

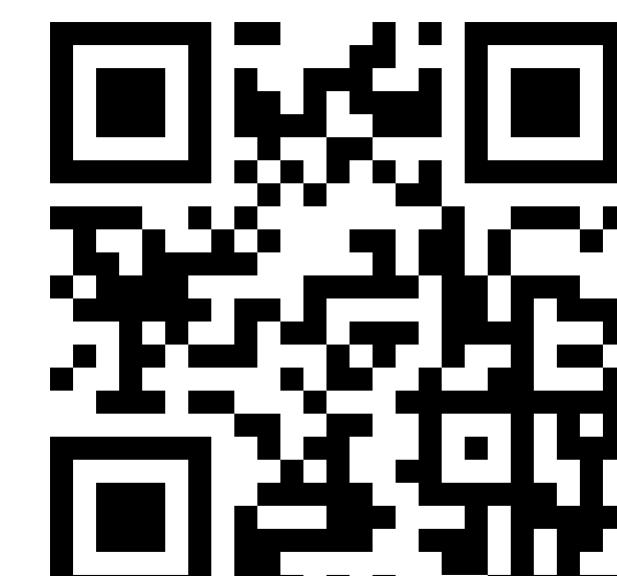
Introduction

- Benchmark data are an important tool for developing theories and evaluating model predictions.
- The majority of benchmark data in sentence processing are limited to naturalistic reading (e.g., [1, 2, 3]).
- But benchmarks based on controlled stimuli (e.g., [7, 17]) are also necessary for robust model evaluation.

Our Work (in Progress)

- We collect self-paced reading benchmark data for a battery of postulated effects in German (10 phenomena).
- In parallel, we also collect eye-tracking data on the same materials.
- So far (December 2025):
 - 950 Prolific participants have been tested with SPR. 63 were excluded due to low accuracy on comprehension questions.
 - 195 in-lab participants have been tested with eye tracking. 1 was excluded due to low accuracy on comprehension questions.
- We show the results so far, compared to qualitative and surprisal-based [4, 10, 15] predictions.

Pre-Registration Protocol (SPR)



osf.io/wpra9

Phenomena, Demographics, Predictions, and Estimates

Experimental Designs

GPSD (2x2): Garden Paths From Subject-vs.-Direct-Object Ambiguity
Ambiguous/Unambiguous \times S-O/O-S — closely replicating [12]

GPSI (2x2): Garden Paths From Subject-vs.-Indirect-Object Ambiguity
Ambiguous/Unambiguous \times Active/Passive — loosely replicating [13]

GPCA (2x2): Garden Paths From Coordination Ambiguity
NP-/VP-Coordination \times AP-/PP-Modifier — closely replicating [9]

GPMI (2x2): Garden Paths From Modifier-vs.-Indirect-Object Ambiguity
Modifier/No-Modifier \times Ambiguous/Unambiguous — closely replicating [8]

AGAT (2x2): Agreement Attraction in Grammatical Sentences
Singular-/Plural-Controller \times Match/Mismatch — closely replicating [5]

LOCO (2x2): Local Coherence
Coherent/Incoherent \times Intervener/No-Intervener — closely replicating [14]

SBIN (2x2): Similarity-Based Interference
Subject-Cue [Yes/No] \times Animacy-Cue [Yes/No] — closely replicating [16]

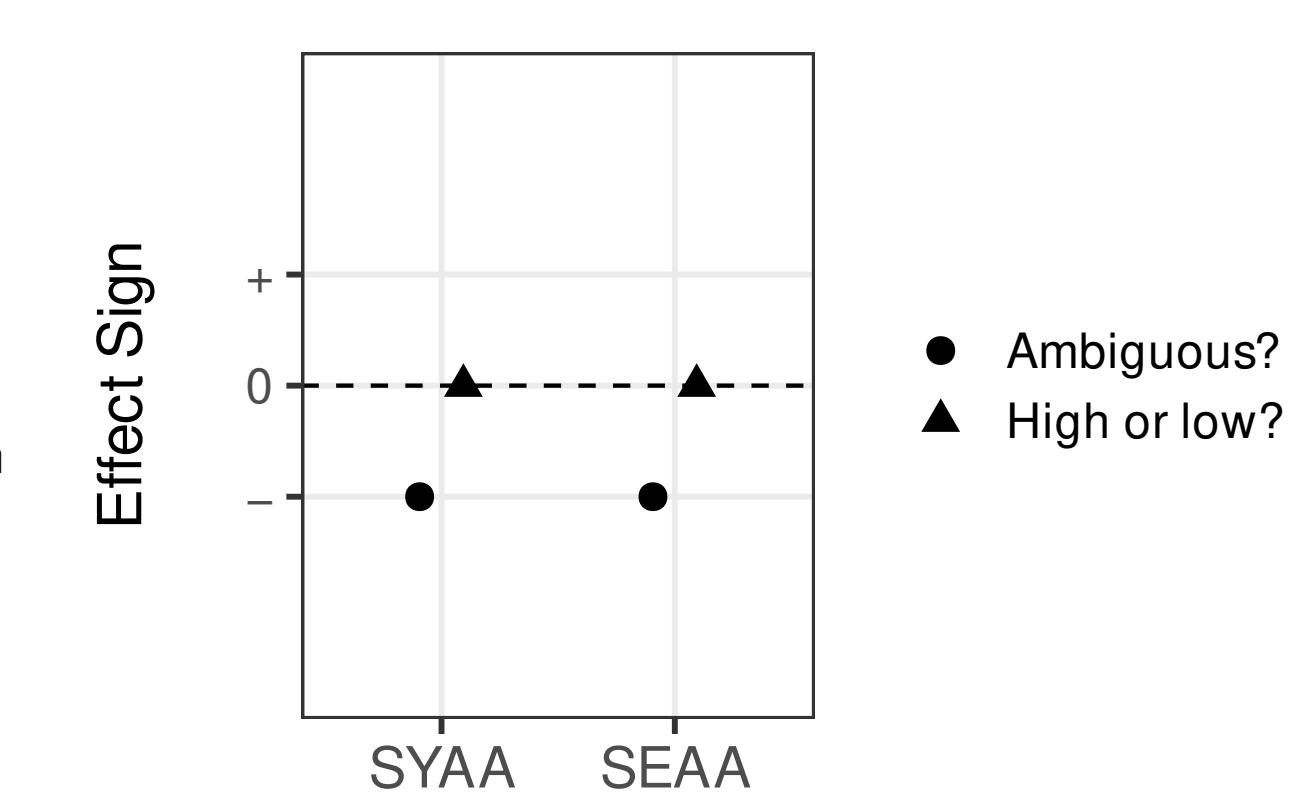
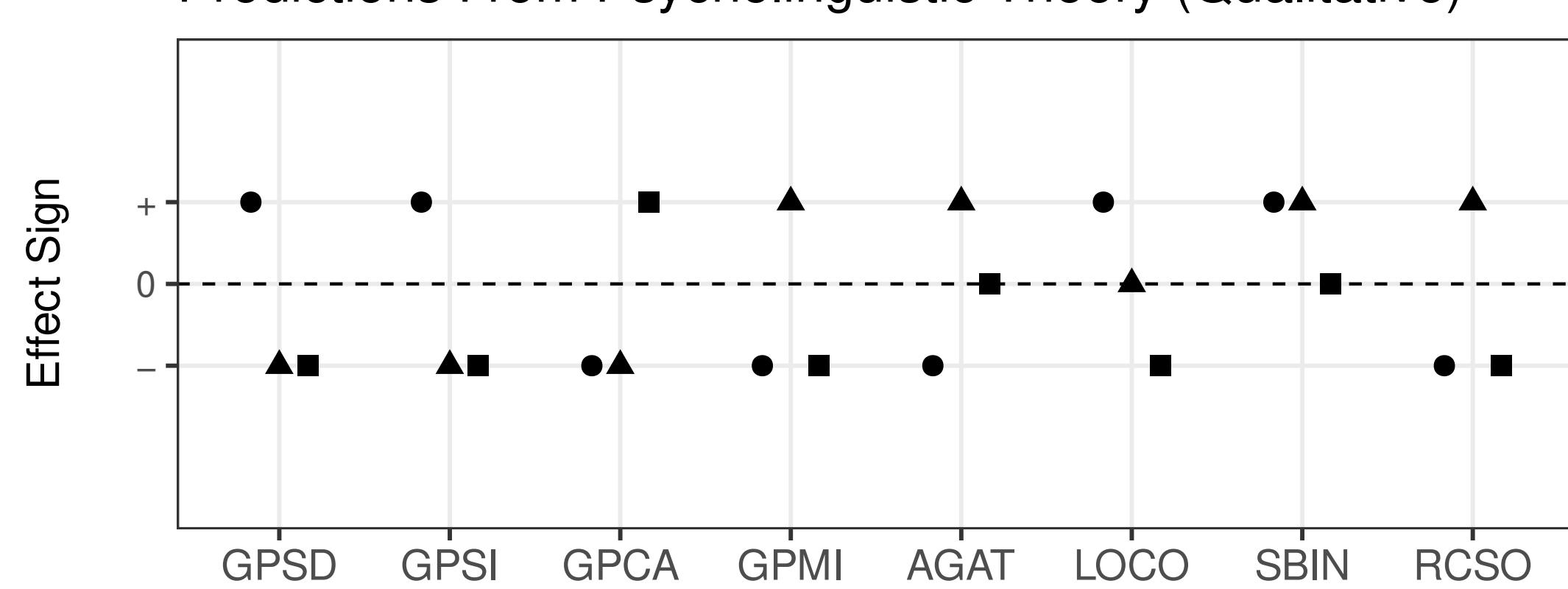
RCSO (2x2): Subject vs. Object Relative Clauses
Subject/Object \times Double-/Single-Embedding — German adaptation of [6]

SYAA (3x1): Syntax-Based Attachment Ambiguity
High-/Low-/Ambiguous-Attachment — closely replicating [11]

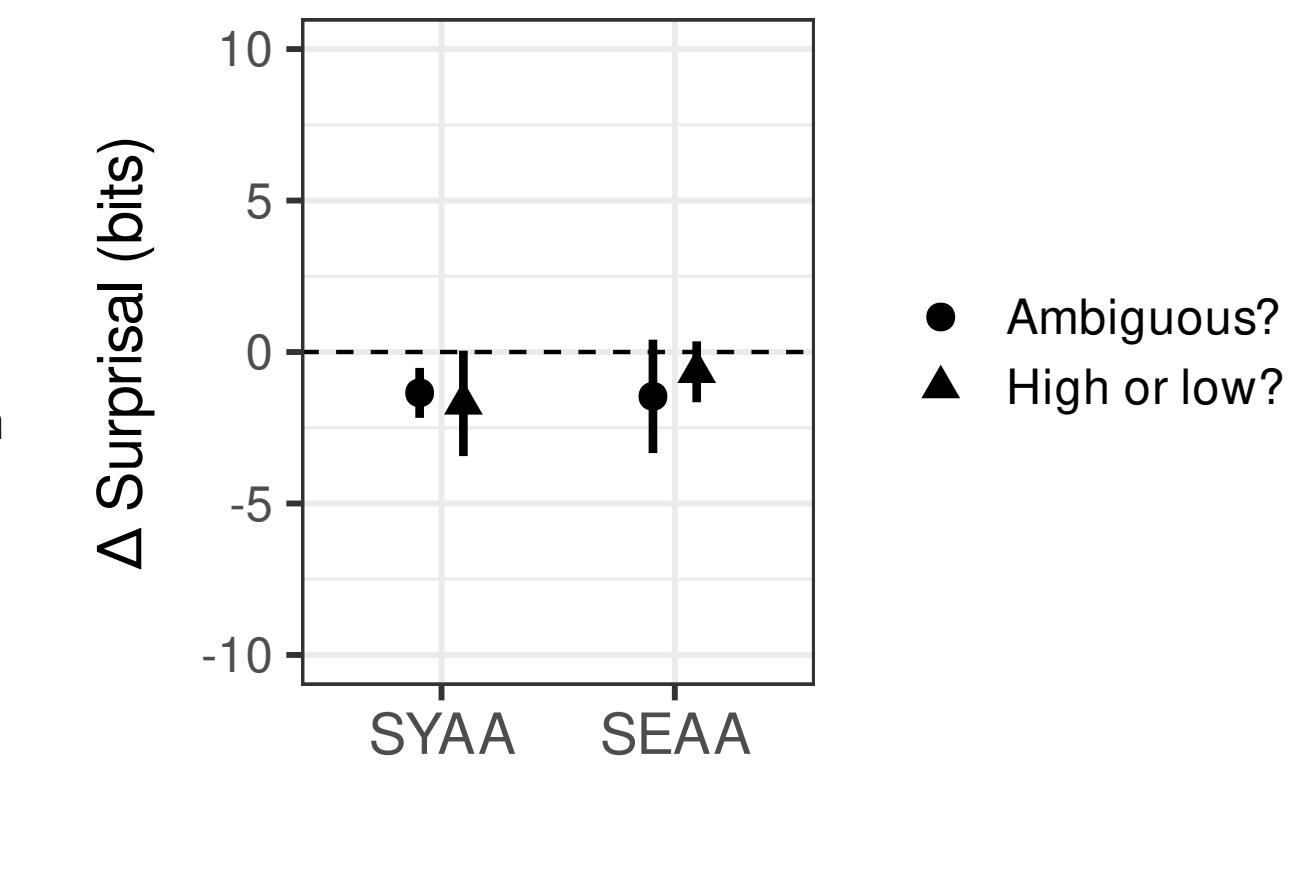
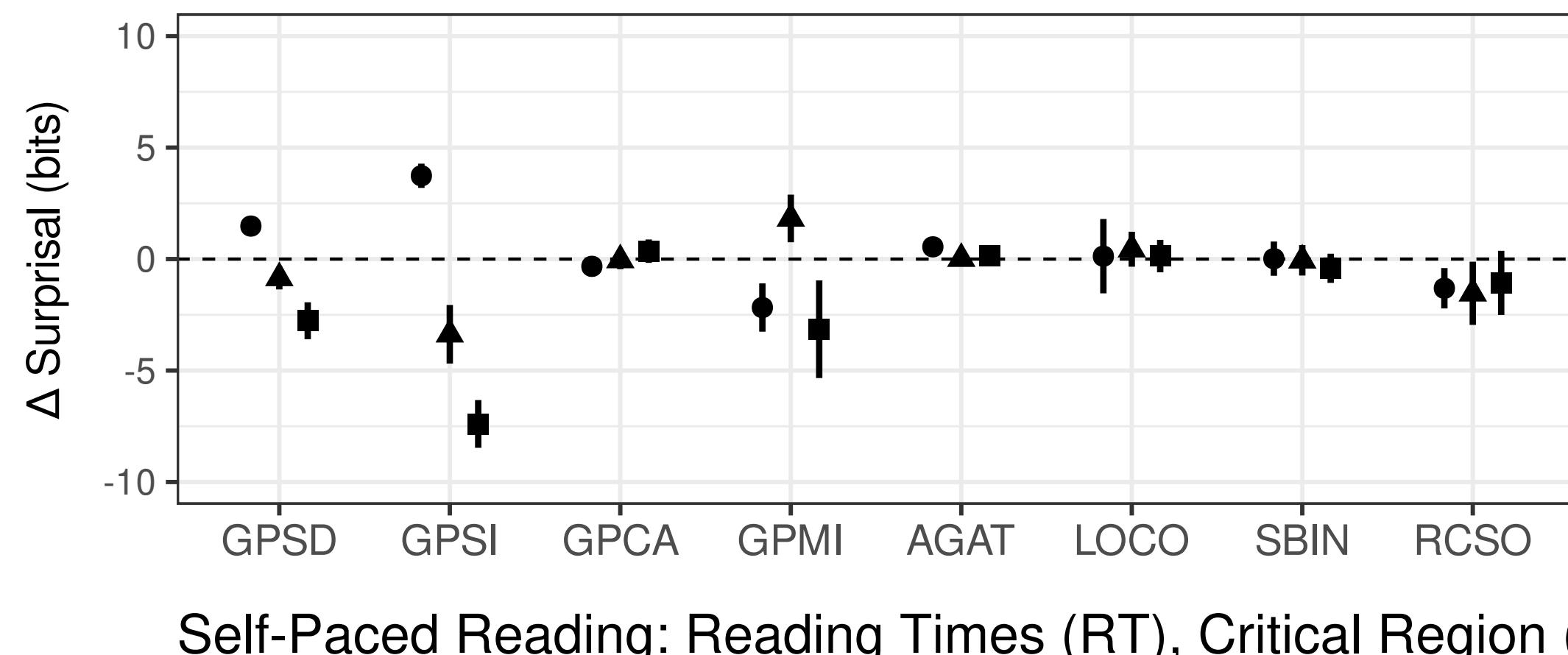
SEAA (3x1): Semantics-Based Attachment Ambiguity
High-/Low-/Ambiguous-Attachment — German adaptation of [18]

Method	L1	N	Gender			Age (SD)	Comprehension Accuracy (%)	Trials per Participant
			Female	Male	Other			
Eye Tracking	German	195	147	46	2	23.3 (4.5)	82.6 %	114
SPR	German	950	425	524	1	30.9 (8.9)	76.3 %	114

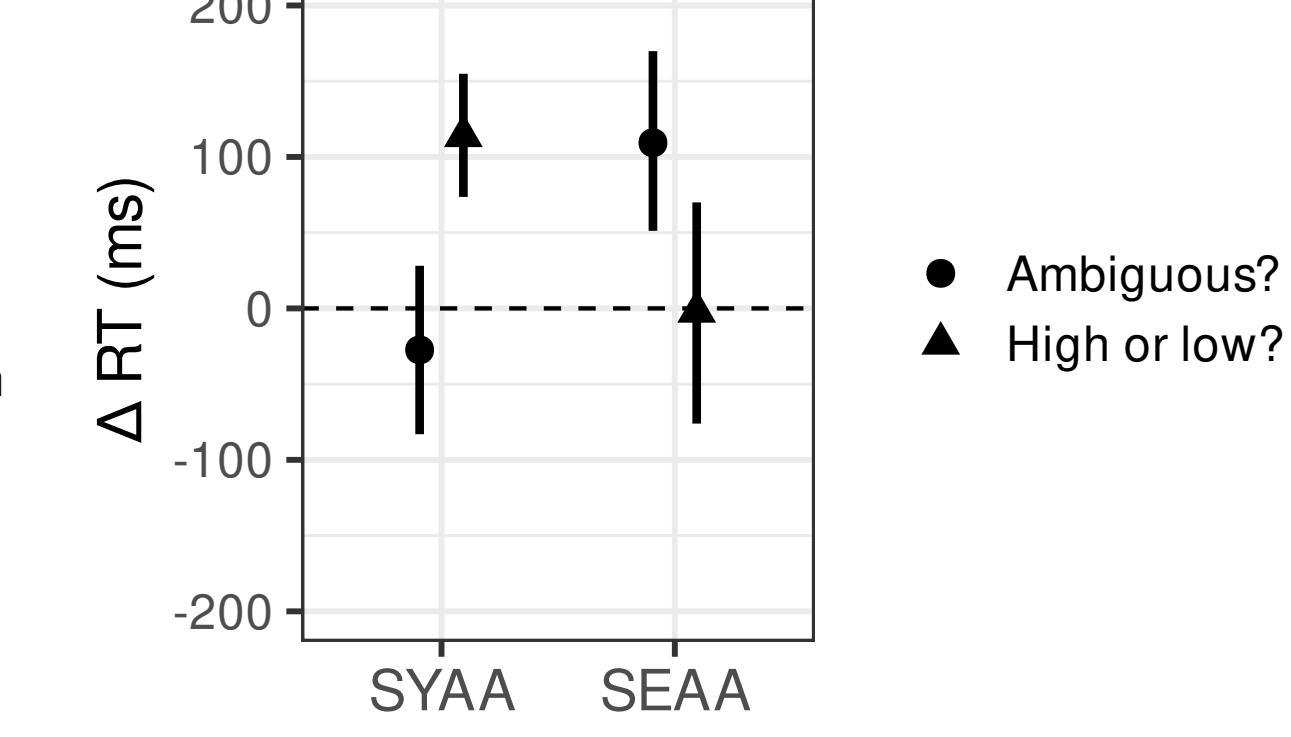
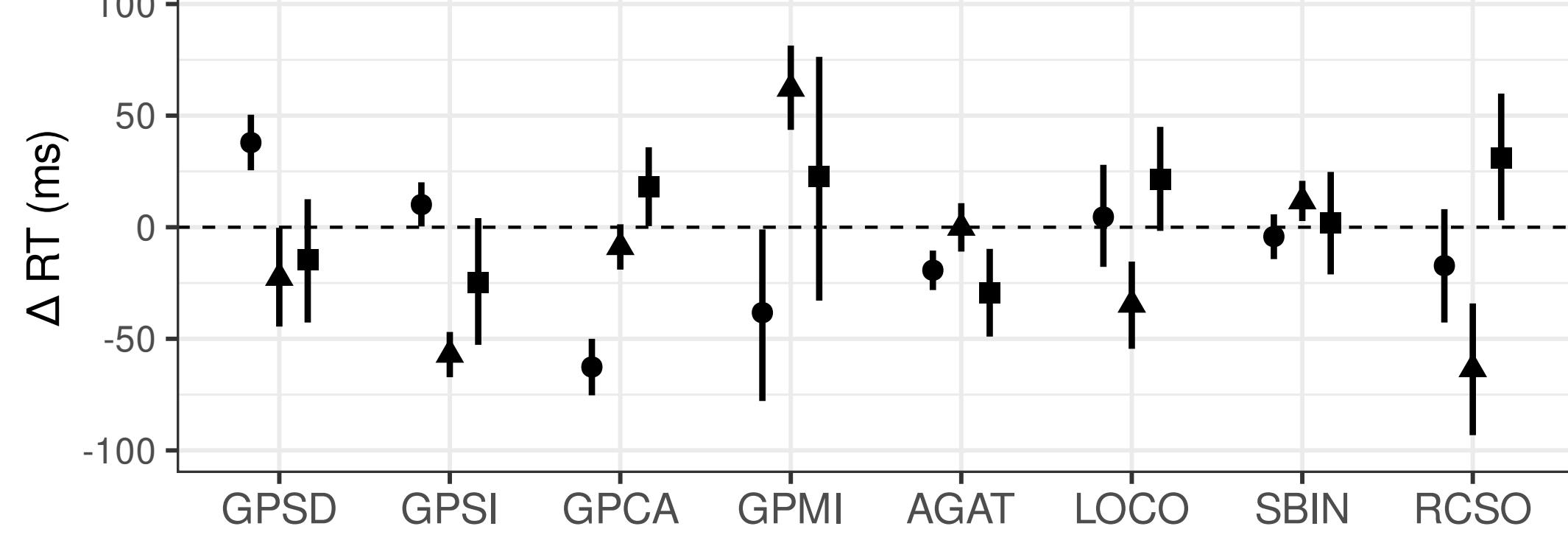
Predictions From Psycholinguistic Theory (Qualitative)



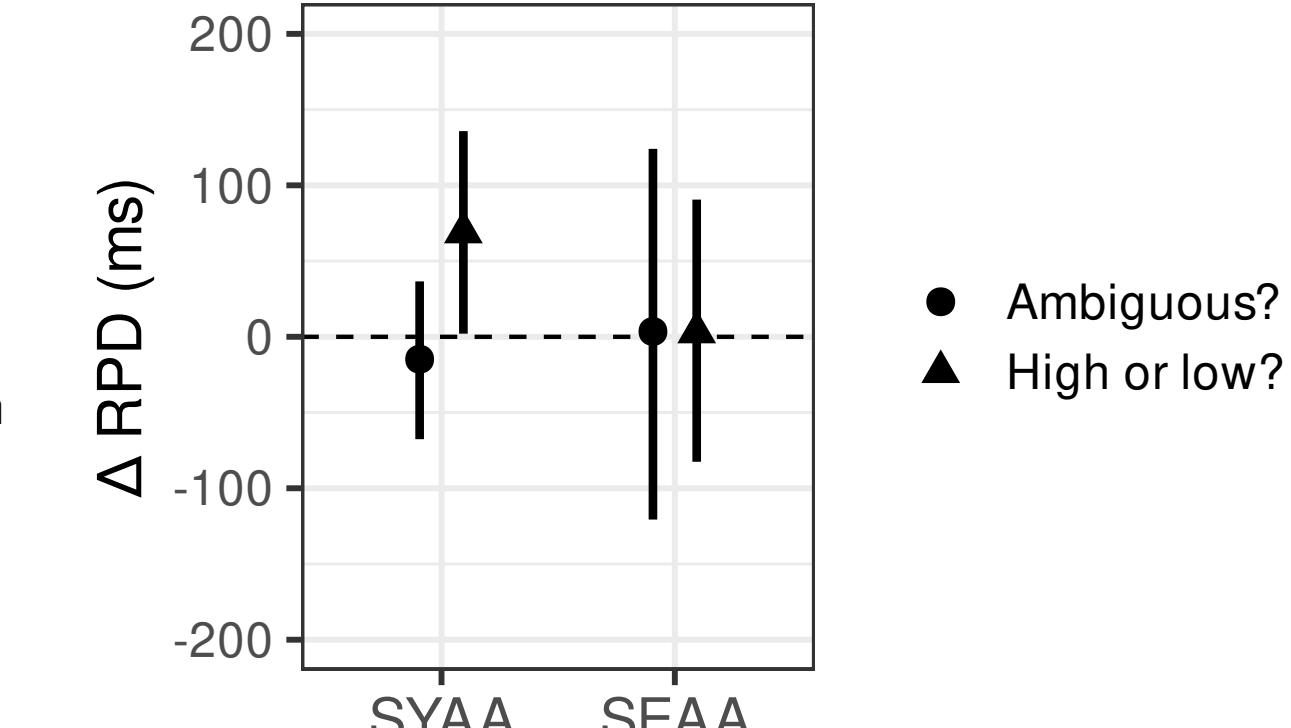
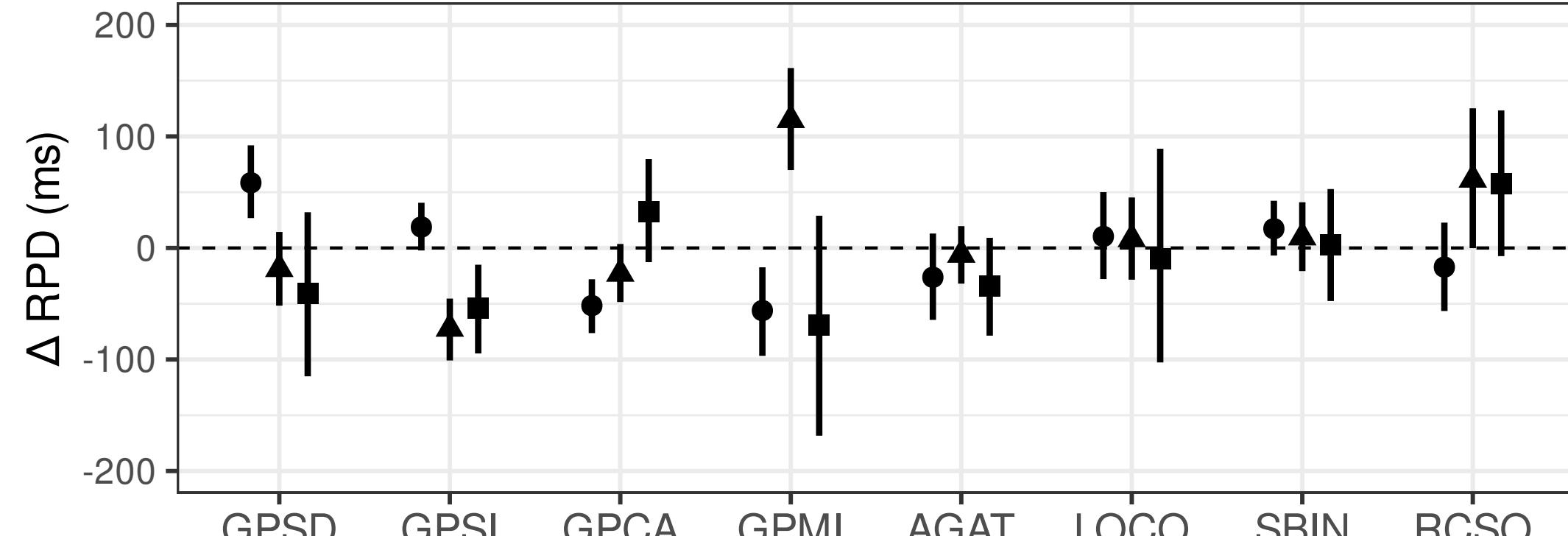
Predictions From Surprisal (95% CIs)



Self-Paced Reading: Reading Times (RT), Critical Region (95% Crls)



Eye Tracking: Regression Path Durations (RPD), Critical Region (95% Crls)



References

- [1] Y. Berzak et al. In: *Open Mind* 6 (2022), pp. 41–50. [2] J. Chromý, M. Ceháková, and J. Brand. In: *Behavior Research Methods* 57.12 (2025), p. 345. [3] R. Futrell et al. In: *Language Resources and Evaluation* 55 (2021), pp. 63–77. [4] J. T. Hale. In: *Proceedings of the Second Meeting of the NAACL*. Pittsburgh, PA, 2001. [5] J. Häussler. PhD thesis. University of Konstanz, 2009. [6] F. Hsiao and E. Gibson. In: *Cognition* 90.1 (2003), pp. 3–27. [7] K.-J. Huang et al. In: *Journal of Memory and Language* 137 (2024), p. 104510. [8] A. van Kampen. PhD thesis. Free University of Berlin, 2001. [9] L. Konieczny, B. Hemforth, and C. Scheepers. In: *German Sentence Processing*. Ed. by B. Hemforth and L. Konieczny. Springer, 2000, pp. 247–278. [10] R. Levy. In: *Cognition* 106.3 (2008), pp. 1126–1177. [11] P. Logačev. In: *Journal of Experimental Psychology: Learning, Memory, and Cognition* 49.9 (2023), p. 1471. [12] M. Meng and M. Bader. In: *Language and Speech* 43.1 (2000), pp. 43–74. [13] M. Meng and M. Bader. In: *Language and Cognitive Processes* 15.6 (2000), pp. 615–666. [14] D. Paape and S. Vasishth. In: *Language and Speech* 59.3 (2016), pp. 387–403. [15] A. Radford et al. In: *OpenAI Blog* 1.8 (2019), p. 9. [16] P. Schoknecht, H. Yadav, and S. Vasishth. In: *Journal of Memory and Language* 141 (2025), p. 104599. [17] W. Timkey et al. Unpublished manuscript. 2025. [18] M. J. Traxler, M. J. Pickering, and C. Clifton Jr. In: *Journal of Memory and Language* 39.4 (1998), pp. 558–592.