Creative grammar

How speakers comprehend novel argument mappings

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Intro: Linguistic creativity

Lexical/morphological creativity

- Monomorphemic neologisms, e.g., *(to) phish (for information)*
- Blending, e.g., *Brexit*, *mansplaining*
- Compounding, e.g., *cancel culture*

Semantic creativity

- Metaphor, e.g., *their love is a shooting star*
- Slang, e.g., *the event is lit/low-key*
- Jokes/irony

Grammatical creativity

- *Frank sneezed the napkin off the table*
- *Pat kissed Bill unconscious*
- *The family snacked their way toward the departure gate*

(Goldberg 1995; Michaelis 2005; Ungerer et al. under review)

More examples

anyone lived in a pretty how town
(with up so floating many bells down)
spring summer autumn winter
he sang his didn’t he danced his did.

(E. E. Cummings, *Anyone lived in a pretty how town*)

He almost danced me right down that garbage chute

(*Friends*, season 4, ep. 4)

Rage me back to the making house

(Dylan Thomas, *If My Head Hurt A Hair's Foot*)

They can’t scare us back in the closet

(*The Handmaid’s Tale*, season 2, ep. 1)

(Busso et al. 2021; Levin 1965)

Two questions

Frank sneezed the napkin off the table

'Frank caused the napkin to fall off the table by sneezing on it.'

QUESTION 1

How do speakers comprehend grammatically creative sentences (in real time)?

QUESTION 2

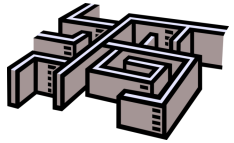
How can this inform theories of verb-argument mapping (aka argument structure)?

Roadmap

1. Grammatical creativity: an understudied phenomenon

2. Theory: Competing accounts of argument structure

3. Norming a set of creative stimuli



4. Experiment 1: maze task

5. Experiment 2: eye tracking

6. Conclusions and next steps

Grammatical creativity: an understudied phenomenon

Linguistic creativity

- Creativity = novelty x effectiveness (Runco & Jaeger, 2012)
- Extensive work on **creative metaphors**:
  - Cross-modal priming (Blasko & Connine, 1993), ratings (Bowdle & Gentner, 2005), self-paced reading (Horvat et al., 2022), ERP (Lai et al., 2009), fMRI (Cardillo et al., 2012)
- Some work on **novel compounds** (e.g., Libben et al., 1999; Bader et al., 2010; Meßmer et al., 2021)
- **BUT:** little <u>experimental</u> research on **grammatical creativity**!

  ≠ ungrammatical sentences:
  The woman persuaded to answer the door. (Osterhout & Holcomb, 1992)

  ≠ non-canonical ordering of thematic roles:
  [*The thunder*]$_{\text{stimulus}}$ *frightened* [*the boy*]$_{\text{experiencer}}$ (Manouilidou et al., 2009)

  ≠ garden paths:
  The horse raced past the barn fell. (Frazier & Rayner, 1982)

Valency coercion

*Frank **sneezed** the napkin off the table.*

*Pat **kissed** Bill unconscious.*

*The family **snacked** their way toward the departure gate.*

- A verb is **"coerced"** into an argument structure in which it usually does not occur
- Related terms: accommodation (Goldberg 1995), event composition (Levin & Rappaport Hovav 2005), type shifting (De Swart 1998)

(Audring & Booij 2016; Goldberg 1995; Lauwers & Willems 2011; Michaelis 2005)

Valency coercion – what do we know?

Previous experimental research

- Coerced sentences prime semantically related verbs (Busso et al. 2021)
  e.g., *Giovanni whistles that he will arrive tomorrow* → *SAY*
- Coerced instances prime each other (Yoon 2019)
- Coercion is facilitated for constructions that attract semantically similar verbs (Busso et al. 2018)
- Coercion is influenced by speakers' L1 knowledge (Perek & Hilpert 2014)

BUT: <u>How</u> do speakers comprehend coerced sentences in real time?

- What is the time course of processing?
- Where do difficulties arise, and how are they resolved?
- What are the theoretical implications?

Theory:
Competing accounts of argument structure

How is argument structure encoded?

*Frank **pushed** the napkin off the table*

Via a verb's lexical entry

push: ⟨NP_{agent}, ⟨NP_{theme},$PP_{location}$⟩⟩

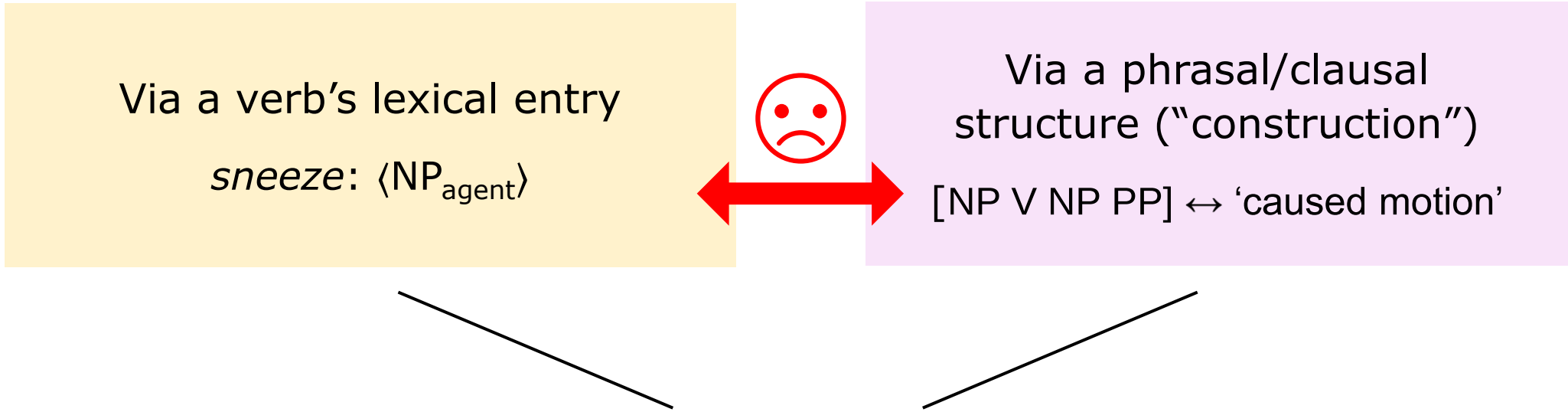
Via a phrasal/clausal structure ("construction")

[NP V NP PP] ↔ 'caused motion'

Which one?

How is argument structure encoded?

*Frank **sneezed** the napkin off the table*



- A chance to distinguish between the contributions of verbs and constructions!
  - **Creative expansions** of the grammatical system may teach us about the organization **of the system itself**

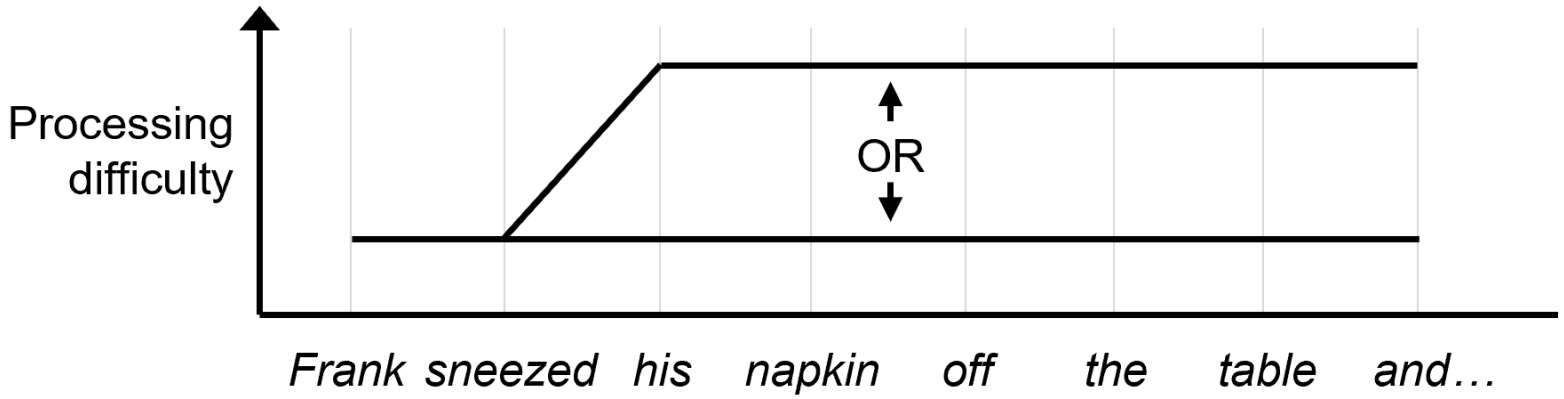
Radically lexical accounts

- Argument structure is (predominantly/uniquely) encoded by the verb
  (Bresnan 1982; Dowty 1991; Grimshaw 1990; Pinker 1989; Rappaport & Levin 1988)
- Different grammatical patterns are licensed by multiple verb entries:

(1) a. *Frank sneezed.*
b. *sneeze*$_1$: ⟨NP$_{agent}$⟩

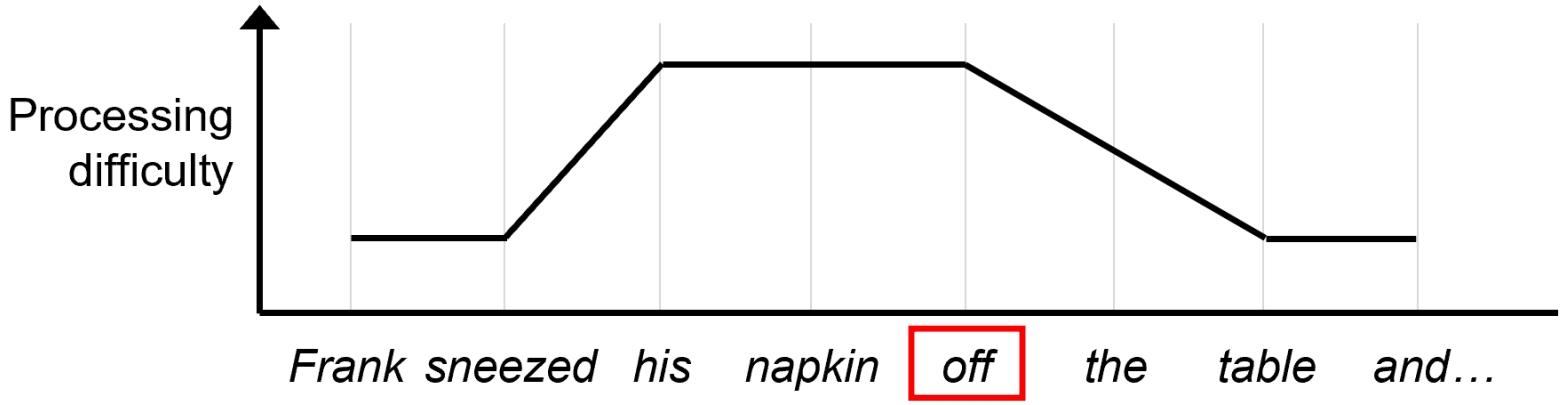
(2) a. *Frank sneezed his napkin off the table.*
b. ? *sneeze*$_2$: ⟨NP$_{agent}$, ⟨NP$_{theme}$,PP$_{location}$⟩⟩

- **Prediction for coerced sentences:** EITHER no processing difficulty
  OR persistent processing difficulty after the verb



Interactive accounts

- **Lexical variants** (Kay 2005; Müller & Wechsler 2014; Sag 2012): speakers only store a single prototypical entry for *sneeze*, but non-canonical verb senses are derived on the fly based on the sentence context
- **Constructional variants** (Boas 2011; Croft 2012; Goldberg 1995): verbs "fuse" with constructional templates (e.g., the caused-motion construction) based on the degree of compatibility between the two
- **Prediction for coerced sentences:** processing difficulty decreases gradually as the verb is integrated with the clausal structure

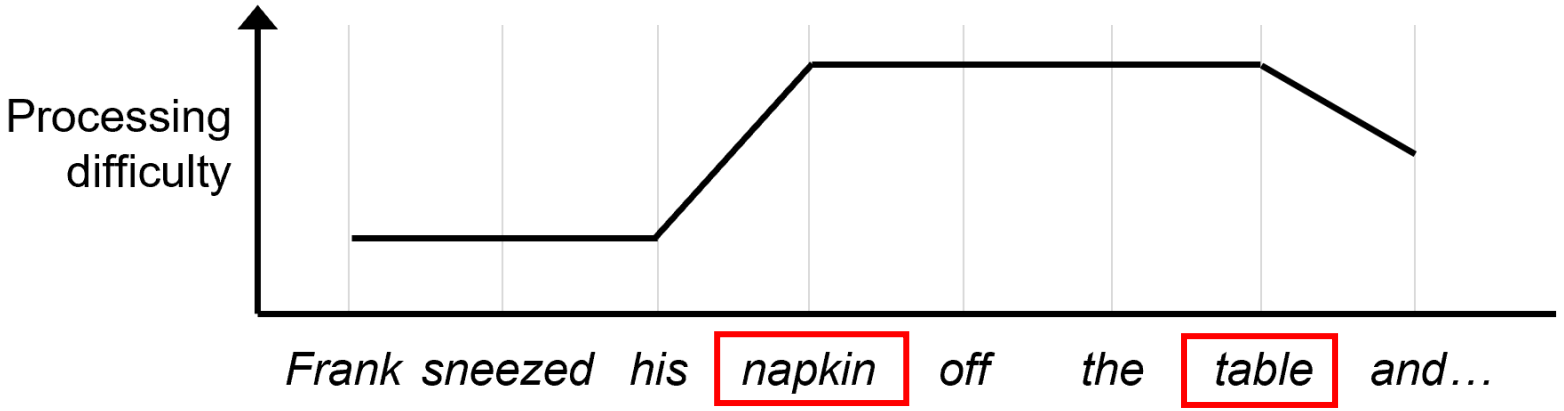


Radically syntactic accounts

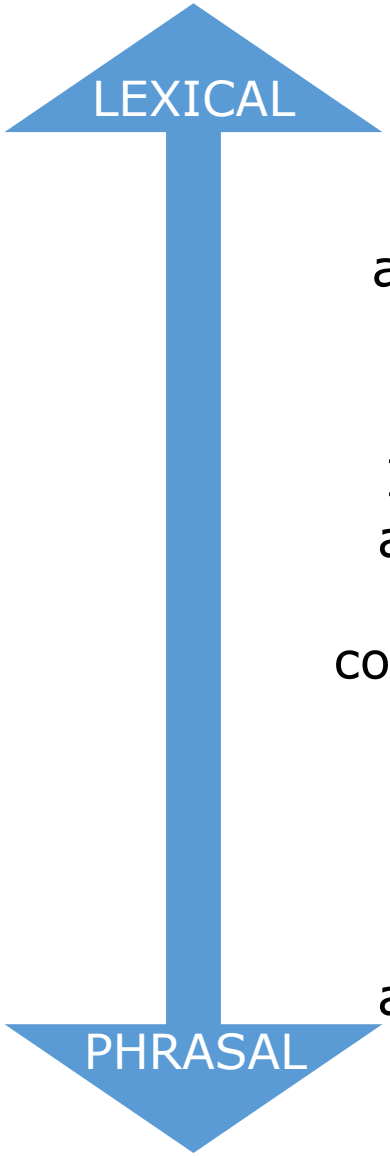
- Argument structure is encoded by syntactic structures, independent from the individual verbs that occur in them (Borer 2003, 2005; Cuervo & Roberge 2012)
- Differences in acceptability arise from world knowledge:

  a. *The dog will sink three boats.*
  b. *The boat will dog three sinks.*

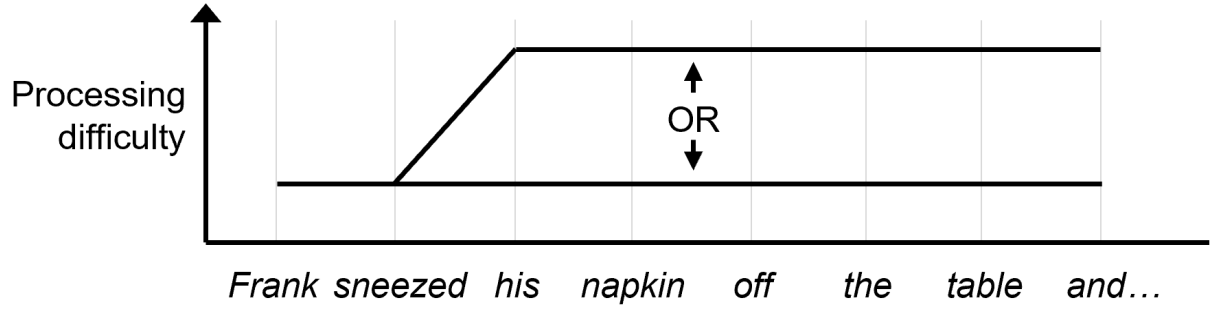
- **Prediction for coerced sentences:** content words, rather than grammatical items, give rise to (increasing/decreasing) processing difficulty



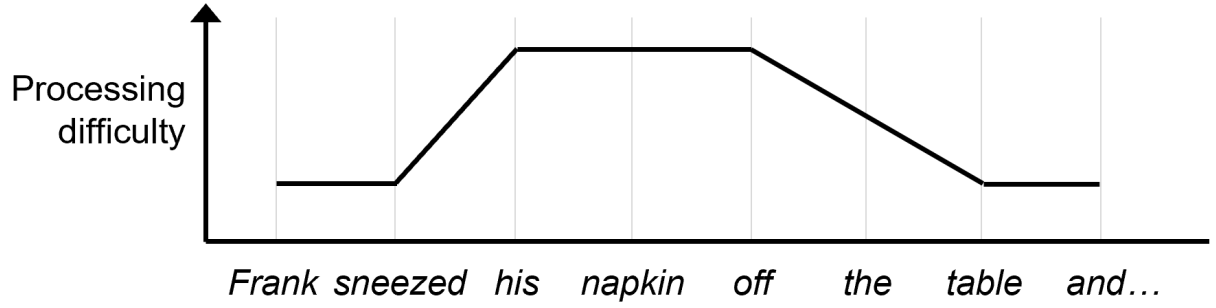
Summary of predictions



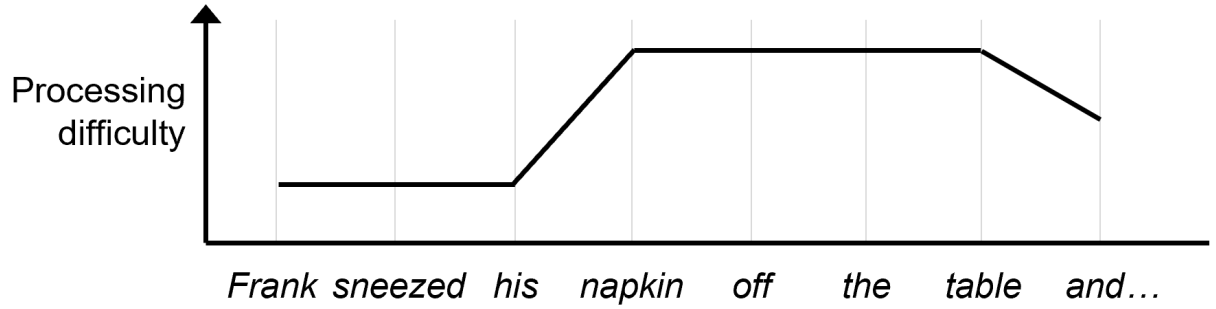
Radically lexical approaches



Interactive approaches (lexical or constructional)



Radically syntactic approaches



Norming a set of creative stimuli

Creativity in context

- Creativity is **context-dependent**
- BUT: creative sentences are often tested in isolation
- Our approach: **2 context sentences + 1 target sentence**

Frank swallowed a red chili pepper at the dinner table. Tears streamed from his eyes, and he reached blindly for his napkin. Unable to control himself, …

[prototypical] *Frank **pushed** his napkin off the table*

[coerced] *Frank **sneezed** his napkin off the table*

[anomalous] *Frank **arrived** his napkin off the table*

… and knocked over a few of the wine glasses.

(coerced verbs were either canonically intransitive, or…)

(Ungerer et al. under review)

Creativity in context

- Creativity is **context-dependent**
- BUT: creative sentences are often tested in isolation
- Our approach: **2 context sentences + 1 target sentence**

Sharon was arguing with her husband in the kitchen. They raised their voices as the discussion grew more and more heated. In the end, …

[prototypical] *Sharon **shoved** her husband out of the kitchen*

[coerced] *Sharon **yelled** her husband out of the kitchen*

[anomalous] *Sharon **relied** her husband out of the kitchen*

… and slammed the door with a loud bang.

(some coerced verbs can occur with inanimate object arguments but were paired with animate ones)

(Ungerer et al. under review)

Norming study

Participants

- 21 self-reported native speakers of English recruited online from the Concordia University community (Montreal)

Materials

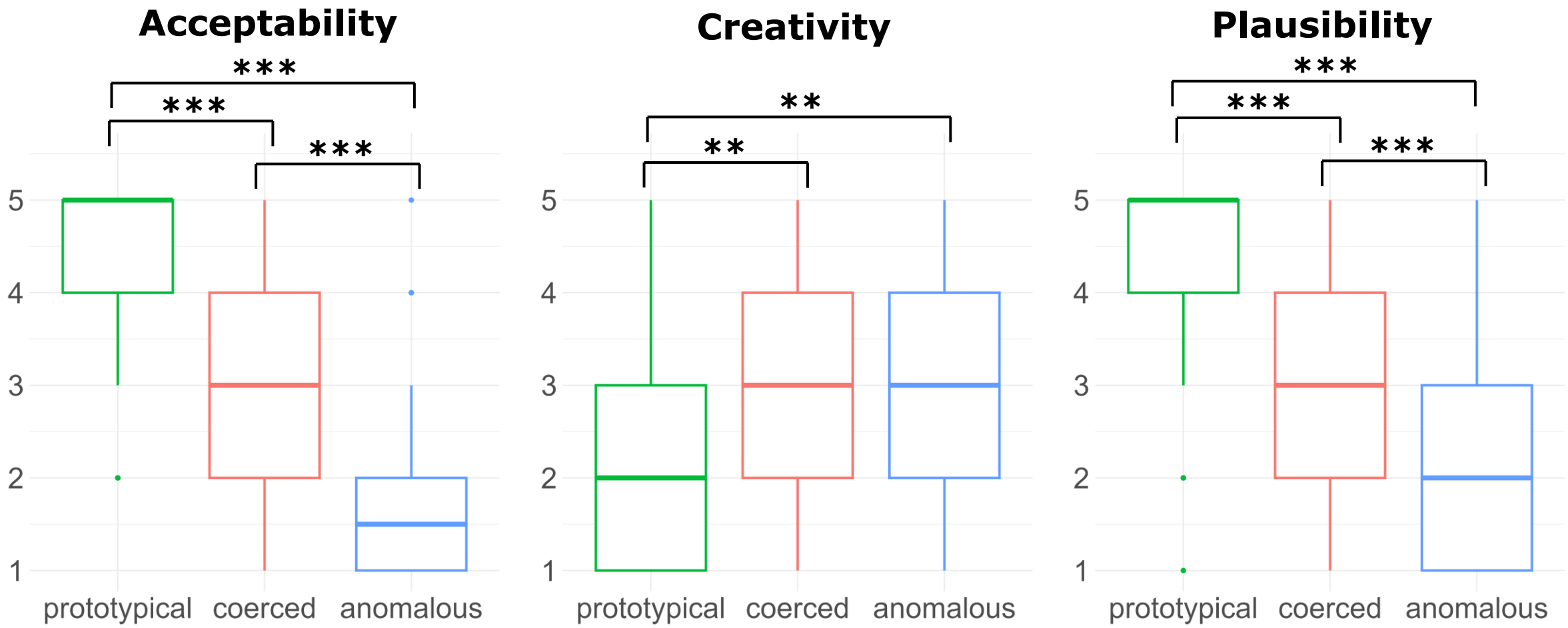
- 24 text passages with **three** target versions (prototypical/coerced/anomalous)

Method

- Ratings (1 to 5 scale) along three dimensions:
  - Acceptability
  - Creativity
  - Plausibility

(Ungerer et al. under review)

Norming: Results



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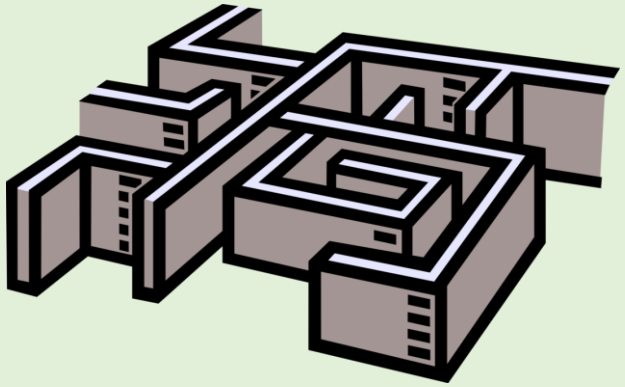


Experiment 1: Maze task

A variant of self-paced reading

Maze task (Forster et al., 2009)

- Participants read sentences word by word
- At every word, they choose between a sensible continuation and a distractor

A variant of self-paced reading

In x-x-x

A variant of self-paced reading

lose the

A variant of self-paced reading

whom, end,

A variant of self-paced reading

Sharon marina

A variant of self-paced reading

suffix yelled

A variant of self-paced reading

her wish

A variant of self-paced reading

husband islands

A variant of self-paced reading

mean out

A variant of self-paced reading

of fit

A variant of self-paced reading

told the

A variant of self-paced reading

kitchen happens

A variant of self-paced reading

Maze task (Forster et al., 2009)

- Participants read sentences word by word
- At every word, they choose between a sensible continuation and a distractor

Advantages of the maze task

- Larger and more robust effects than in traditional self-paced reading (Boyce et al., 2020; Boyce & Levy, 2023)
- Highly localized effects (little spillover) (Boyce & Levy, 2023)
- Higher task demands are likely to ensure participants' attention

Exp. 1: Methods

Participants

- 80 self-reported native speakers of English recruited online via Prolific (UK/US/Canada)

Materials

- 24 text passages (12 per participant) with **two** target versions (prototypical/coerced)
- Distractors automatically created with A-maze (Boyce et al. 2020)

Method

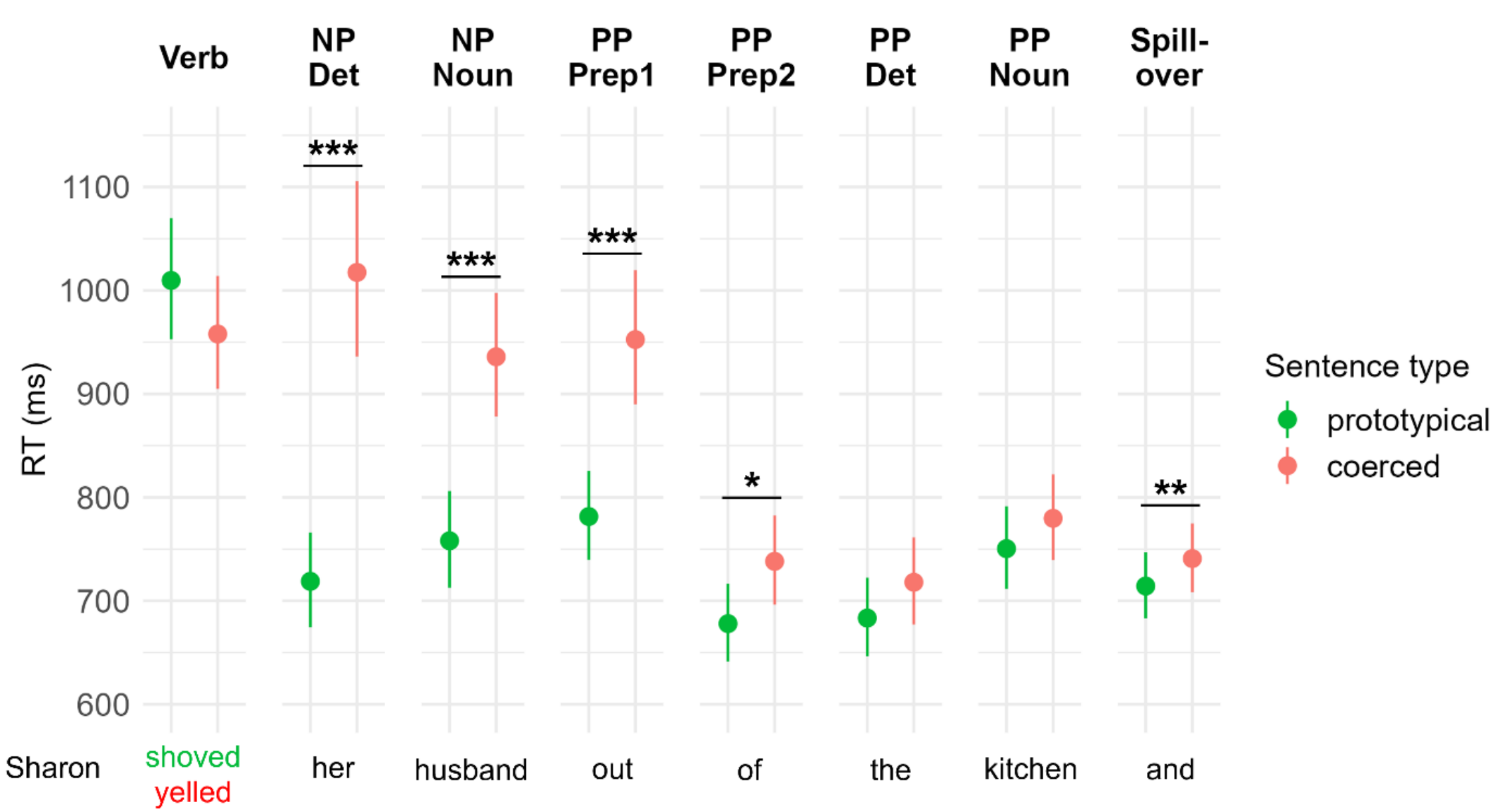
- Normal reading in context sentences; "maze" task in target sentences
- Comprehension questions after 50% of trials

Analysis

- LMEs of logged RT at each word region (did not converge for accuracy)

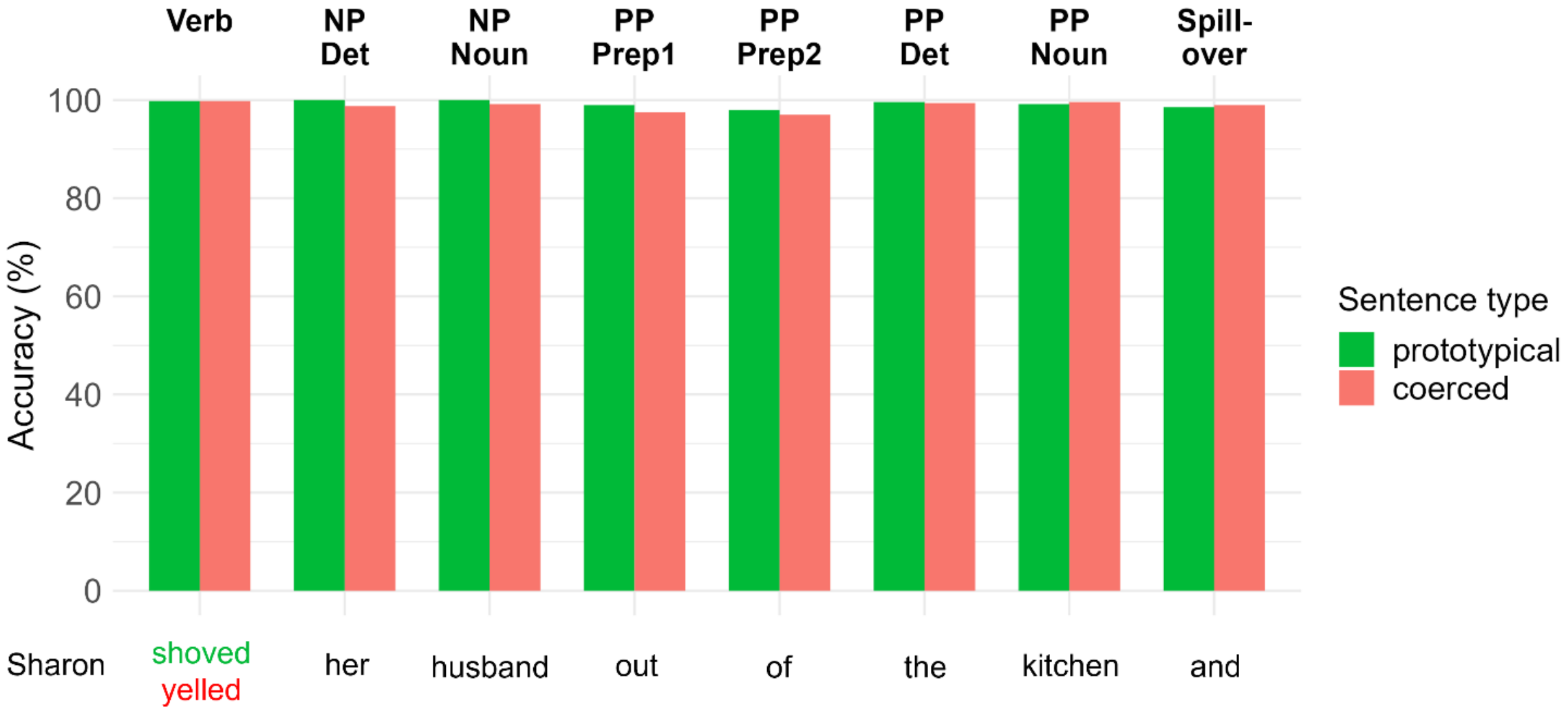
(Ungerer et al. under review)

Exp. 1: Response times



(Ungerer et al. under review)

Exp. 1: Accuracy



(Ungerer et al. under review)

Exp. 1: Discussion

- Processing difficulty **after the verb**, which **gradually decreases**, especially following the locative preposition *(… yelled her husband <u>out of</u> the room*)

- Support for **interactive accounts of argument structure**:
  speakers integrate information from the verb and the clausal construction;
  effects are driven by function words rather than content words

- Open questions:

  1. How do creative sentences compare to **fully anomalous sentences**?
  2. Do speakers **revisit the verb** as they interpret the sentence?
  3. How do the effects play out during **more natural reading**?

(Ungerer et al. under review)

Experiment 2: Eye tracking

Eye tracking

- Participants' eye movements are recorded during normal reading

Unable to control himself, Frank sneezed his napkin off the table and …

Advantages:

- Ecological validity
- Participants can regress (look back) to earlier sentence regions
- Provides "early" and "late" measures of processing

(Clifton et al. 2016; Rayner 2009)

Exp. 2: Methods

Participants

- 55 self-reported native speakers of English recruited in person at Concordia University (Montreal)

Materials

- 24 text passages with **three** target versions (prototypical/coerced/anomalous)

Method

- Eye movements are recorded with a head-mounted EyeLink II eye tracker
- Comprehension questions after 25% of trials

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(Ungerer et al. under review)

Exp. 2: Methods

Analysis

- (G)LMEs of three eye-tracking measures at each sentence region

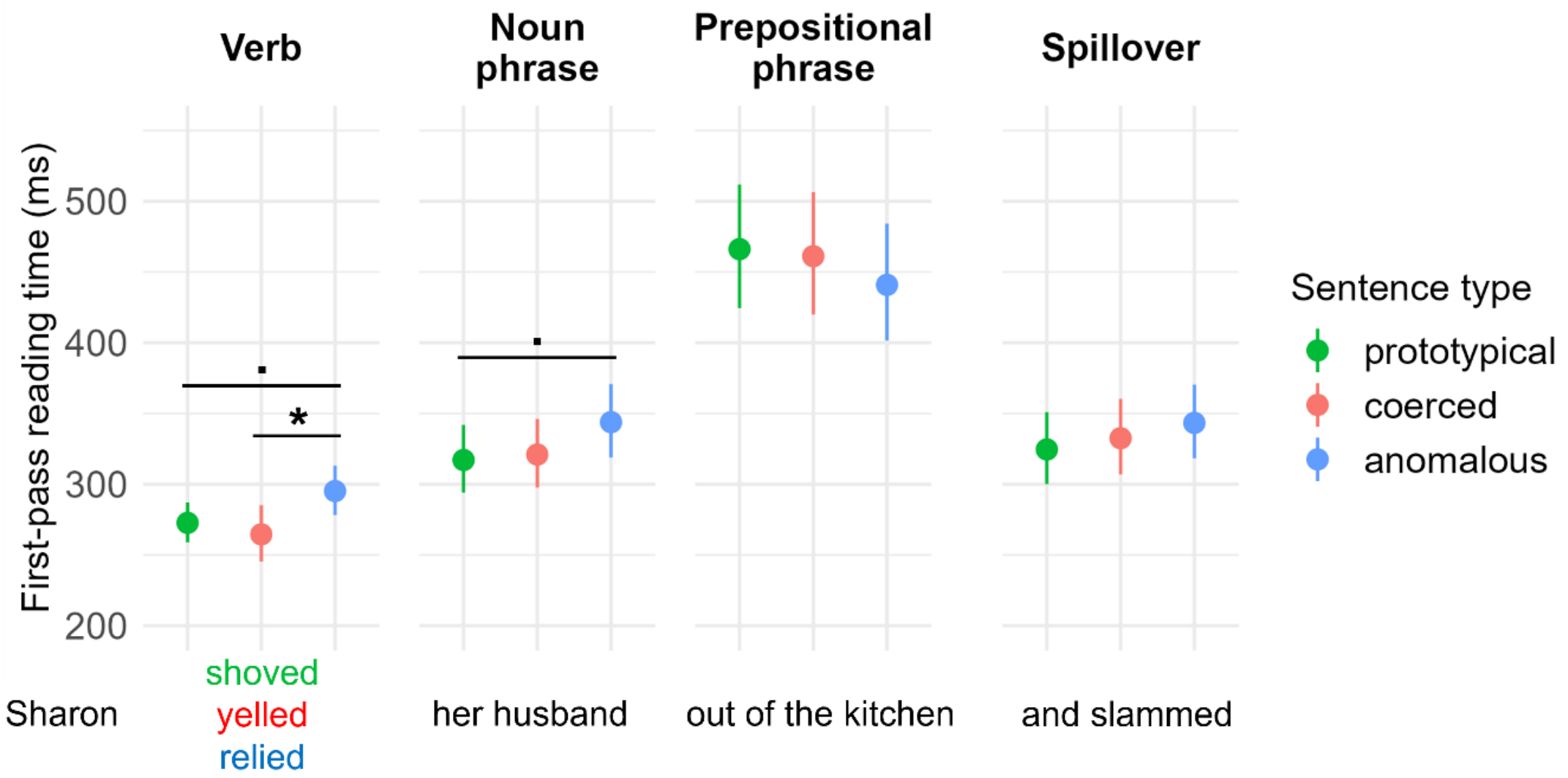
- **First-pass reading time:**
  how long do participants fixate on a given region when they read it **for the first time**?

- **Proportion of outgoing regressions:**
  how likely are participants to look back **from a given region** to earlier regions?

- **Proportion of incoming regressions**:
  how likely are participants to look back **to a given region** from later regions?

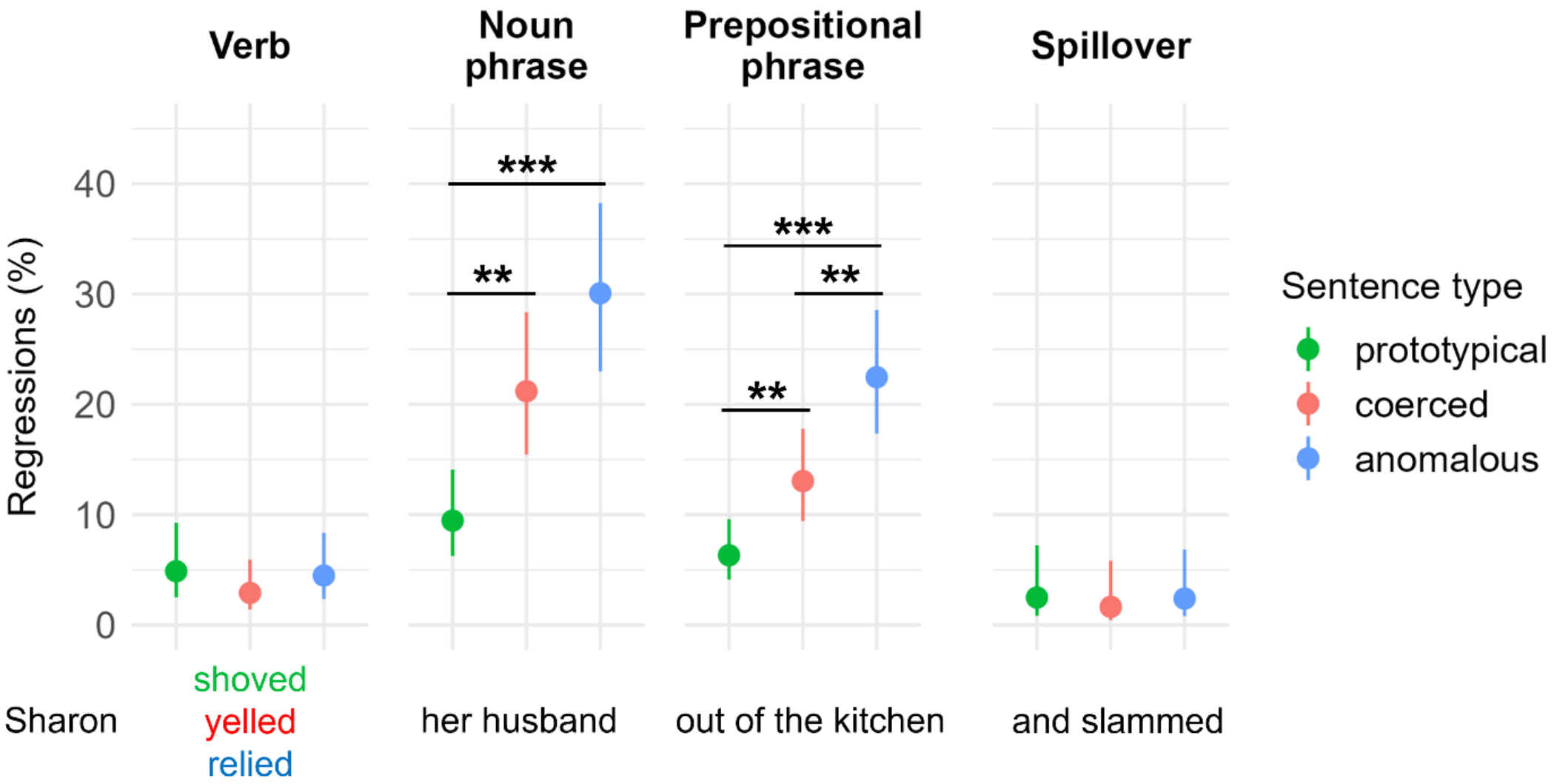
(Ungerer et al. under review)

Exp. 2: First-pass reading time



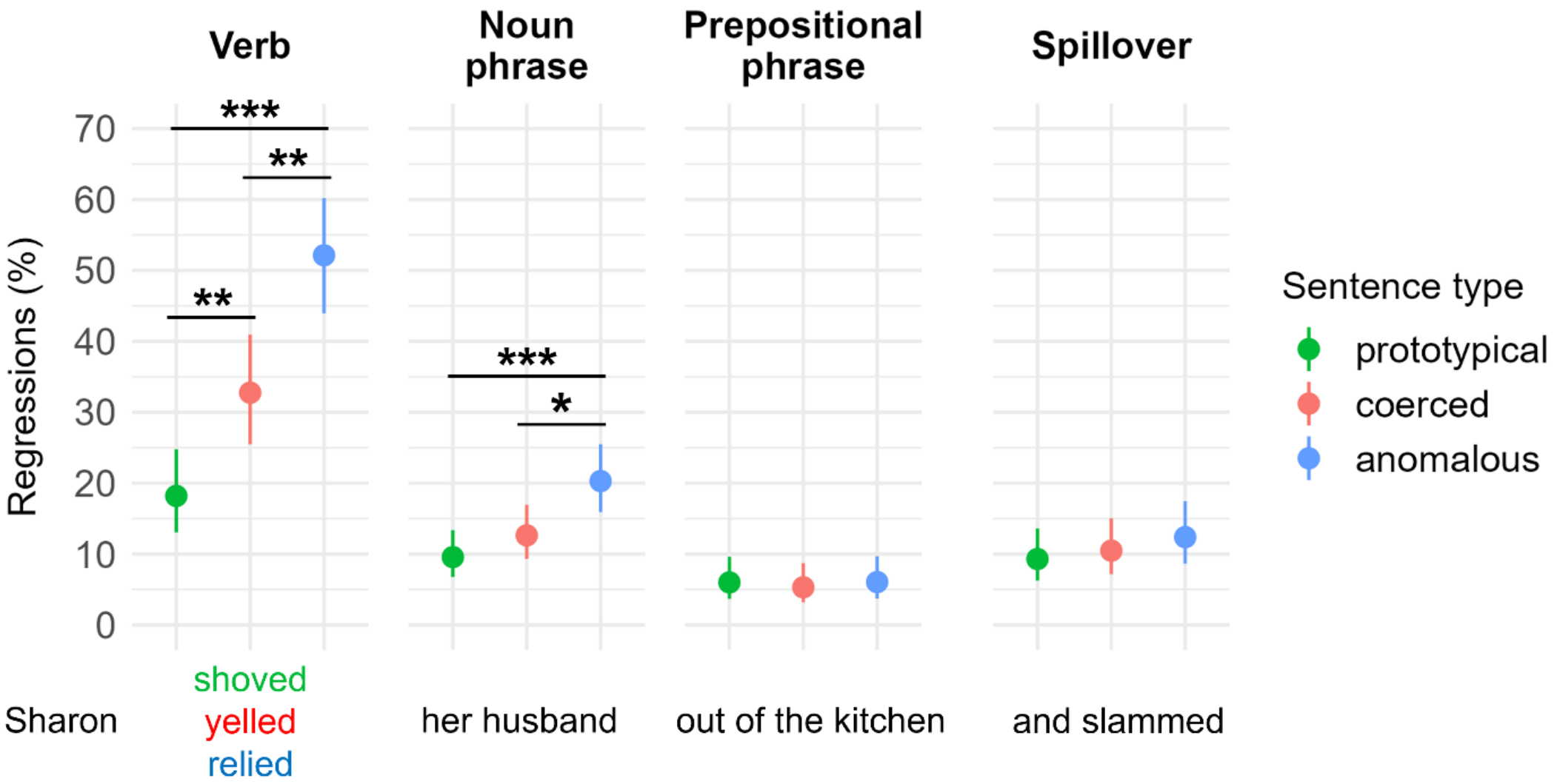
(Ungerer et al. under review)

Exp. 2: Outgoing regressions



(Ungerer et al. under review)

Exp. 2: Incoming regressions



(Ungerer et al. under review)

Exp. 2: Discussion

- Effects mostly manifest themselves in late measures (regressions)

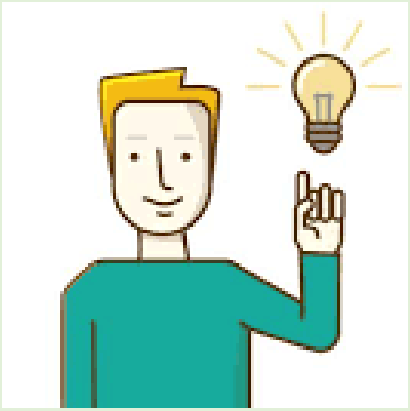
  → **Reanalysis/integration**

- Creative sentences tigger more regressions than prototypical sentences, but fewer regressions than anomalous sentences (especially at the PP)

- Most regressions land on the verb → **grammatical "anchor"**

- Results support **interactive accounts of argument structure**: participants revisit the verb to integrate it with the clausal construction

(Ungerer et al. under review)



Conclusions and next steps

Key findings

Frank sneezed the napkin off the table

What is the time course of valency coercion processing?

→ Initial processing difficulty is rapidly and incrementally resolved (before the end of the clause)

By what mechanisms do speakers arrive at a successful interpretation?

→ Reintegration via close interaction between verb and construction

How can this inform theories of argument structure?

→ Support for **interactive approaches** (lexical or constructional) rather than radically lexical/syntactic approaches

Possible extensions

More constructions, more languages

Every language provides distinct options for grammatical creativity

Manipulating context characteristics

E.g., characteristics of the situation or the speaker (are they a high/low-creative individual? L1/L2 speaker?)

Neuronal correlates

- Electroencephalography (EEG)
- Comparisons with other types of linguistic creativity (e.g., metaphors)
- More fine-grained mechanistic accounts

(https://www.pxfuel.com/en/free-photo-imypr)

Thanks!

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Questions? Suggestions?
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