

Syntactically-Conditioned Word Order Expectations & (Lack of?) Flexibility

Wednesday Bushong¹ & T. Florian Jaeger^{1,2,3}

¹Brain & Cognitive Sciences; ²Computer Science; ³Linguistics
University of Rochester

Comprehenders have rich knowledge about the statistics of their language

word frequency

conditional word probability

syntactic probabilities

word order probabilities

...

Syntactic expectations

- How fine-grained are these expectations?
(cf. Mitchell et al., 1995)
- Lexically-conditioned syntactic preferences
(e.g., Desmet et al., 2006; Trueswell et al., 1994; Garnsey et al., 1997; Kamide et al., 2003)
- However, production preferences also predict **more intricate patterns** in the **input** (cf. Morgan, 2017; Bresnan et al., 2007; Lohse et al., 2004; Wasow, 2002)

Test Case: Definiteness Ordering Preference in Ditransitives

The woman wrote the author a letter.

The woman wrote **a letter** to **the author.**

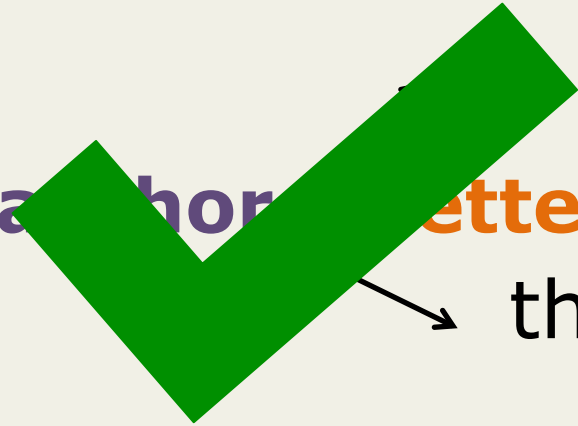
The woman wrote **the author** **a letter**.

Argument 1
Definite

Argument 2
Indefinite

Syntactic Structure: Double Object (DO)
Definiteness Order: Definite-Indefinite

The woman wrote **the** a **hor** **etter.**



the

Definiteness-Conditioned Expectations?

The woman wrote **an author** **a**
e letter
the



Definiteness- and Syntactic- Conditioned Expectations?

The woman wrote **a letter** to **an** author

the

Can we actually observe these fine-grained preferences in processing?

Are these preferences malleable to recent experience?

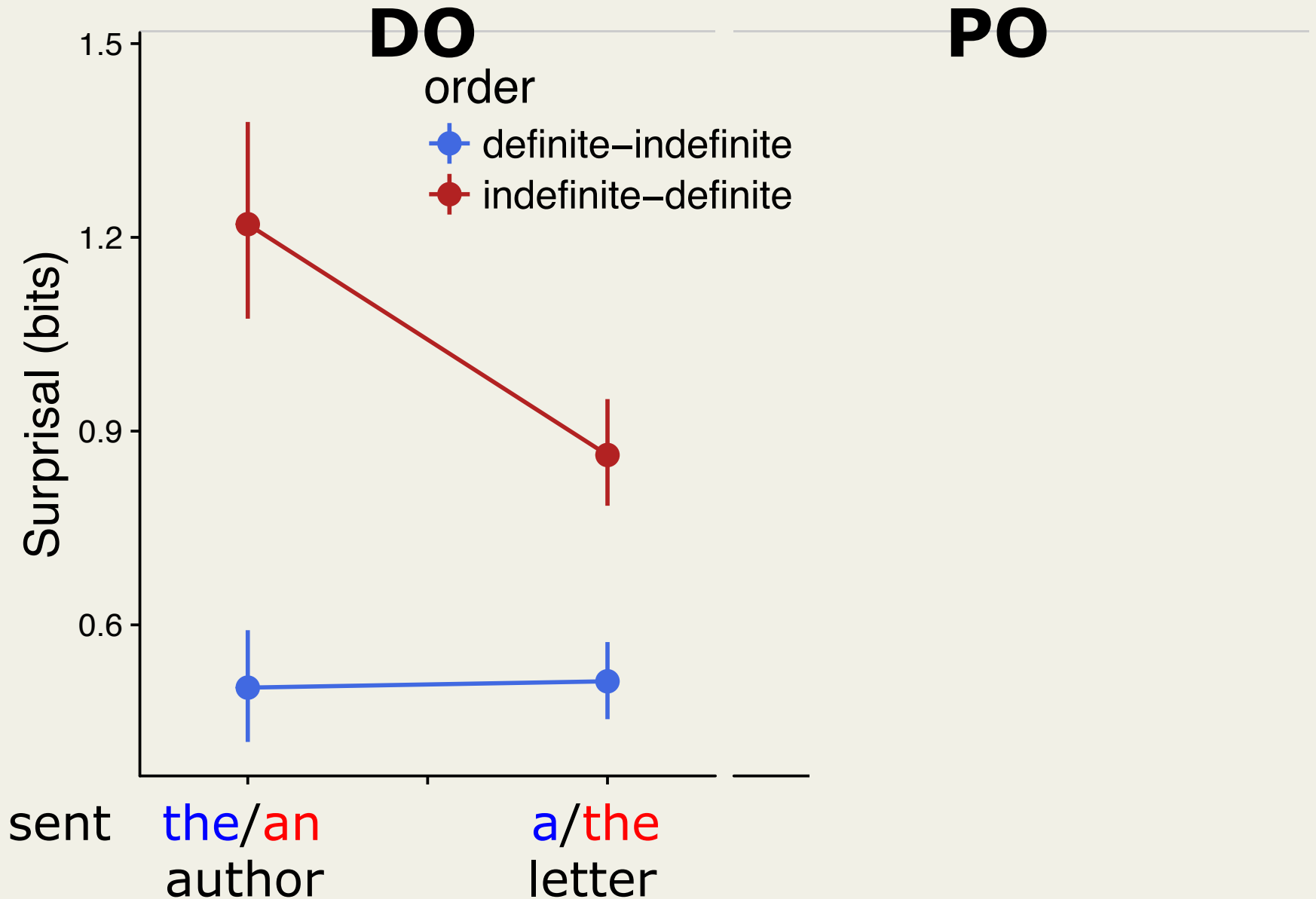
Outline

- 1. Derive predictions** about incremental surprisal **based on input statistics**
- 2. Present SPR experiments** that test(ed) this prediction
3. Can comprehenders **adapt even for fine-grained expectations?**

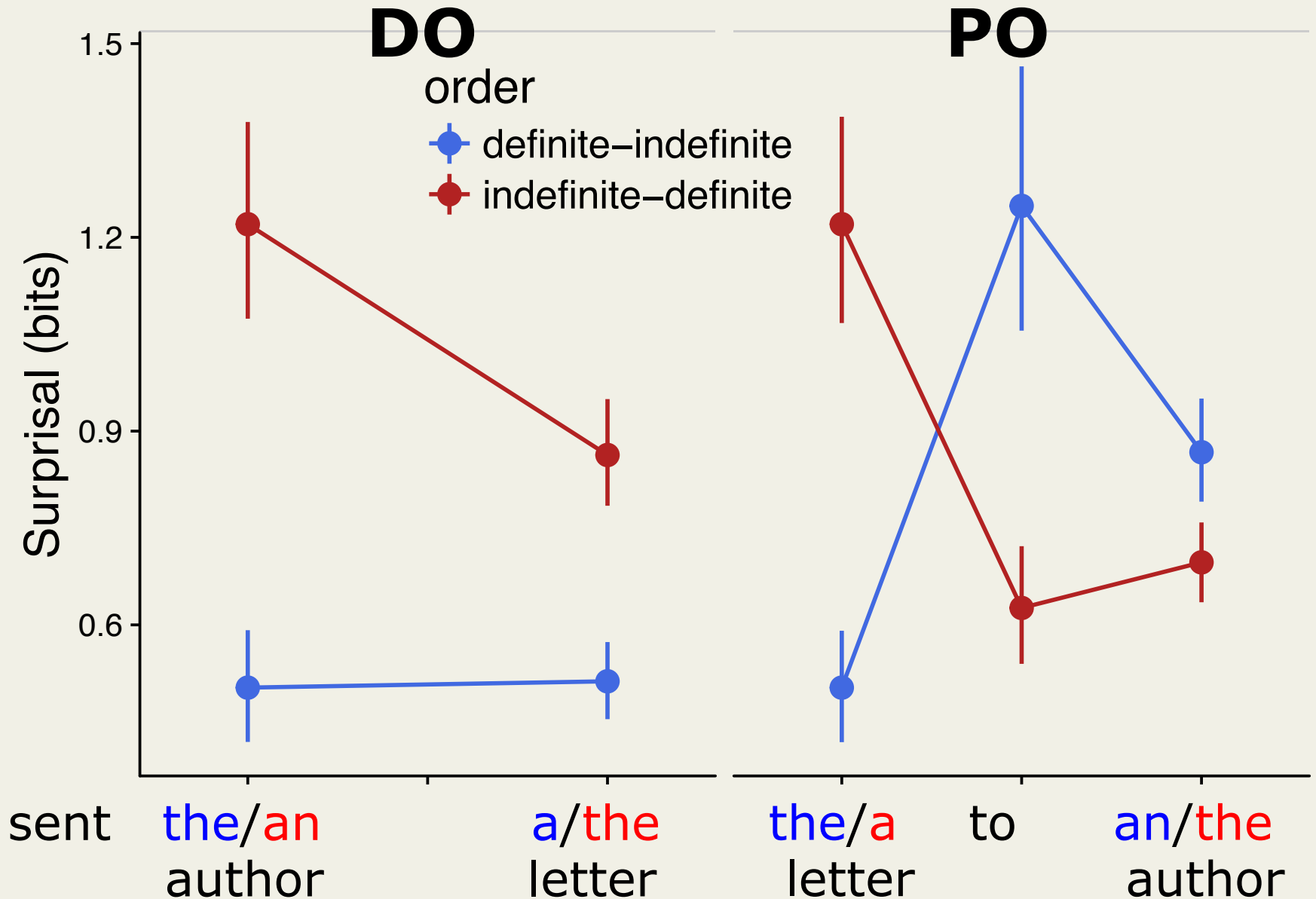
Corpus Study

- Corpus of syntactically annotated ditransitives (Bresnan et al, 2007)
- **Calculate surprisal** of at each sentence region for each definiteness order and syntactic structure

Estimated surprisal



Estimated surprisal



- Ditransitives exhibit intricate pattern
- Good environment to study fine-grained definiteness- and syntactically-conditioned expectations

Outline

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Previous work

- Brown et al. (2012): interaction of structure and definiteness order

Context: A woman had just finished reading a book by her favorite **author**.

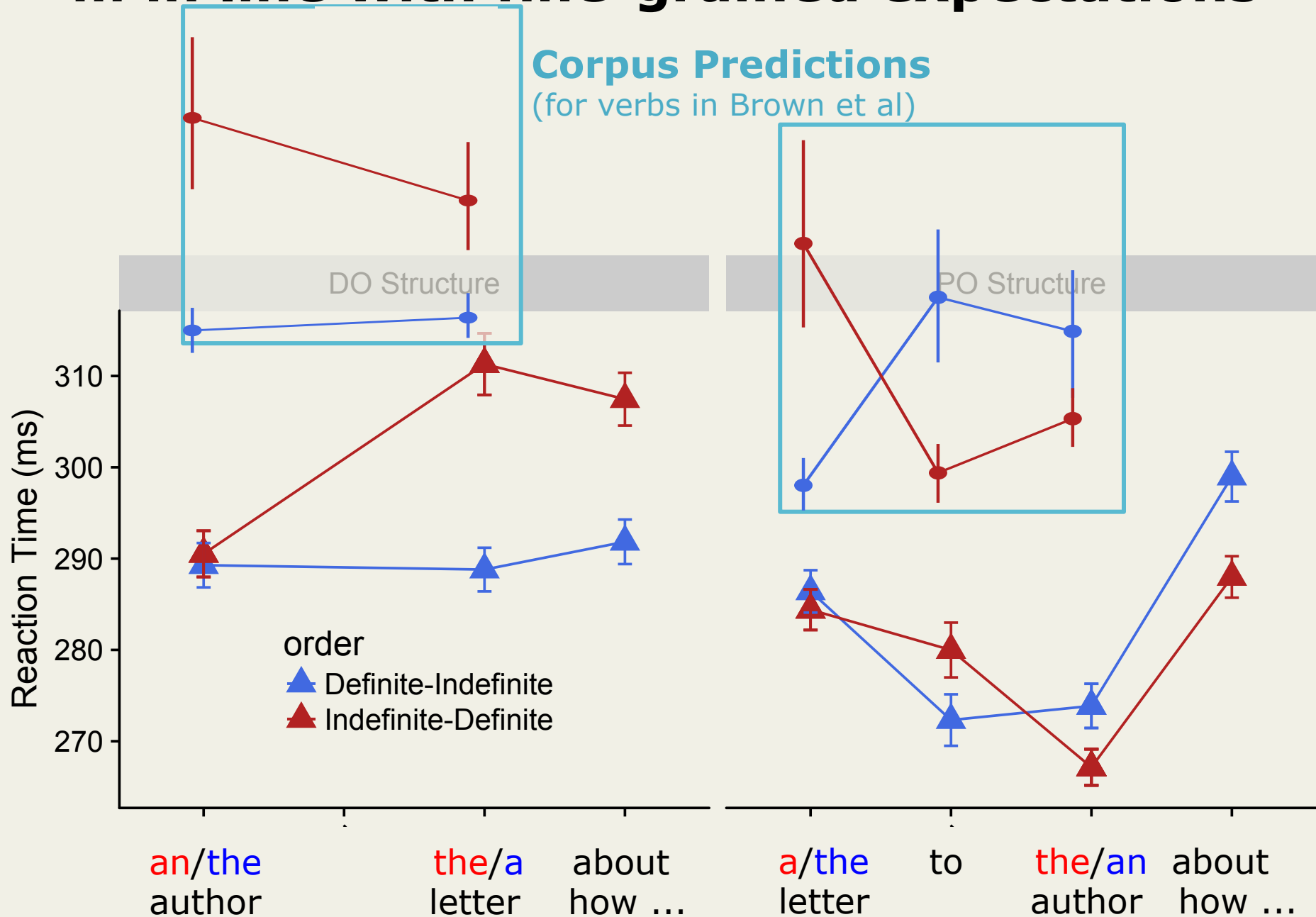
Definite-Indefinite, PO

The woman wrote **the author a letter** about how much she enjoyed his most recent book.

Indefinite-Definite, DO

The woman wrote **a letter** to **the author** about how much she enjoyed his most recent book.

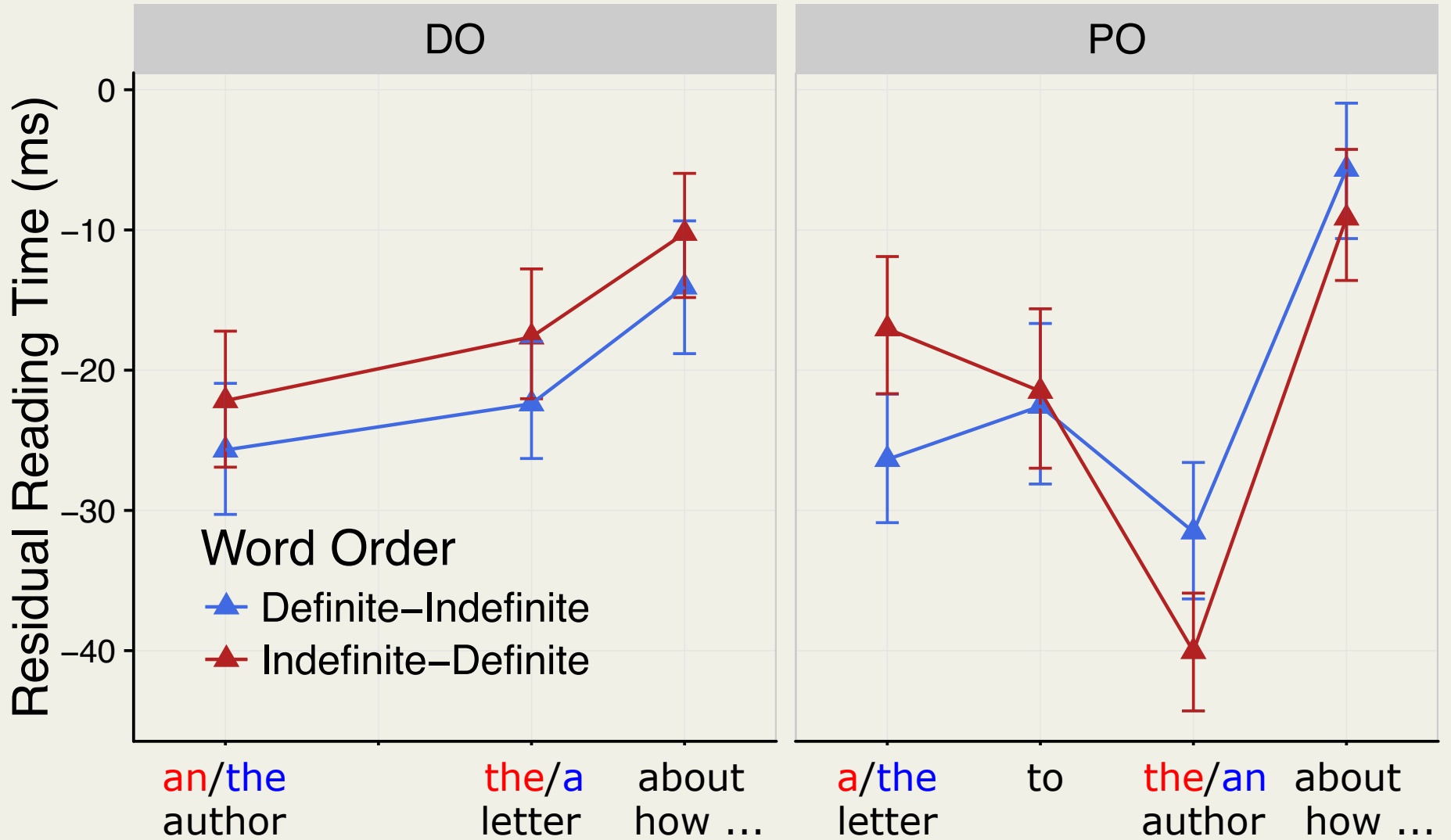
... in line with fine-grained expectations



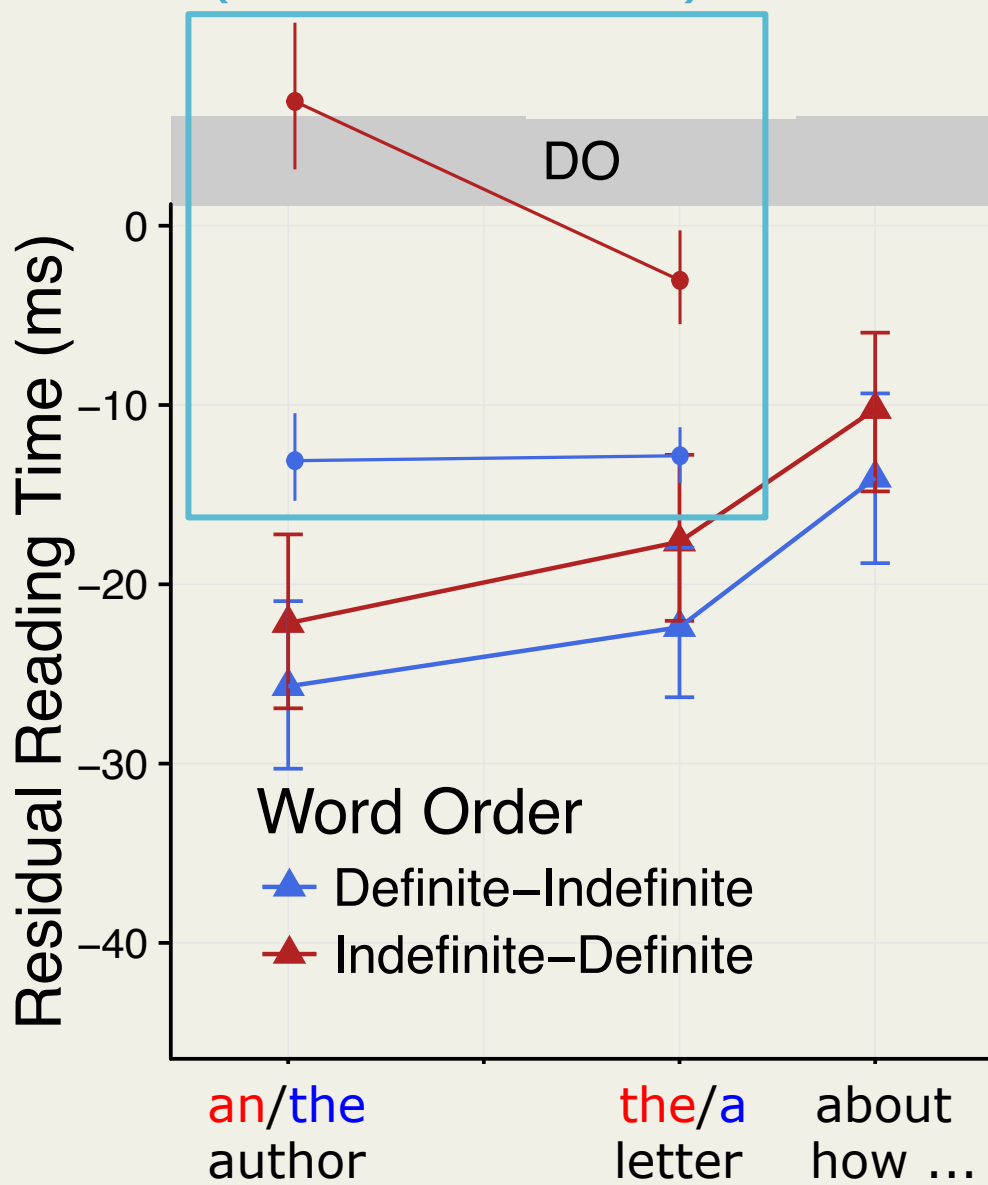
Experiment 1: conceptual replication

- Self-paced reading
- **New materials** (verb repetition)
- 91 Mechanical Turk subjects

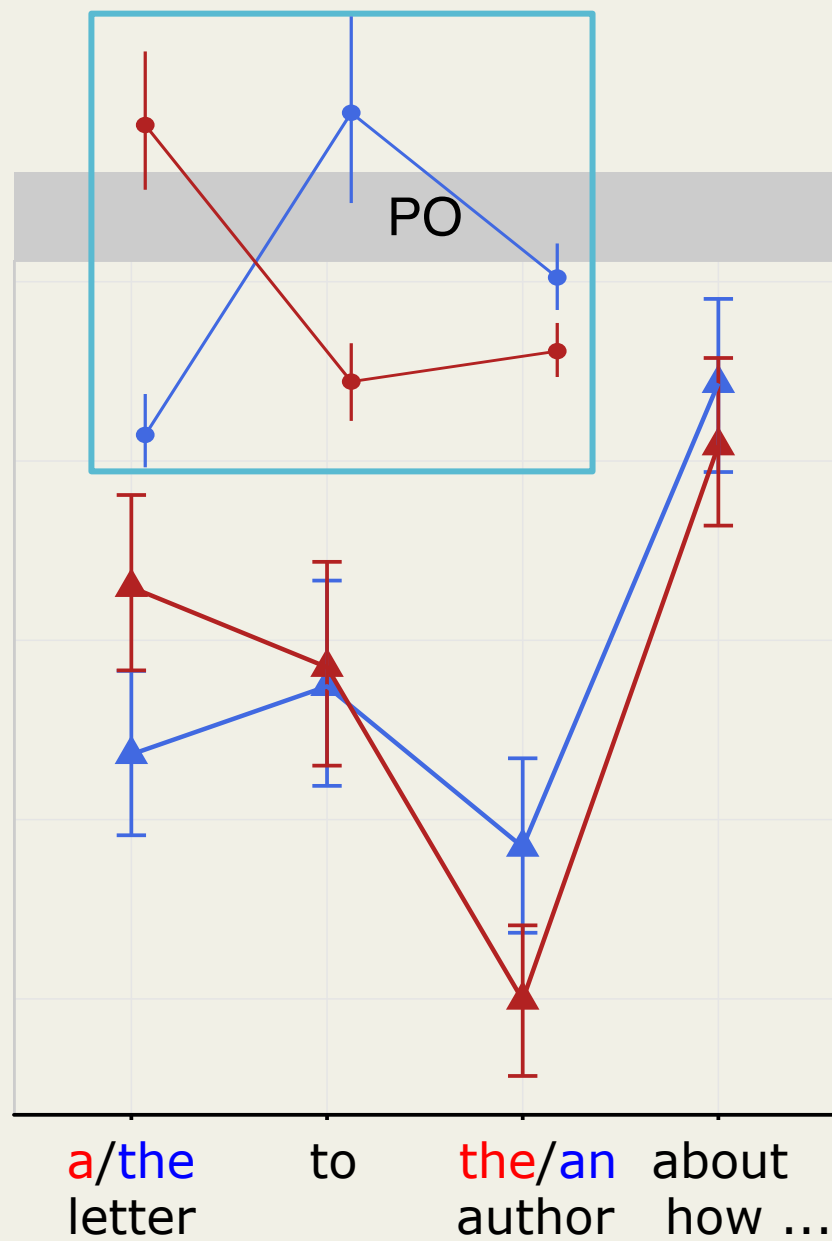
Experiment 1 Results



Corpus Predictions (for our materials)



Corpus Predictions (for our materials)

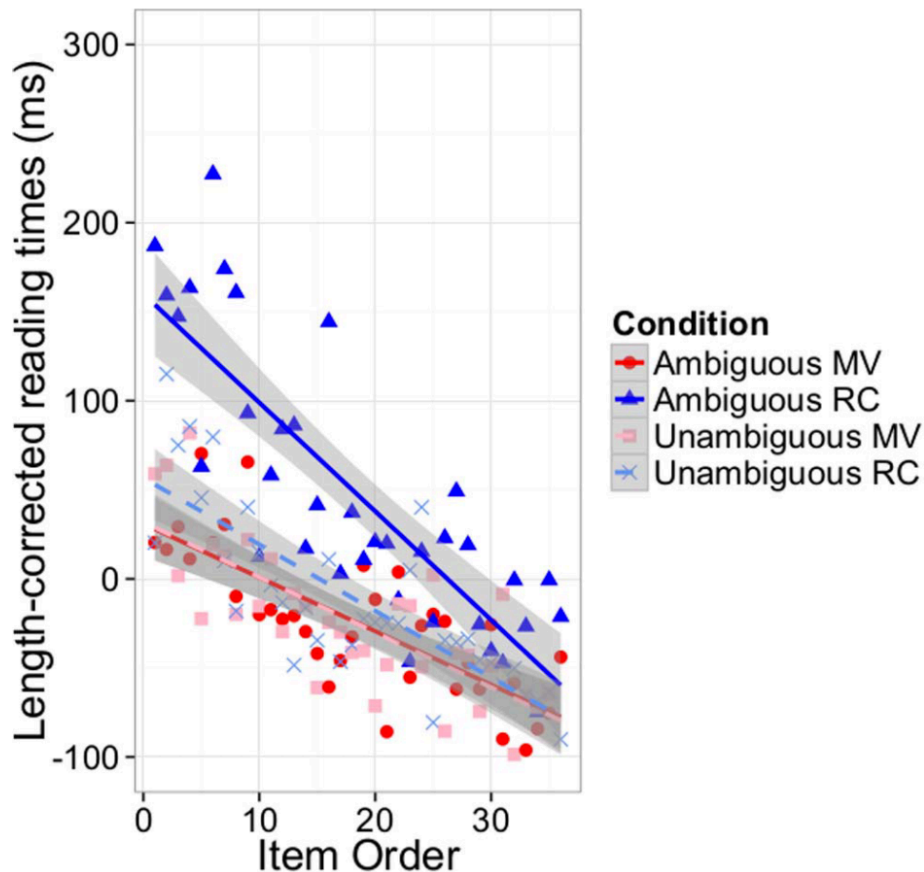


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Adaptation to changes in statistics

*The experienced soldiers warned about the dangers **conducted** the midnight raid.*



repeated exposure →
reduction in
processing difficulty

Experiment 2

- Adaptation to fine-grained expectations as well?
- Exposure-test paradigm
- Same materials as in Exp 2, but **only DOs**
- 178 Mechanical Turk subjects

Exposure Phase

DO Definite-
Indefinite
Exposure
(*24 sentences*)

or

DO Indefinite-
Definite
(*24 sentences*)

between subjects

Test Phase

DO Definite-
Indefinite Test
(*12 sentences*)

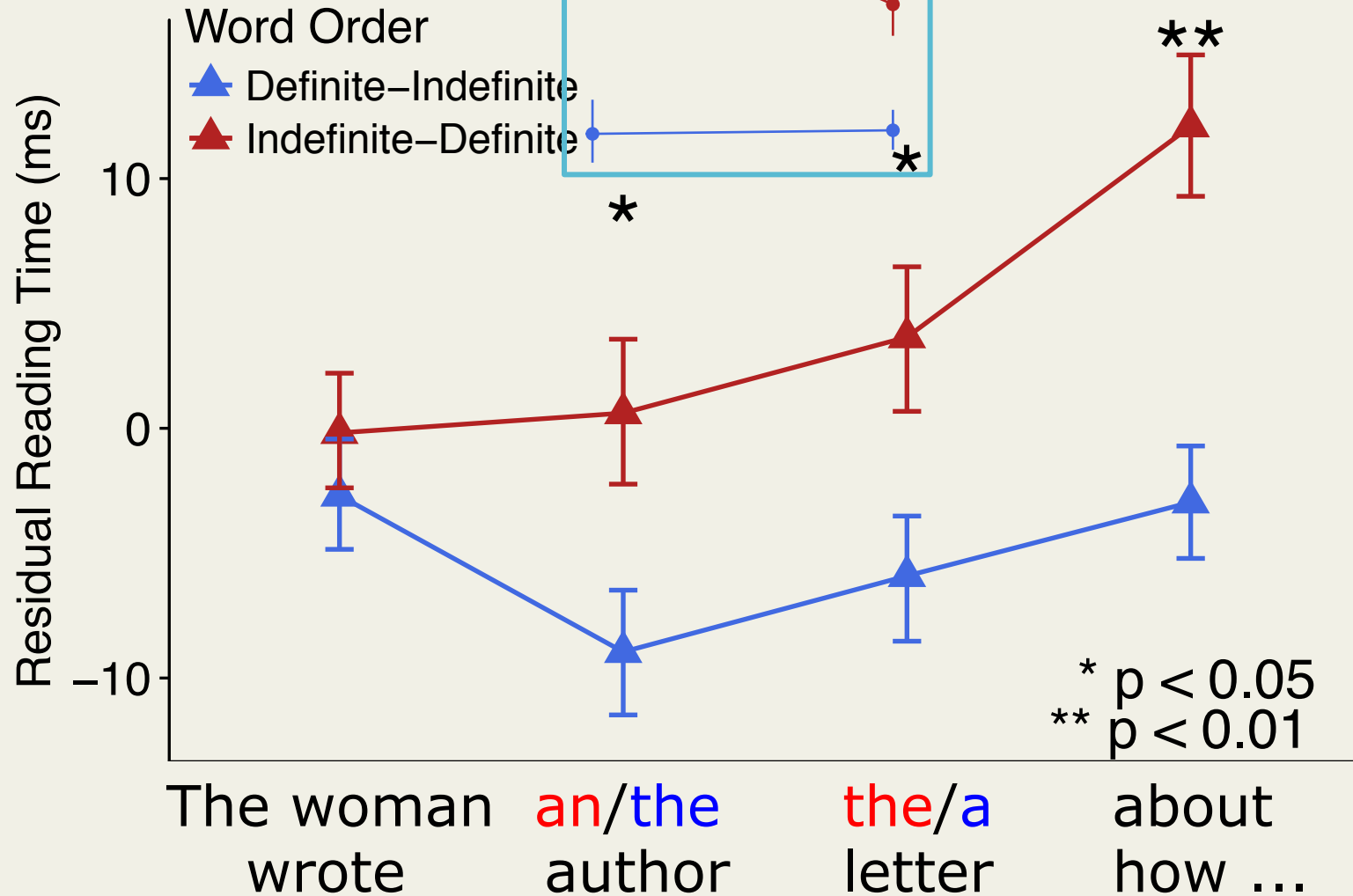
+

DO Indefinite-
Definite Test
(*12 sentences*)

within subjects

Exposure Phase

Corpus Predictions
(for our materials)

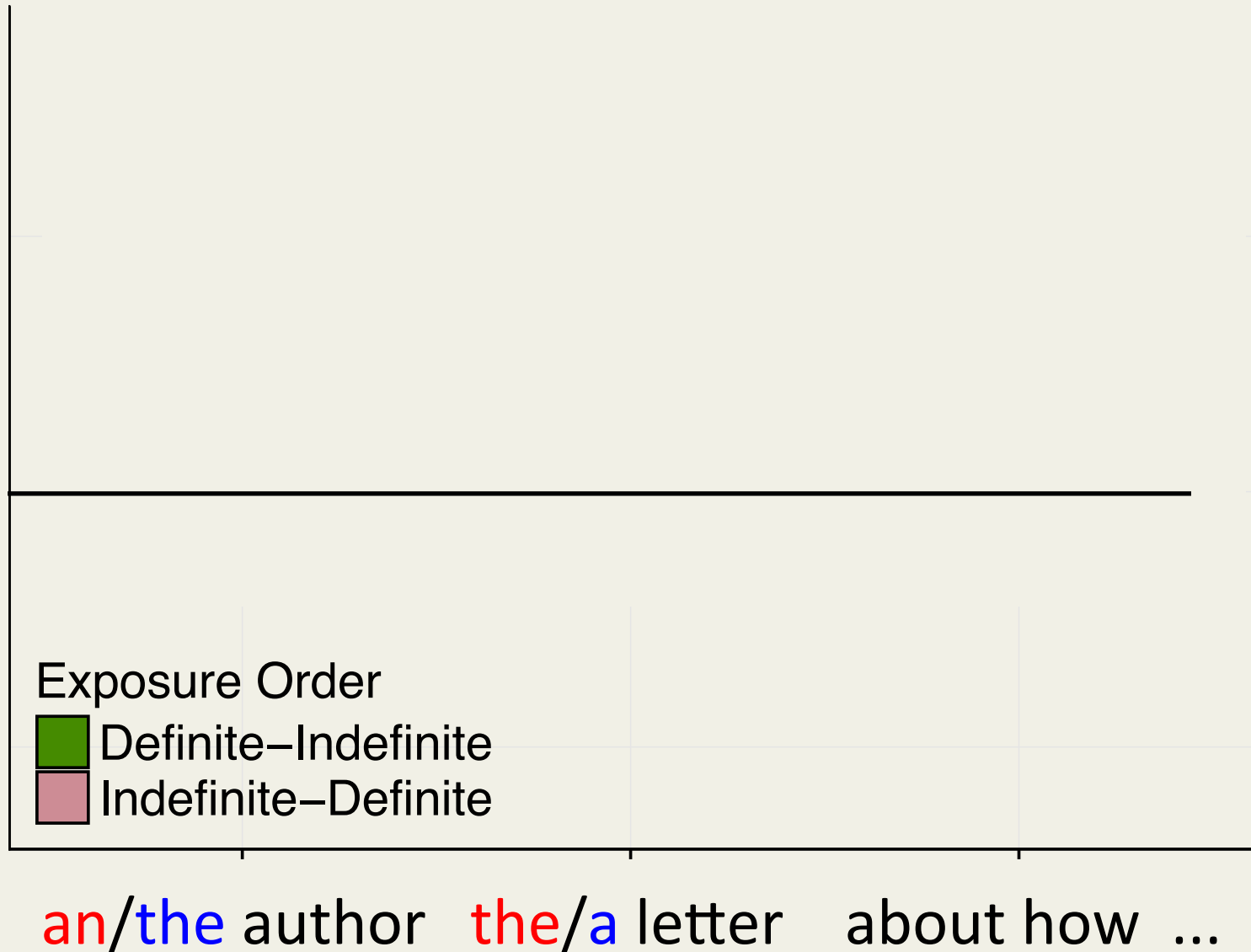


Test Phase

Definite-
Indefinite
Advantage



Indefinite-
Definite
Advantage

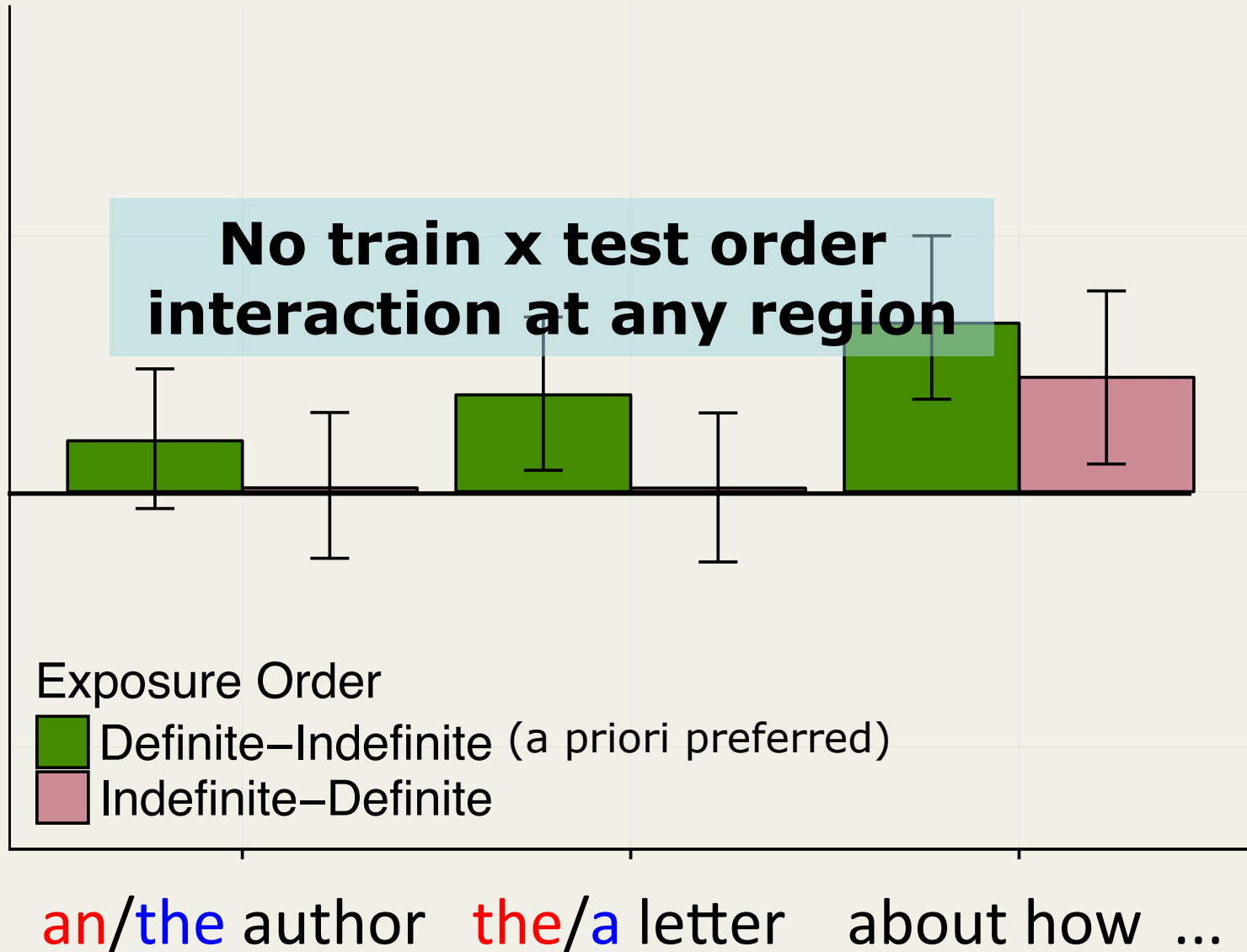


Test Phase

Definite-
Indefinite
Advantage



Indefinite-
Definite
Advantage



Experiment 2 Summary

- Strong prior expectations for definite-indefinite order (exposure phase)
- Null effect for adaptation
 - (when data is analyzed region-by-region)

Discussion

- Comprehenders condition expectations about definiteness ordering on syntactic structure from lifetime experience
- **No/little evidence that comprehenders are adaptable** to new fine-grained statistics (of the type investigated here)

Future Work

- Under what conditions do we expect comprehenders to track fine-grained statistics?
 - How much evidence needed before it's worth it to adapt?
 - Are distributions *actually likely* to vary from situation to situation?

Thank You!

HLP Lab

Christopher Langfield



KurTan Lab

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CUNY Reviewers



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