

Updating predictions incrementally: Listeners are able to process new information following prediction errors

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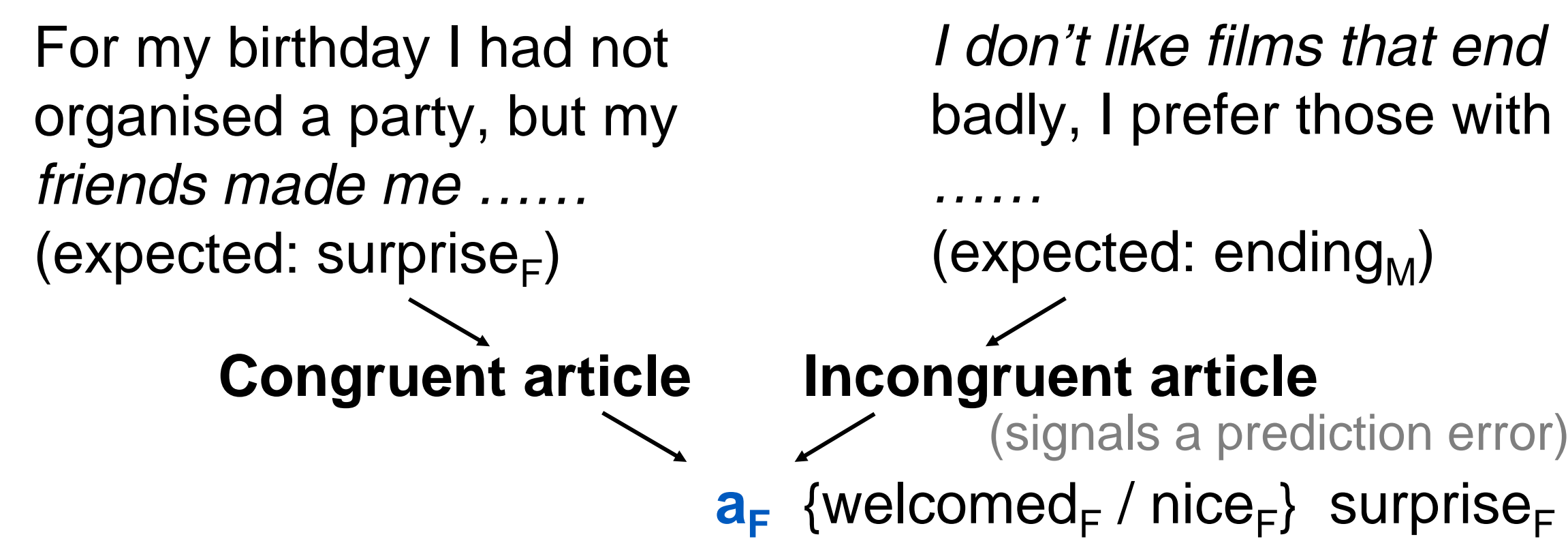


INTRODUCTION

Comprehenders can

- predict upcoming language based on global context^[1-2] and
- use disconfirming evidence or informative cues to rapidly update their predictions on the fly^[3-5].

It's been suggested that prediction failure hinders local semantic processing^[6].



They found a reduced N400 response to the target noun when it was preceded by a predictive relative to a neutral adjective, but only when it followed an article that matched the most expected noun.

- **However**, the predictive adjective may not increase the likelihood of the target noun as it was implausible in most incongruent items.

THE PRESENT STUDY

We used prediction-mismatching classifiers to signal a prediction error^[3].

- Nominal classifiers are obligatory in Mandarin Chinese when the noun is modified by a demonstrative or numeral. A specific classifier which was incompatible with the globally-predictable noun can signal a prediction error.

We then used informative adjectives to trigger potential updating of noun predictions^[5].

THE PRESENT STUDY (continued)





- We measured cloze probabilities of the target noun to ensure that an informative adjective can always make the noun more likely to follow even after a prediction-mismatching classifier.

METHOD

A 2x2 design: Classifier (specific vs. general) × Adjective (informative vs. uninformative)

The old house's courtyard is full of greenery, and in its centre, there is ...

- (a) Specific classifier (signals a prediction error)
One CL_{zhang} {chess-playing / good-looking} table
- (b) General classifier (does not signal a prediction error)
One CL_{xie} {chess-playing / good-looking} table

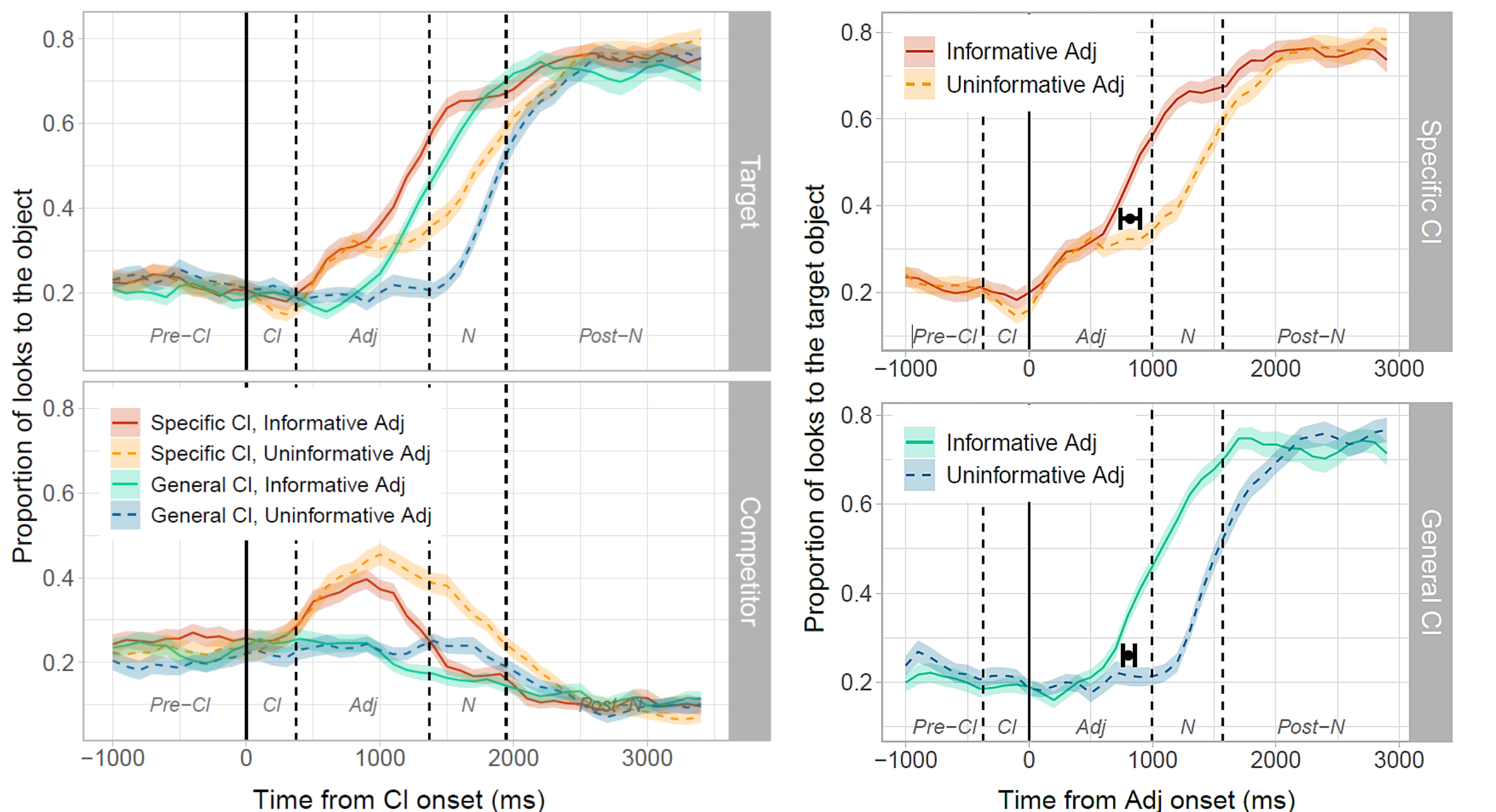
Expected	Distractor	Sentence frame	Target cloze
		Before CI	1%
		After specific CI	11%
		+ informative Adj	63%
		+ uninformative Adj	10%
		After general CI	1%
		+ informative Adj	41%
		+ uninformative Adj	1%
Target	Competitor		

40 experimental + 110 filler items; n = 50

ANALYSIS

- **GAMM**: To test the predictive effects of the classifier and adjective while accounting for autocorrelation and non-linear relationships between fixation proportions and time.
- **Bootstrapping**: To identify the time point at which participants' looks to the unexpected target object diverged^[7].

RESULTS



After a specific classifier

- Listeners were more likely to look toward the unexpected target and competitor.

After an informative adjective

- Listeners' looks to the unexpected target increased and looks to the competitor decreased no matter whether they just encountered a specific or general classifier.

No difference in divergence points

CONCLUSION

No evidence for disruptive effects of prediction errors. Comprehenders can rapidly use new information to update their predictions even right after encountering an early sign of prediction error.

REFERENCE

[1] Kamide et al. (2003). J Mem Lang. [2] Altmann & Kamide. (2007). J Mem Lang. [3] Chow & Chen. (2020). Lang Cogn Neurosci. [4] Chen, et al. (2022). AMLaP28, York, UK. [5] Szewczyk, et al. (2022). J Exp Psychol Learn Mem Cogn. [6] Husband & Bovolenta. (2020). Lang Cogn Neurosci. [7] Stone, et al. (2021). Biling: Lang Cogn.