

Reflexives: We don't see the Attraction

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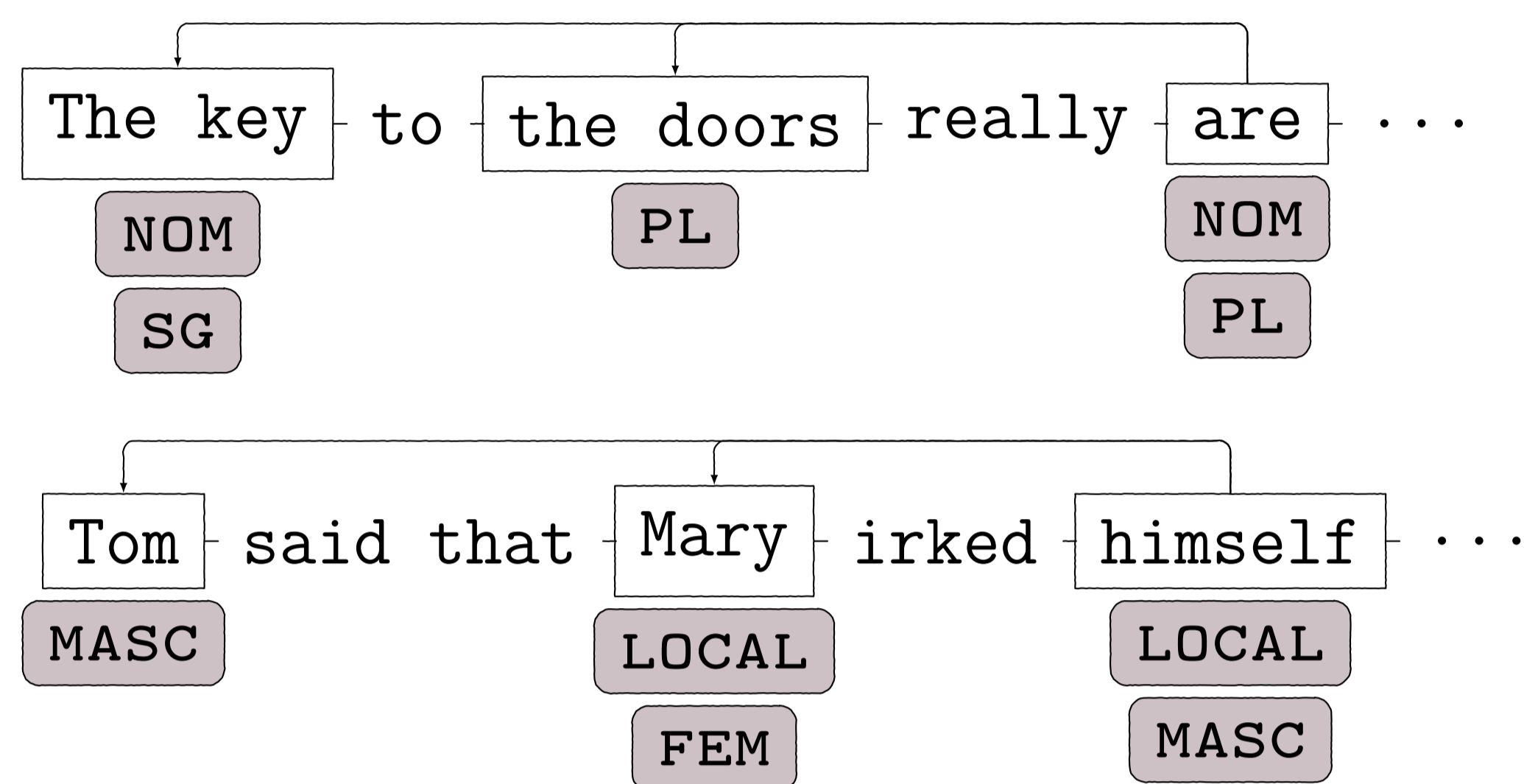
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Question

Do we observe uniform intrusion profiles for agreement and reflexives?

Intrusion & Cue-Based Retrieval

Cue-based models of sentence processing [1-3] lead us to *a priori* expect that verb agreement and reflexive pronouns should be similarly prone to intrusion effects.



However, previous work finds strong intrusion effects for agreement, but not for reflexives:

- Many studies find "agreement attraction" effects [4-7]
- Very few studies report an analogous grammatical illusion for reflexive pronouns [7-11; c.f.12-14]
- In a direct comparison of agreement and reflexives, Dillon et al. (2013) found no intrusion effects for reflexives, but substantial effects for agreement.

(1) The tall nurse who cared for the elderly widows definitely...

{ were reluctant to work long shifts.
pricked themselves with a used syringe. }

The Present Study

Previous work may have unintentionally biased against finding intrusion with reflexives. We aim to maximize the likelihood of finding intrusion effects for both dependencies.

- The position of the intruder was chosen to maximize the rate of attraction [4]
- The critical and spillover regions were standardized for best comparison [c.f. 7]
- We focus on intrusion from plural nouns, which are known to exert stronger attraction effects [5]
- Materials were normed to ensure that intruders could act as felicitous antecedents for the reflexive

Materials and Methods

- 64 UMass undergraduates participated in an eye-tracking while reading study
- Materials were 48 sentence sets like (2)
- Tested a *gram* × *intruder* × *dependency* interaction using LME with de-correlated slopes and intercepts for subjects and items

References

[1] Lewis & Vasishth. (2005). *Cognitive Science*; [2] McElree. (2000). *JPR*; [3] van Dyke. (2007). *JEP*; [4] Bock & Cutting. (1992). *JML*; [5] Wagers, Lau, & Phillips. (2009). *JML*. [6] Lago, Shalom, Sigman, Lau, & Phillips.(2015). *JML*; [7] Dillon, Mishler, Sloggett, & Phillips.(2013). *JML*; [8] Sturt.(2003).*JML*; [9] Xiang, Dillon, & Phillips. (2009). *Brain & Language*; [10] Patil, Lewis, & Vasishth. (2016). *Frontiers in Psychology*; [11] Engelmann, Jaeger, & Vasishth. (Submitted). [12] King, Andrews, & Wagers.(2012).*CUNY*; [13] Parker & Phillips.(2014).*CUNY*; [14] Sloggett & Dillon.(2015).*CUNY*;

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Hypothesis: Agreement and reflexives represent distinct processes

Stimuli: *grammaticality* × *intrusion* × *dependency*

(2) The motherly therapist(s) of the widow(s) eventually

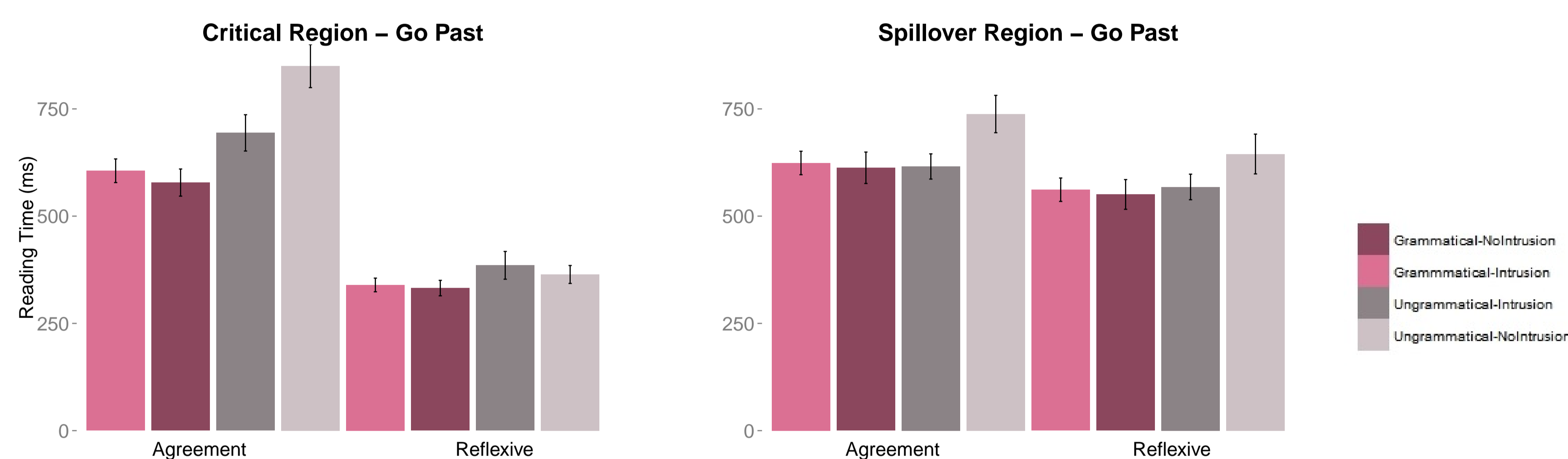
	/	were reassured/
reassured	/	themselves/

 that the family/ was on the road to recovery.

Predictions: How should number attraction affect agreement and reflexives?

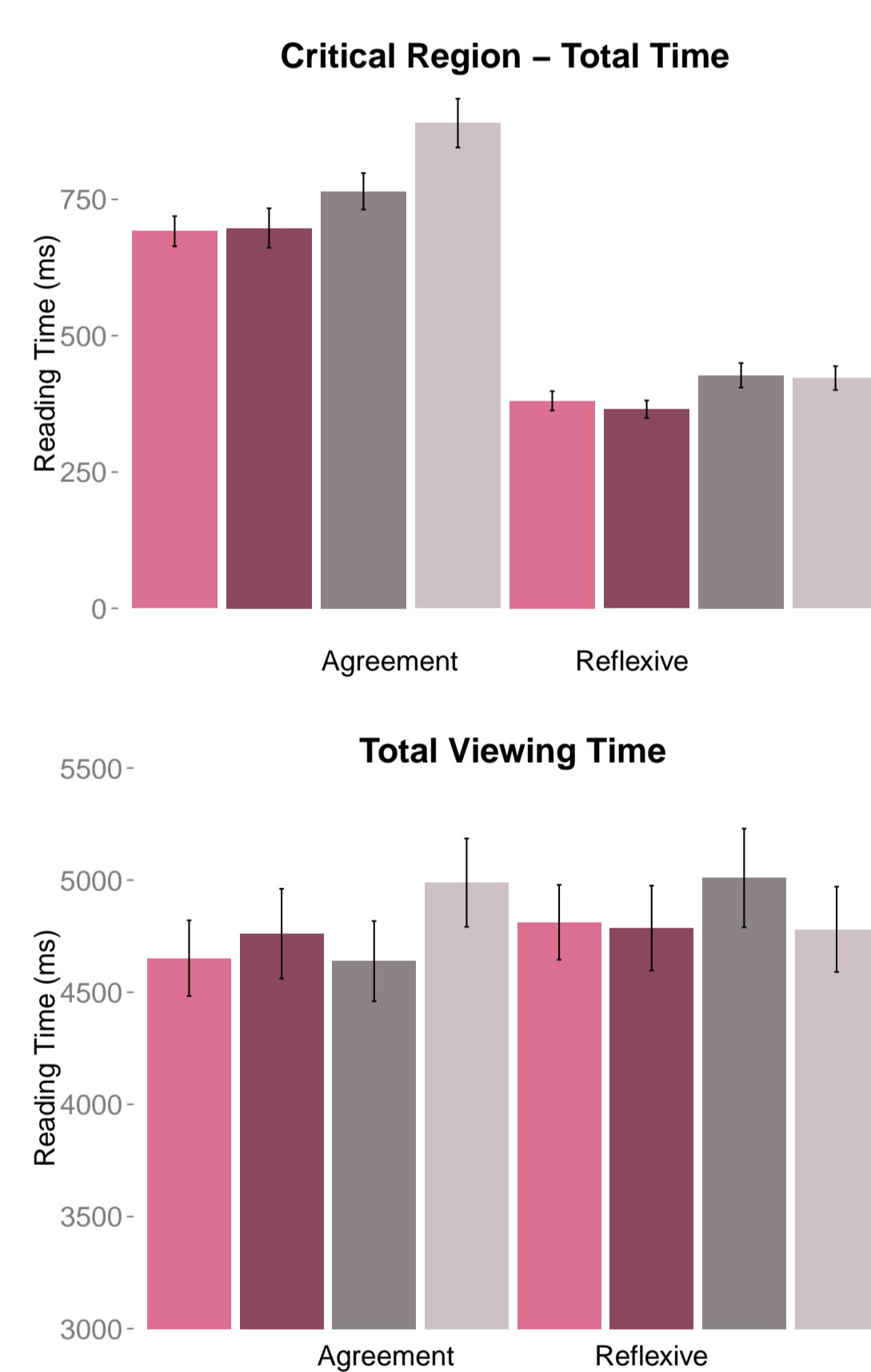
- Number Attraction:** The penalty for ungrammaticality should be ameliorated by a plural intruder, reducing reading times at the critical region
- Cue-based retrieval:** Number attraction effects should be same for agreement and reflexives
- Distinct dependencies:** Little to no impact of number attraction on reflexive dependencies

Eye-tracking Results



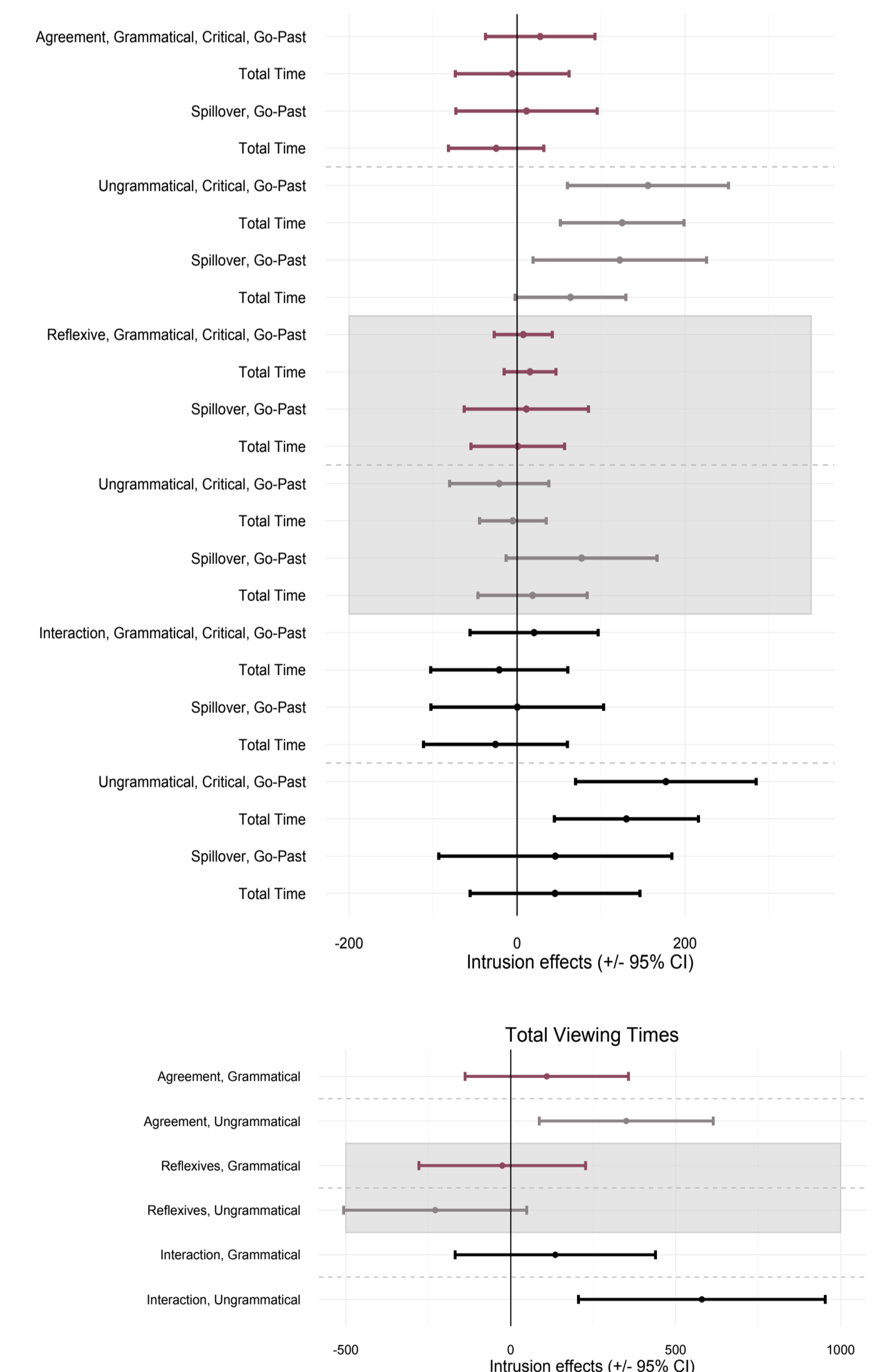
- Early number attraction for agreement
- No number attraction for reflexives
- Main effect of *gram* disappears for agreement
- Delayed sensitivity to intruder number for reflexives

Reflexive Intrusion is Short-lived



- Agreement number attraction survives in TVT
- Reflexive number attraction disappears in TVT
- Reflexive intrusion is limited and short-lived

Intrusion Effect Analysis



Summary of Results

The results at the critical region replicate the primary findings of Dillon et al. (2013):

- Strong agreement attraction in go-past times at the critical region, but no effect for reflexives
- There is a trend to a reflexive intrusion effect at the spillover region in go-past reading
- However, this effect disappears in total-viewing time.

In sum, we do find hints of intrusion for reflexives, but it seems to be smaller, less durable, and maybe later, than the one for agreement, suggesting a qualitatively different character.

Conclusion: Reflexive intrusion is distinct

- Reflexives show trends to intrusion effects, but in a manner distinct from agreement [n.b. 11]
- These findings might still implicate a role for cue-based retrieval, but more work is needed to understand the divergence from agreement
- Our findings also highlight the importance of a carefully chosen spillover region: weak reflexive intrusion effects in previous studies may have been obscured by variation in spillover analyses.

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