouns depicted on the screen.

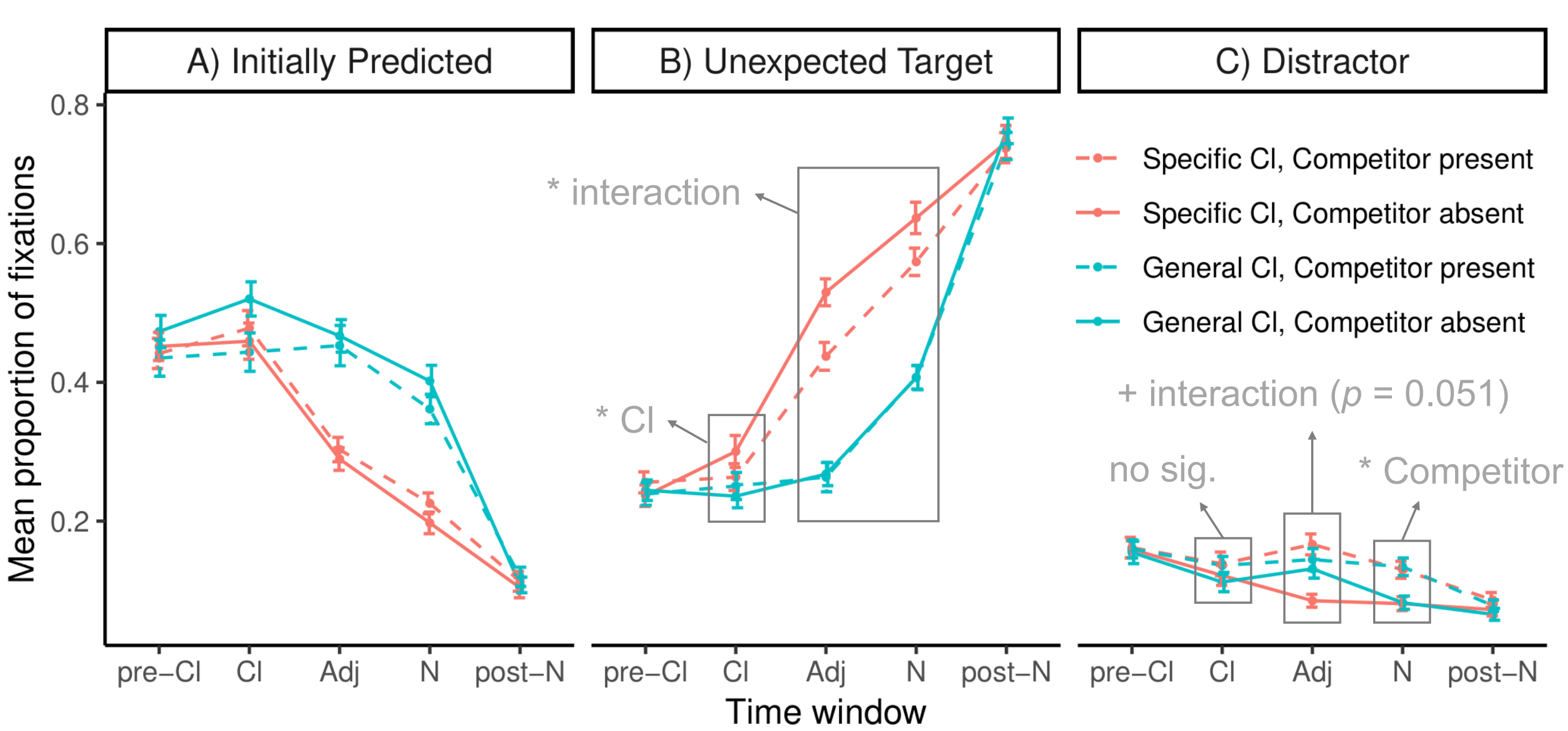
Competitor (present vs. absent)

- Present:** one distractor object was a competitor (*comb*) which shared the same specific classifier as the target noun (*shovel*) but was implausible within the global context.
- Absent:** the competitor was replaced by an unrelated object (*headphones*; which was the competitor in another item).

ANALYSIS

- In the pre-classifier window, we examined whether listeners were most likely to fixate on the initially predicted object.
- In the classifier, adjective, and noun windows, we analysed the effects of Classifier and Competitor on fixations towards the target and distractor objects.

RESULTS



In the pre-classifier window:

- Listeners were more likely to fixate on the initially predicted object than the other three objects, indicating predictions based on the global sentential context.

In the classifier window:

- Listeners were more likely to fixate on the unexpected target upon hearing a specific classifier compared to a general classifier (sig. main effect of Classifier).

In the adjective and noun windows:

- Listeners were less likely to fixate on the unexpected target upon hearing the specific classifier when the local competitor was present on the screen than when it was absent (sig. interaction between Classifier and Competitor).
- The local competitor attracted more fixations than the unrelated control object.

CONCLUSION

- Comprehenders were drawn to the local competitor upon encountering the informative cue (specific classifier), impacting the speed of prediction revision.
- Nevertheless, the effect of global context was substantially greater than that of local context, and the interference from the luring competitor was small.
- This suggests that prediction revision benefits from the automatic, bottom-up spread activation from local information while remaining strongly constrained by the global context.

Reference

[1] Altmann, G. T. M., & Kamide, Y. (1999). Incremental interpretation at verbs: Restricting the domain of subsequent reference. *Cognition*, 73(3), 247–264.
[2] Chow, W.-Y., & Chen, D. (2020). Predicting (in)correctly: Listeners rapidly use unexpected information to revise their predictions. *Language, Cognition and Neuroscience*, 35(9), 1149–1161.
[3] Kukona, A., Cho, P. W., Magnuson, J. S., & Tabor, W. (2014). Lexical interference effects in sentence processing: Evidence from the visual world paradigm and self-organizing models. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 40(2), 326–347.
[4] Nozari, N., Trueswell, J. C., & Thompson-Schill, S. L. (2016). The interplay of local attraction, context and domain-general cognitive control in activation and suppression of semantic distractors during sentence comprehension. *Psychonomic Bulletin & Review*, 23(6), 1942–1953.