



The Reversed Goldilocks Effect: Premask Duration Modulates Priming in the Masked-Priming Same-Different Task

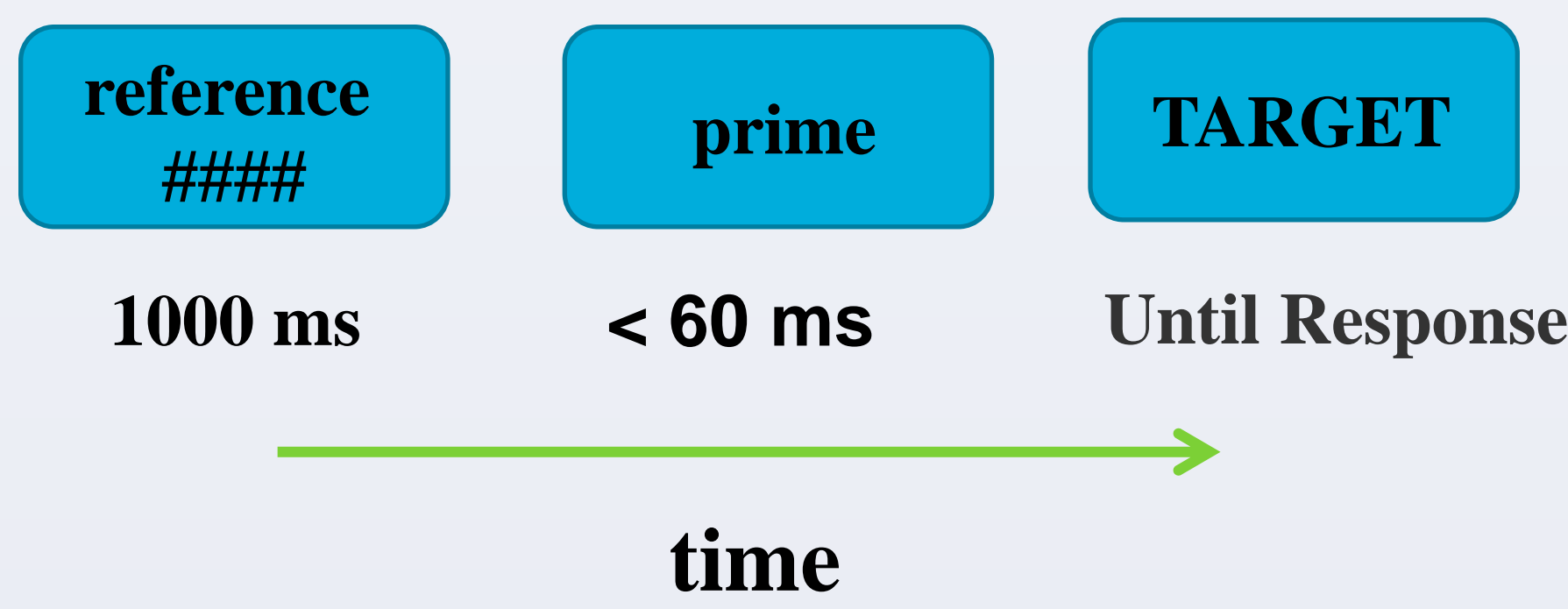
Jason Geller¹, Mary L. Still², & Alison L. Morris¹

Iowa State University¹ San Jose State University²

Letter-Position Coding

How do readers encode letter positions within words? Is noisy letter-position coding driven in part by a position-independent letter representation?

Standard Same-Different Task



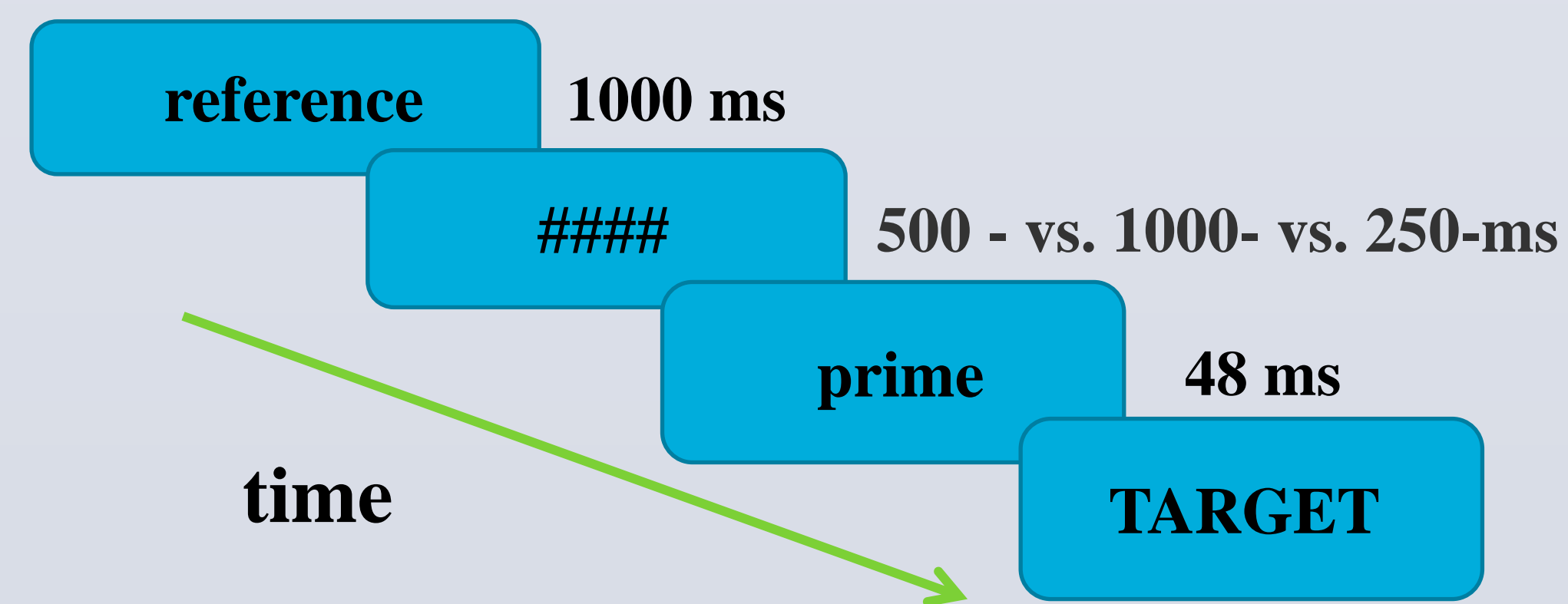
- This task is thought to examine orthographic processing at the prelexical level, as significant priming is shown for word and nonword targets (Kinoshita & Norris, 2009)
- According to Bayesian models of masked priming (Norris & Kinoshita, 2008, 2012), facilitatory priming in “same” trials is driven by a noisy accumulation of evidence from the prime
- Bayesian models make no explicit predictions concerning other trial events that might modulate priming

Research Questions

- Can reversed-anagram primes produce priming in the same-different task?
- Is priming in “same” trials modulated by premask duration?

Procedure: Experiments 1 & 2

Modified Same-Different Task



Materials: Experiments 1 & 2

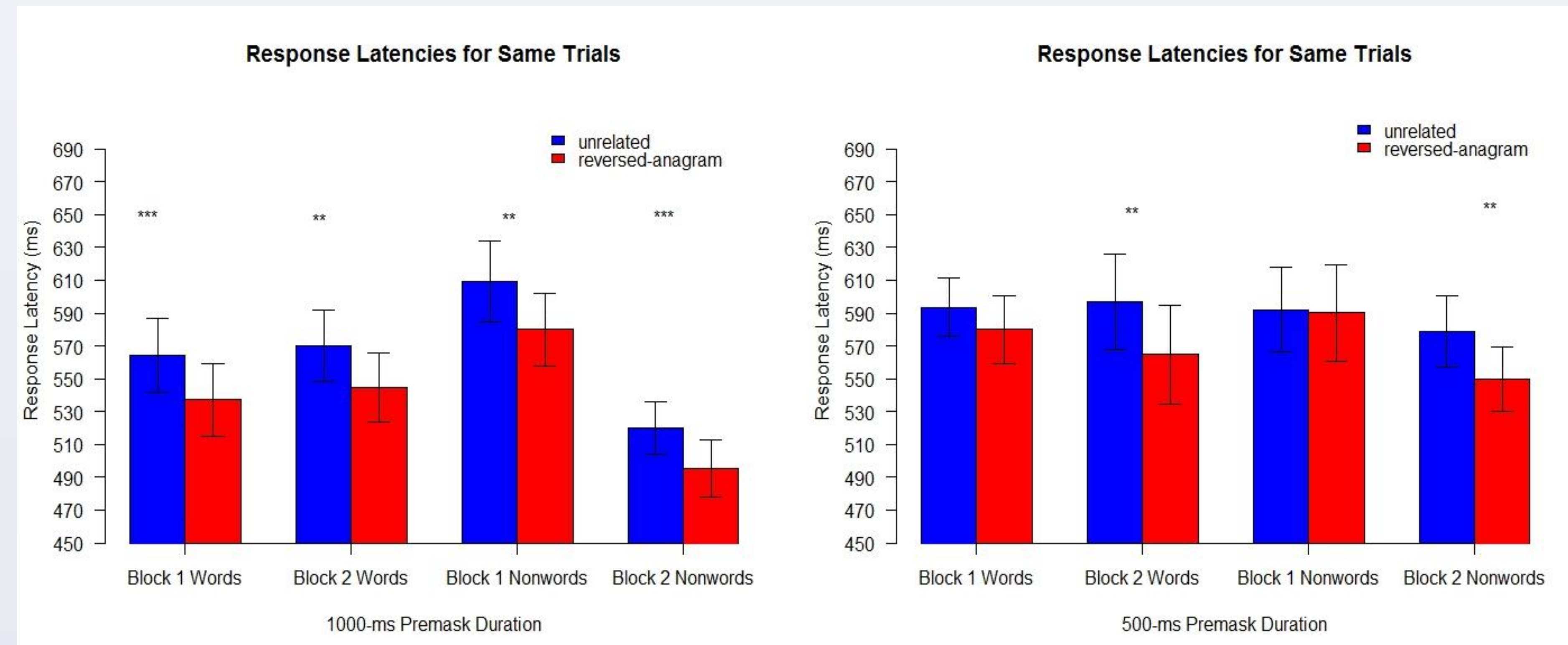
	Reference	Prime	Target
Diff/Anagram	drop	eulb	BLUE
Diff/Unrelated	drop	hsif	BLUE
Same/Anagram	blue	eulb	BLUE
Same/Unrelated	blue	hsif	BLUE

“Different” trials are not discussed henceforth

Experiment 1 Results: 500-ms Premask vs. 1000-ms Premask

In Experiments 1 and 2, RTs were analyzed with a crossed random effects model, with random subject (112) intercepts and random item (192) intercepts

- Between-subject differences accounted for 34% of the total RT variance
- Between-items differences accounted for 0% of the total RT variance (inclusion of a random item intercept did not improve model fit)
- Fixed effects: premask duration (500 ms vs. 1000 ms), block order (word first vs. nonword first), target lexicality (word vs. nonword) and prime type (reversed-anagram vs. unrelated)



Planned comparisons: 1000-ms premask duration

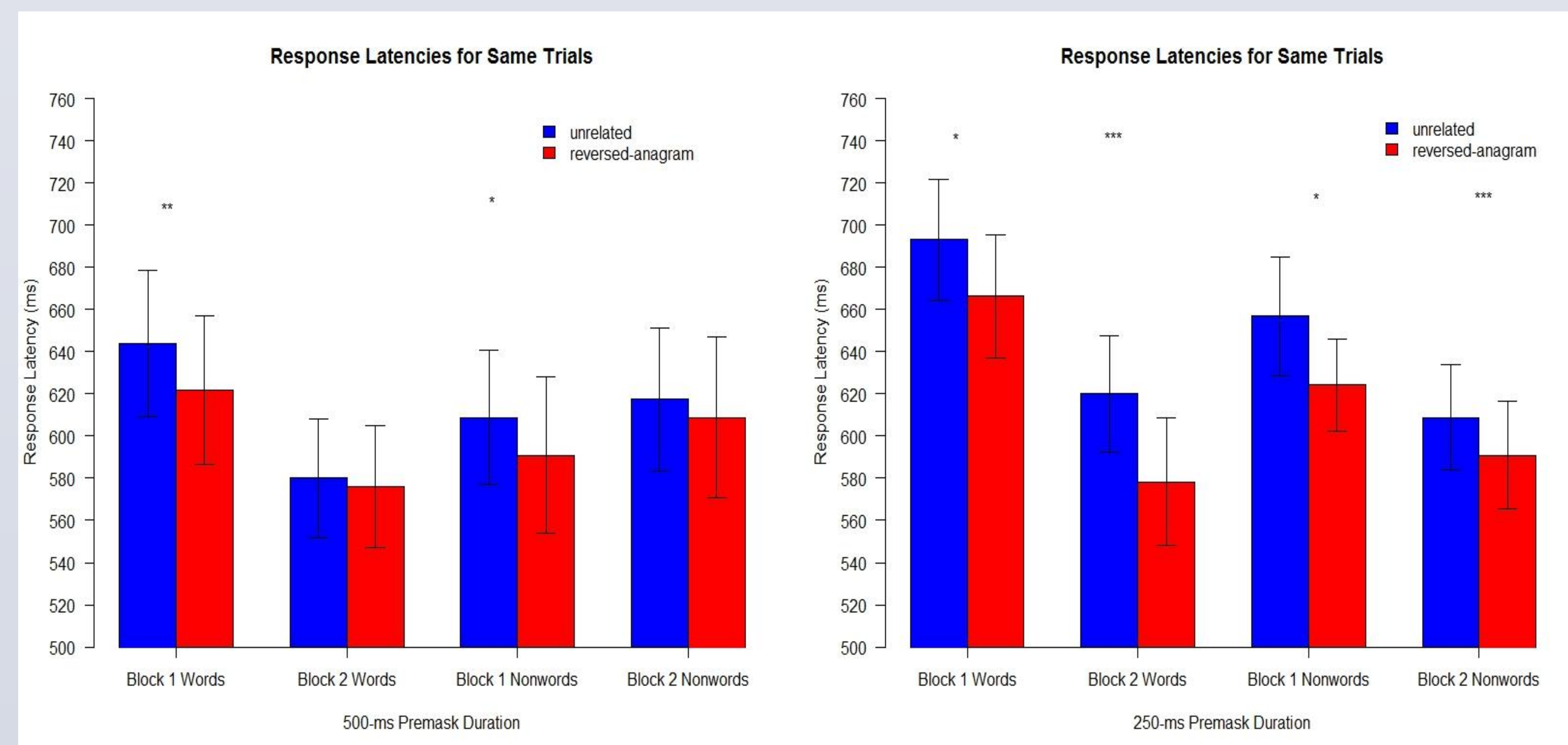
- Significant priming was observed for words and nonwords in both blocks, all $t_s > 3$

Planned comparisons: 500-ms premask duration

- Priming emerged when nonword targets came in the second block ($t = 3.12, p < .01$)
- Priming emerged when words came in the second block ($t = 3.36, p < .01$)

Experiment 2 Results: 500- ms Premask vs. 250-ms Premask

- Between-subject differences accounted for 45% of the total RT variance
- Between-items differences accounted for 0% of the total RT variance (inclusion of a random item intercept did not improve model fit).
- Fixed effects: premask duration (500 ms vs. 250 ms), block order (word first vs. nonword first), target lexicality (word vs. nonword) and prime type (reversed-anagram vs. unrelated)



Planned comparisons: 500-ms premask duration

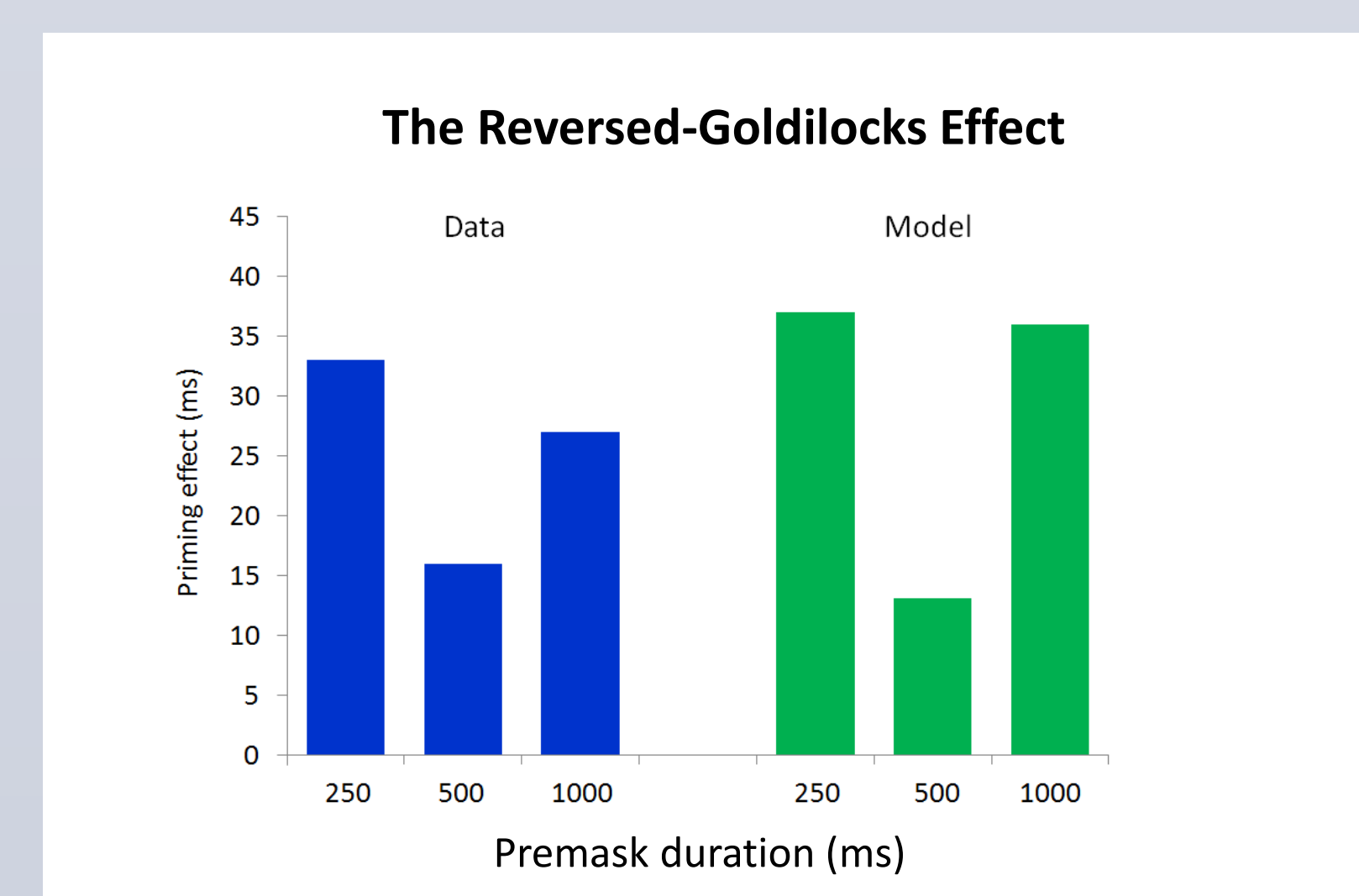
- Priming emerged for words in the first block ($t = 2.48, p = .01$)
- Priming emerged for nonwords in the first block ($t = 2.00, p = .05$)

Priming in the 500-ms premask condition appears to be unreliable. This is the “Reversed Goldilocks Effect” – greater priming for the shorter and longer premask durations, but reduced priming for the medium-length duration!

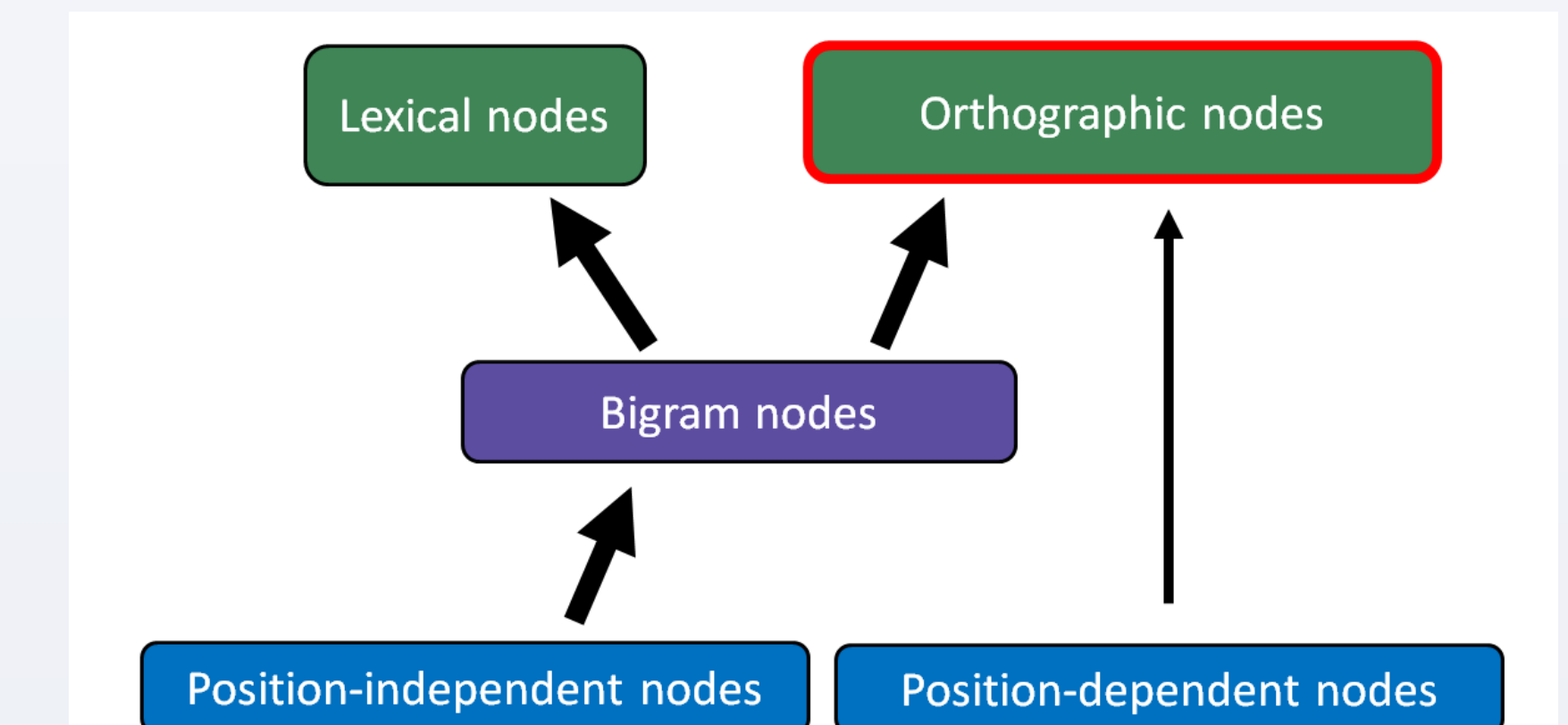
We have developed a model that simulates this effect.

Planned comparisons: 250-ms premask duration

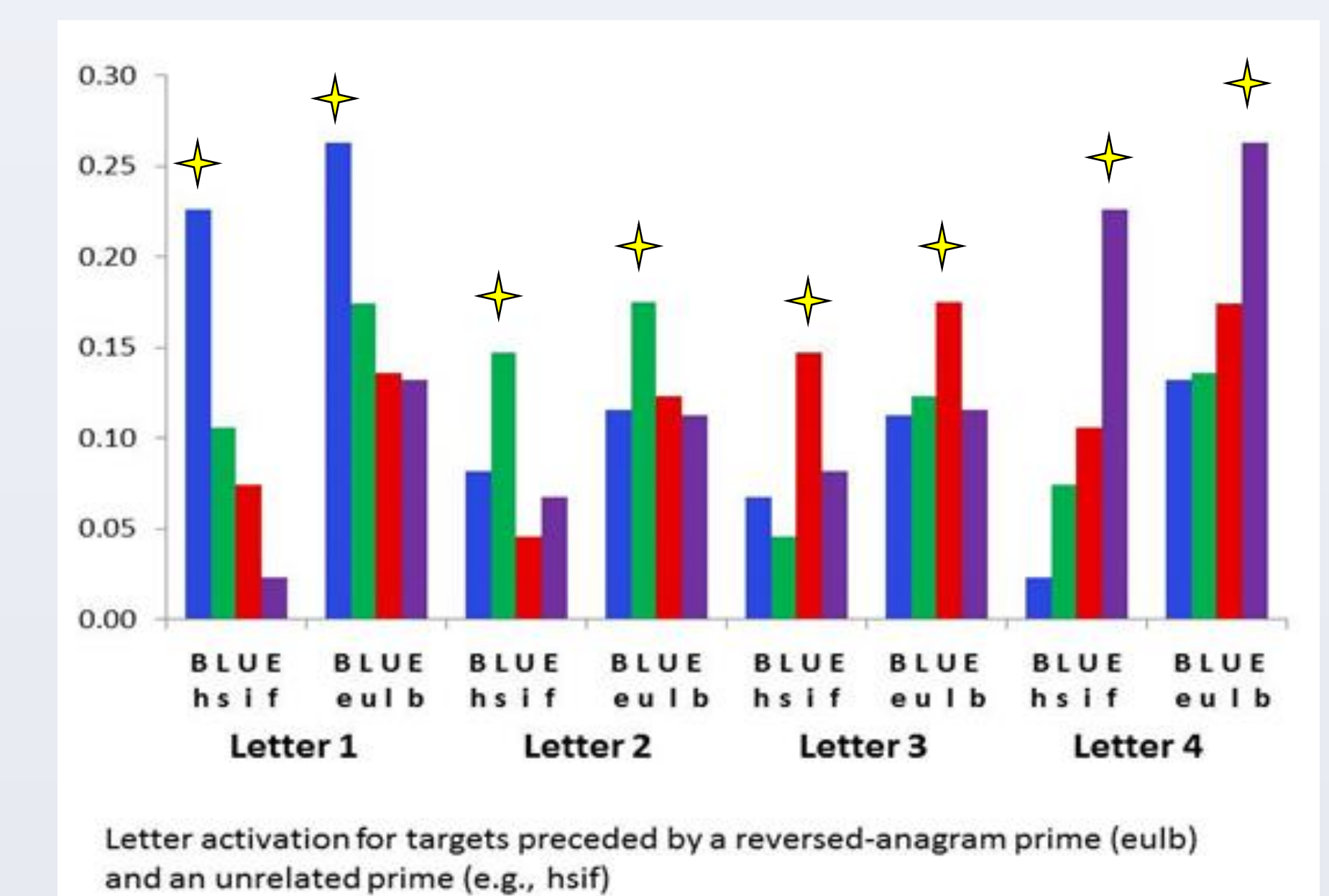
- Significant priming was observed for words and nonwords in both blocks, all $t_s > 2.90$



Model Schematic

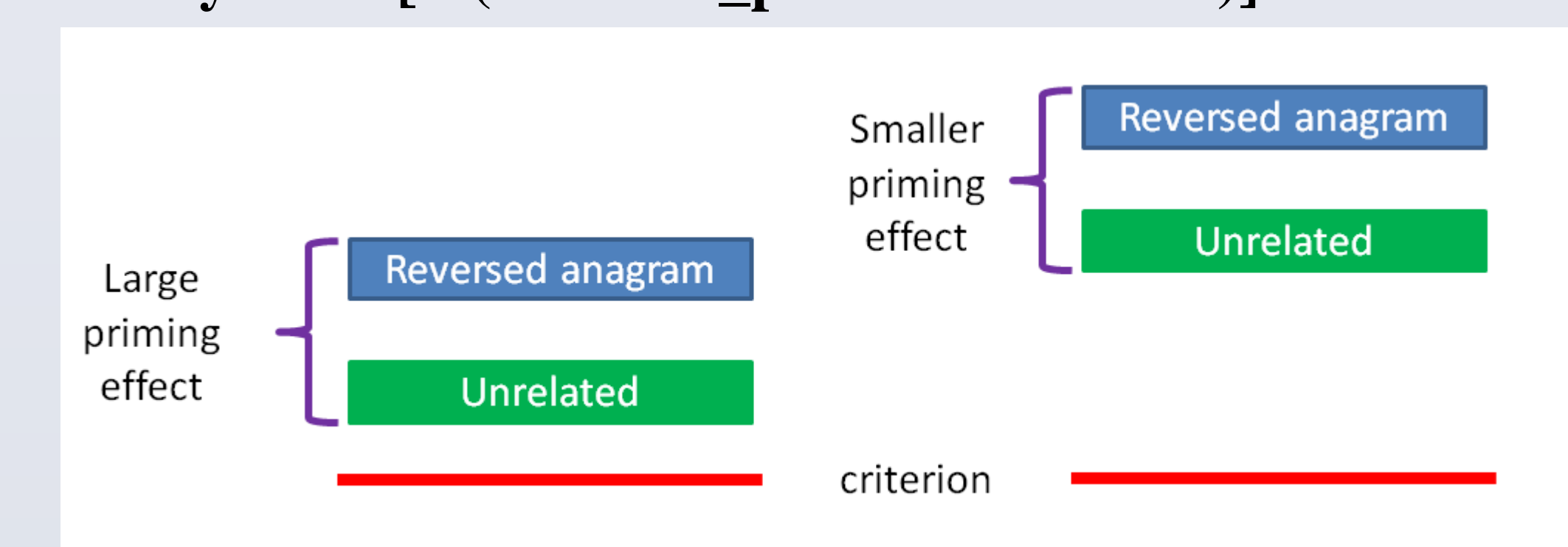


Our model produces reversed-anagram priming

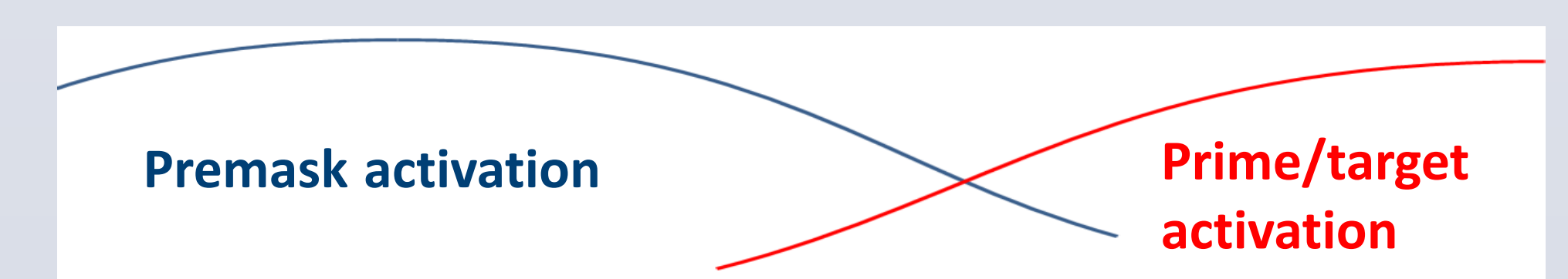


Decision criterion

- A SAME decision is made when the summed product of the orthographic nodes from the reference and target exceeds a criterion
- Cycles = $[1 - (\text{summed_product} - \text{criterion})]^5 * 250$



- The equation produces larger priming effects when the summed products are nearer the criterion; delaying access to the target reduces priming effects.
- What might delay access to the target? In the model, the prime and target are treated as the same object, and the prime/target must compete with the premask for access to awareness.



- Because attention in the model peaks after 325 cycles, a 500-ms premask will delay access to the target, reducing priming and producing the Reversed-Goldilocks Effect.

Conclusions

- A position-independent letter representation in conjunction with bigrams may be needed to simulate priming from reversed anagrams
- Models designed to account for same-different data must consider all of the elements of the experimental trial
- A task that appears simple, is probably not!

References

- Kinoshita, S., & Norris, D. (2009). Transposed-letter priming of prelexical orthographic representations. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 35(1), 1-18.
- Norris, D., & Kinoshita, S. (2008). Perception as evidence accumulation and Bayesian inference: Insights from masked priming. *Journal of Experimental Psychology: General*, 137, 433-455.
- Norris, D., & Kinoshita, S. (2012). Reading through a noisy channel: Why there's nothing special about the perception of orthography. *Psychological Review*, 119(3), 517-545. doi:10.1037/a0028450