

# Use/Mention ambiguities in comprehension: Evidence from agreement attraction

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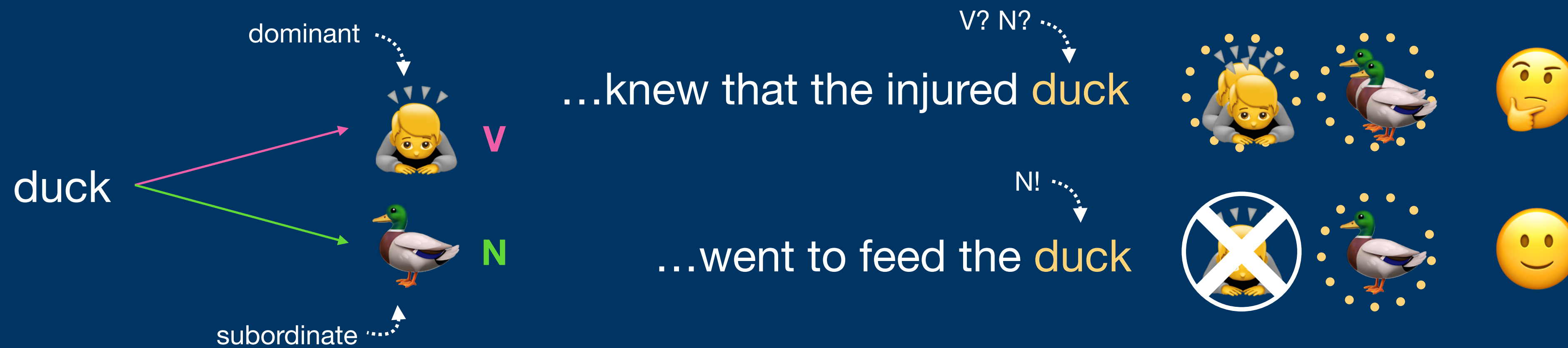
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# Context effects on lexical ambiguity



**Dominant meanings aren't considered if their category wouldn't fit the parse.**



**SELECTIVE  
ACCESS (of a  
subordinate  
meaning)**

**How general is  
this effect?**

# Ambiguity across number: Use and mention

The canonical meaning and features of a word...

...can be obviated if it is “mentioned” rather than “used”.

USE

MENTION

dogs [N, PL]

the dogs {<sup>\*is</sup>  
<sub>are</sub>} lying on the sidewalk



“dogs” [N, SG]

the word “dogs” {<sup>is</sup>  
<sub>\*are</sub>} written on the sidewalk



After the word “ a mention can be confidently predicted.

↳ can the parser use this to selectively access a mention reading?

FLEXIBLE SELECTIVE ACCESS

↳ or is selective access only possible from category expectations?

MINIMAL SELECTIVE ACCESS

# The test: Agreement attraction

In lexical access for a plural noun...

costumes spigots voices  
quiches neighbors  
solutions songs theorems  
scientists

If a **use** reading is considered:

+PL N may\* be present in memory.

↳ plural mentions may trigger AA

If a **mention** reading is selectively accessed:

+PL N won't be present in memory.

↳ plural mentions won't trigger AA

↳ Agreement attraction in SPR as an indirect probe for whether typical features were accessed.

On AA in SPR: Wagers, Lau & Phillips (2009) among many others

\*On why we might expect lingering misinterpretation: Christianson, Hollingworth, Halliwell & Ferreira (2001); Slattery, Sturt, Christianson, Yoshida & Ferreira (2013)

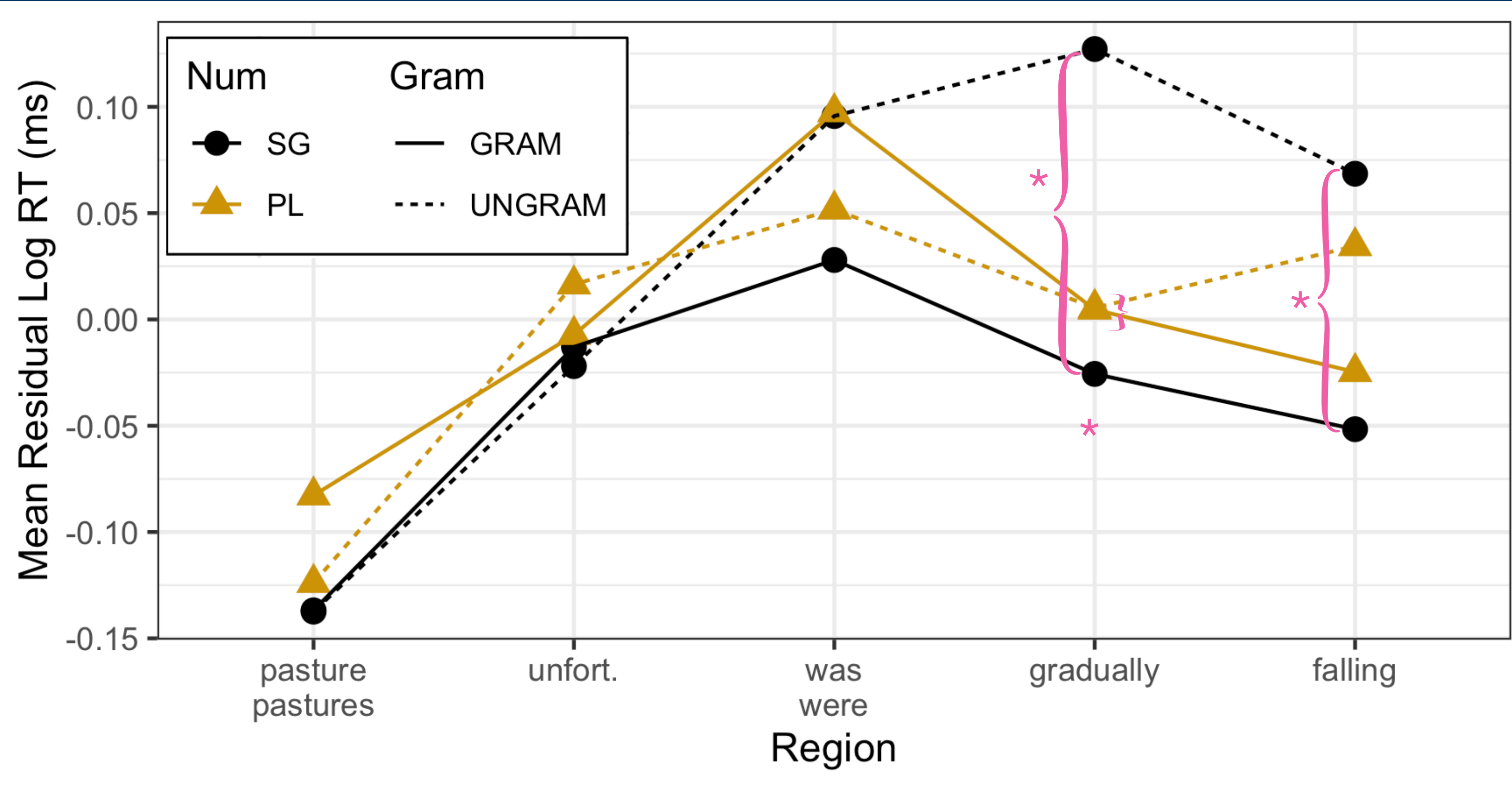


# E1: Replicating AA from PP modifiers

SG, GRAM	—●—
SG, UNGRAM	---●---
PL, GRAM	—▲—
PL, UNGRAM	---▲---

The gate to the pasture unfortunately was gradually falling down due to disrepair.  
The gate to the pasture unfortunately were gradually falling down due to disrepair.  
The gate to the pastures unfortunately was gradually falling down due to disrepair.  
The gate to the pastures unfortunately were gradually falling down due to disrepair.

- $\pm$ GRAM: UNGRAM penalty after V
- $\pm$ GRAM X NUM: UNGRAM penalty reduced with PL attractors



Log RTs residualized over position and length, analyzed via LMER fit in STAN, fixed effects treatment-coded. Effects reported if 95% credible interval excludes 0.

# E2: AA from mentioned plurals

**SG, GRAM** —●—

**SG, UNGRAM** ...●...

**PL, GRAM** —▲—

**PL, UNGRAM** ...▲...

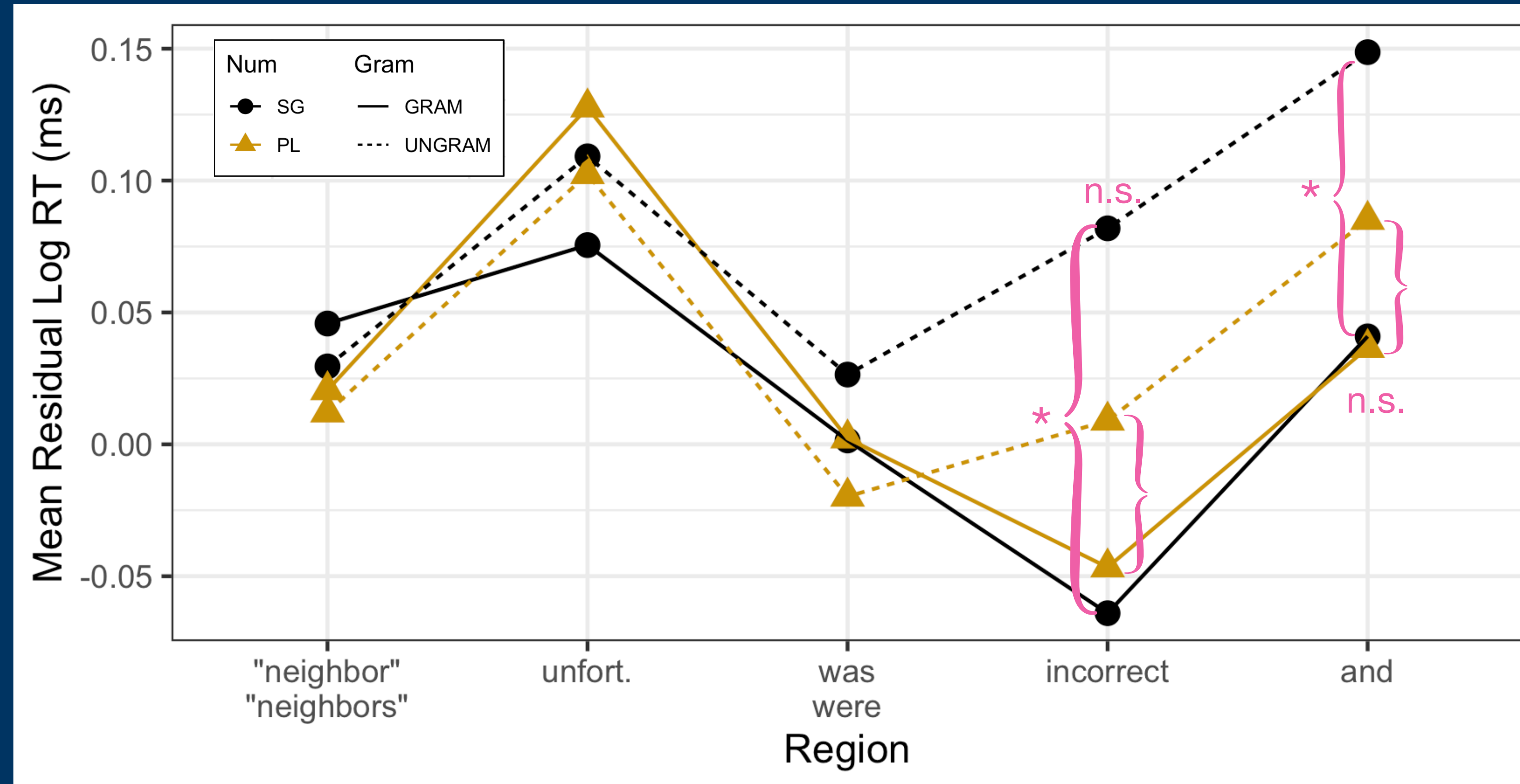
The word “neighbor” unfortunately was incorrect and it bothered the teacher.

The word “neighbor” unfortunately were incorrect and it bothered the teacher.

The word “neighbors” unfortunately was incorrect and it bothered the teacher.

The word “neighbors” unfortunately were incorrect and it bothered the teacher.

- $\pm$ GRAM: **UNGRAM** penalty after V
- $\pm$ GRAM X NUM: **UNGRAM** penalty numerically reduced for **PL**
- Power simulations based on E1 effect suggest power  $< 0.80$  if interaction is smaller than E1



Log RTs residualized over position and length, analyzed via LMER fit in STAN, fixed effects treatment-coded. Effects reported if 95% credible interval excludes 0.

# Upshots



Mentioned plural nouns may trigger agreement attraction.

- ↳ **PL features linger: Novel evidence of AA from a rejected parse**
- ↳ **PL was considered: Consistent with Minimal Selective Access**

There are at least some limits on how much top-down effects can intervene.

- ↳ **Context is fast, but so is morphological decomposition.**

# Appendix

Additional details about the study

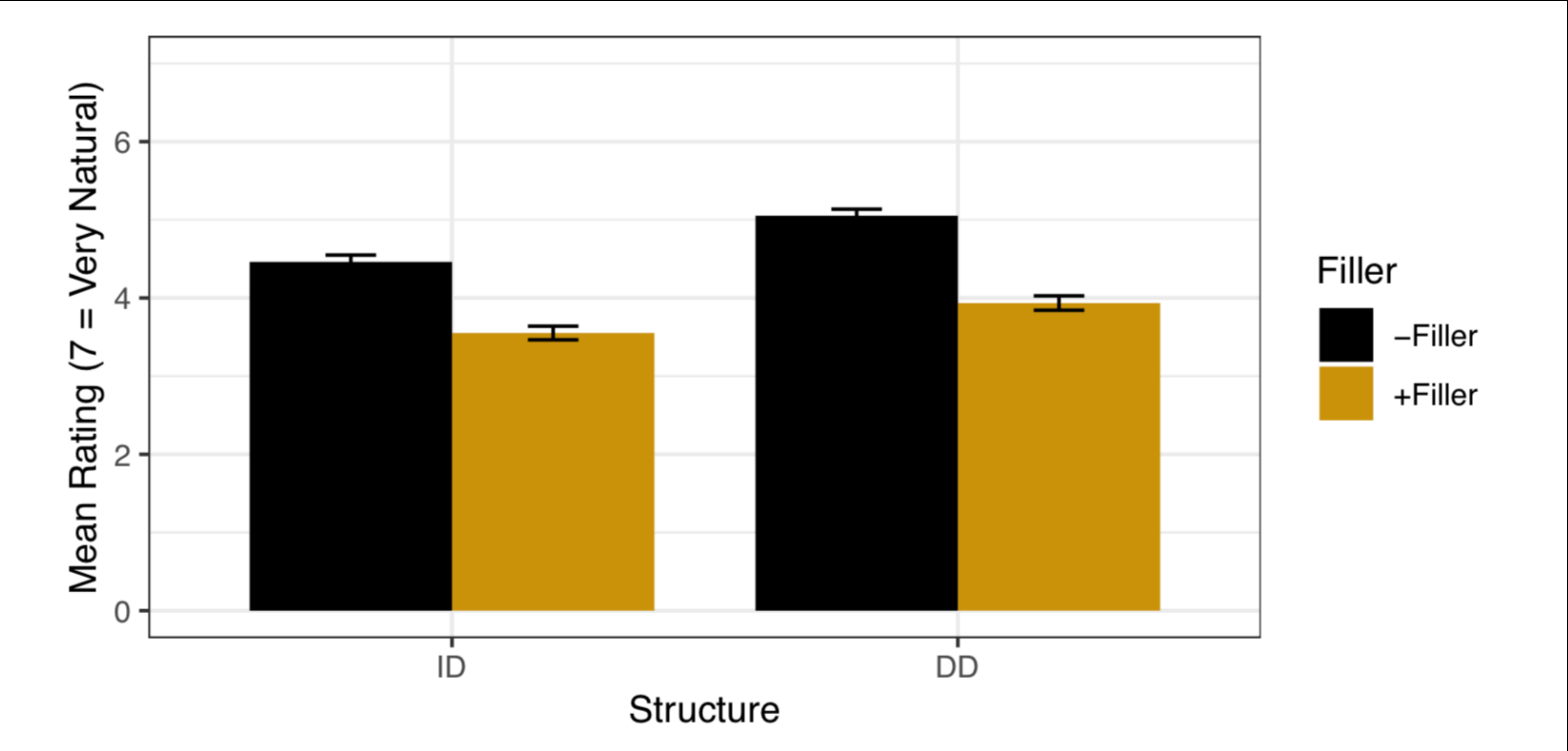


# Don't we still have to understand the word?

- When we read these sentences, we can't just skip over the mentioned noun: it's an important part of the meaning of the complex noun phrase!
- As a result, readers might parse the mention purposefully. But we might still have expected them to hold it in a separate part of memory, since its linguistic features are not relevant for the parse.
- From this point of view, our result in this study fits into a broader research program on how we store quotations, given that they (usually) do not contribute grammatically to their containing sentences.
  - We know we recognize quotation quickly, and comprehend it vividly (Yao & Scheepers 2011, Yao et al. 2011, Stites et al. 2013).
  - But we don't seem to store it separately: e.g. it still interferes with filler gap dependencies just as much as regular embedded content (Duff, Anand, Brasoveanu & Rysling, Poster @ CUNY 2020).

Filler	ID	DD
-Filler	The butcher asked if the lady who said that she would like a nice big ham was cooking for a party.	The butcher asked if the lady who said, "I would like a nice big ham," was cooking for a party.
+Filler	The butcher asked who the lady who said that she would like a nice big ham was cooking for ____.	The butcher asked who the lady who said, "I would like a nice big ham," was cooking for ____.

From that work...



# The plurality Stroop effect

- Berent et al. (2005): participants reporting how many words they see on the screen are faster for matches **dog/dogs dogs** than mismatches **dogs/dog dog**
- Patson & Warren (2010): The same effects can be elicited in sentences by prompting participants to make a number judgment during phrasal SPR
- Our planned follow-up:
  - a. The teacher had a problem with the word // **“neighbor”**.
  - b. The teacher had a problem with the word // **“neighbors”**.
  - c. The teacher had a problem with the // **word “neighbor”**.
  - d. The teacher had a problem with the // **word “neighbors”**.

# E1: More Sample Items

- The slogan on the **poster** crucially **was** designed to get attention.
- The picture on the **flier** actually **was** of a village church in the south of France.
- The mistake in the **program** ultimately **was** disastrous for the small software company.
- The label on the **container** probably **was** a warning about the hazardous chemicals inside.
- The problem in the **store** eventually **was** solved by firing the assistant manager.
- The name on the **billboard** unsurprisingly **was** of a prominent local politician.
- The crime in the **suburb** likely **was** a reflection of the violence in today's society.
- The defect in the **appliance** disastrously **was** unknown to consumers and government regulators.

## E2: More Sample Items

- The word "**neighbor**" unfortunately **was** incorrect and it bothered the teacher.
- The word "**solution**" thankfully **was** simple and it reassured the student.
- The word "**response**" oddly **was** wrong and it perplexed the telemarketer.
- The word "**song**" arguably **was** vulgar and it troubled the PTA members.
- The word "**theorem**" ultimately **was** meaningless and it irked the scientist.
- The word "**voice**" finally **was** identifiable and it chilled the security guard.
- The word "**saint**" obviously **was** holy and it impressed people.
- The word "**circumstance**" clearly **was** appropriate and it pleased the speechwriter.



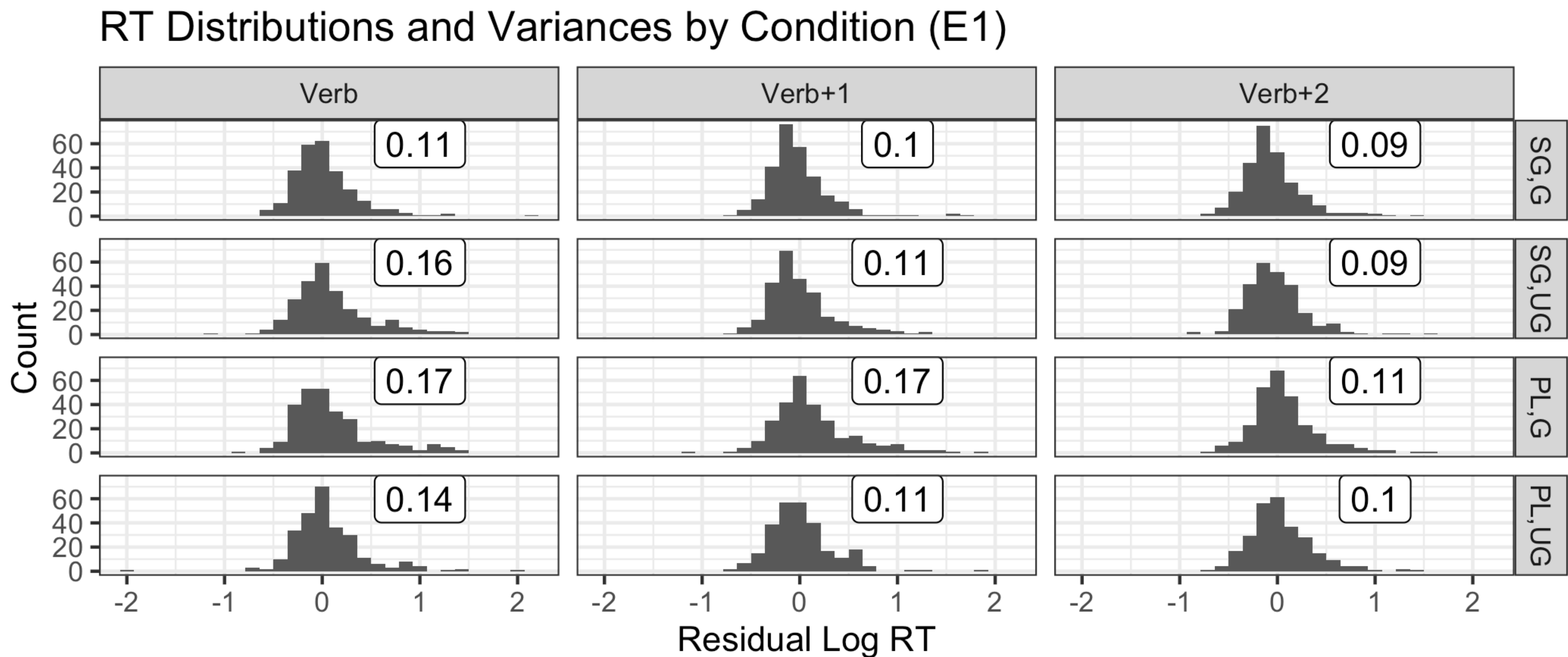
# E1: Full Model

Region:	Verb				Verb + 1				Verb + 2			
	$\beta$	SE	95% HDI		$\beta$	SE	95% HDI		$\beta$	SE	95% HDI	
Intercept	0.03	0.04	-0.04	0.10	-0.03	0.03	-0.08	0.03	<b>-0.05</b>	<b>0.03</b>	<b>-0.10</b>	<b>-0.00</b>
Num (PL)	0.06	0.03	-0.01	0.13	0.03	0.03	-0.03	0.09	0.02	0.03	-0.04	0.08
Gram (UN)	<b>0.06</b>	<b>0.03</b>	-0.00	0.13	<b>0.15</b>	<b>0.03</b>	<b>0.09</b>	<b>0.21</b>	<b>0.12</b>	<b>0.03</b>	<b>0.06</b>	<b>0.18</b>
Num:Gram	<b>-0.10</b>	<b>0.05</b>	<b>-0.19</b>	<b>0.00</b>	<b>-0.15</b>	<b>0.04</b>	<b>-0.23</b>	<b>-0.06</b>	-0.05	0.04	-0.14	0.04

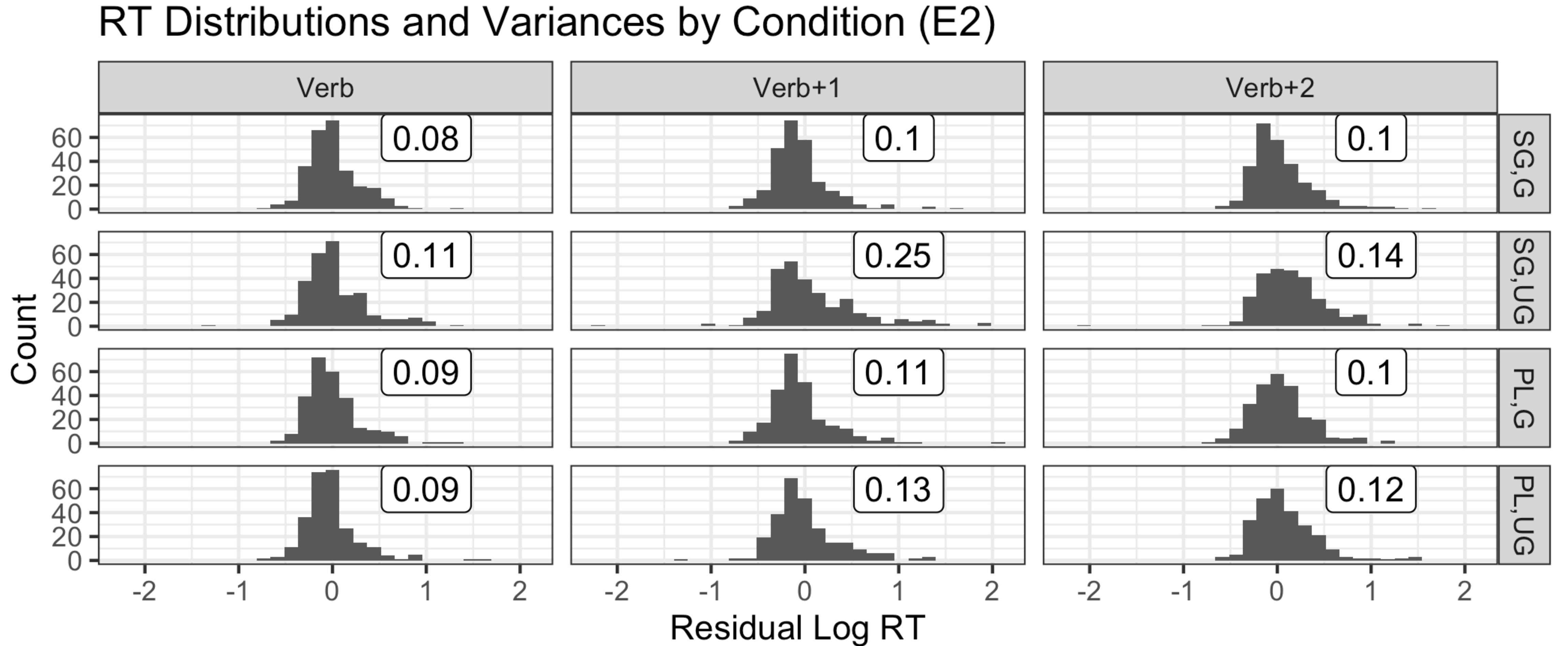
# E2: Full Model

Region:	Verb				Verb + 1				Verb + 2			
	$\beta$	SE	95% HDI		$\beta$	SE	95% HDI		$\beta$	SE	95% HDI	
Intercept	0.00	0.02	-0.04	0.04	-0.06	0.03	-0.11	-0.01	0.04	0.03	-0.02	0.10
Num (PL)	-0.00	0.03	-0.05	0.05	0.02	0.03	-0.05	0.09	-0.00	0.03	-0.07	0.06
Gram (UN)	0.03	0.03	-0.03	0.08	0.14	0.04	0.07	0.22	0.11	0.03	0.05	0.17
Num:Gram	-0.04	0.04	-0.12	0.03	-0.09	0.05	-0.19	0.01	-0.06	0.04	-0.14	0.02

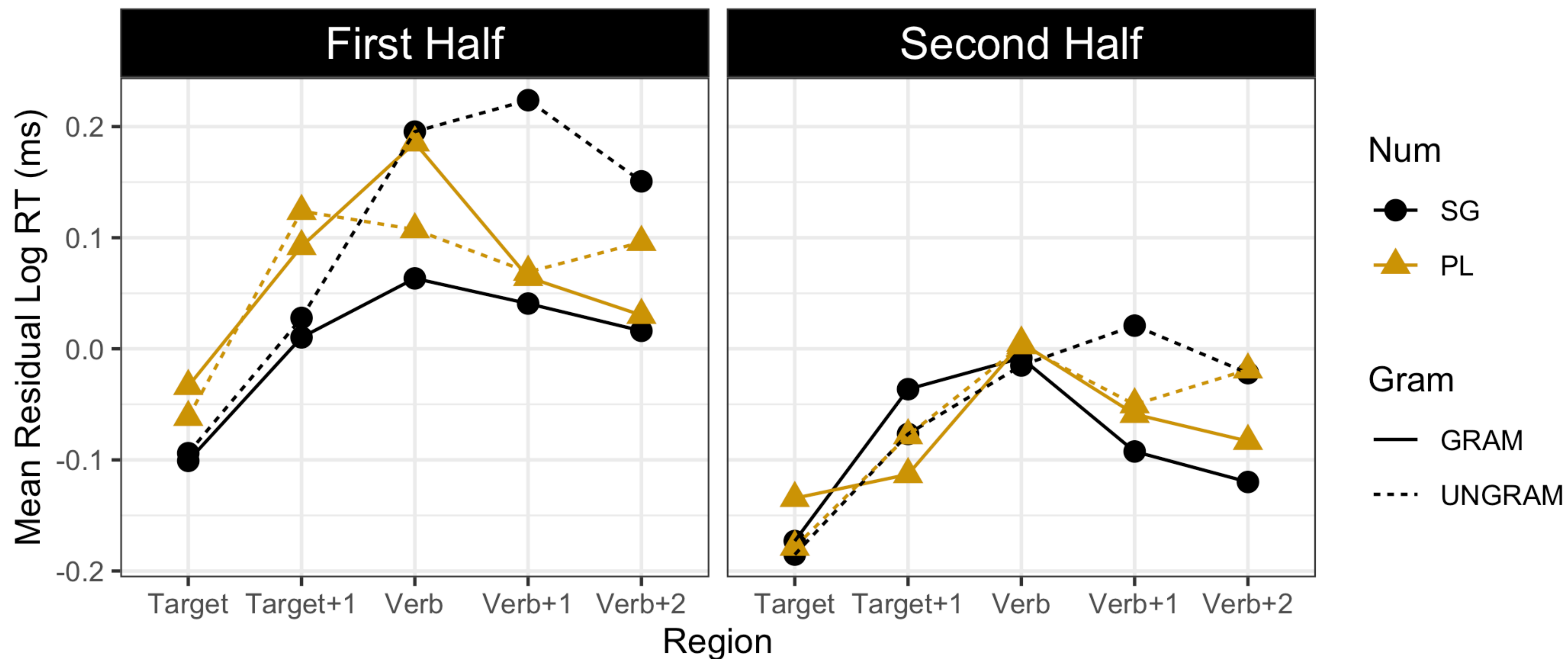
# E1: Conditional distributions of RTs



# E2: Conditional distributions of RTs



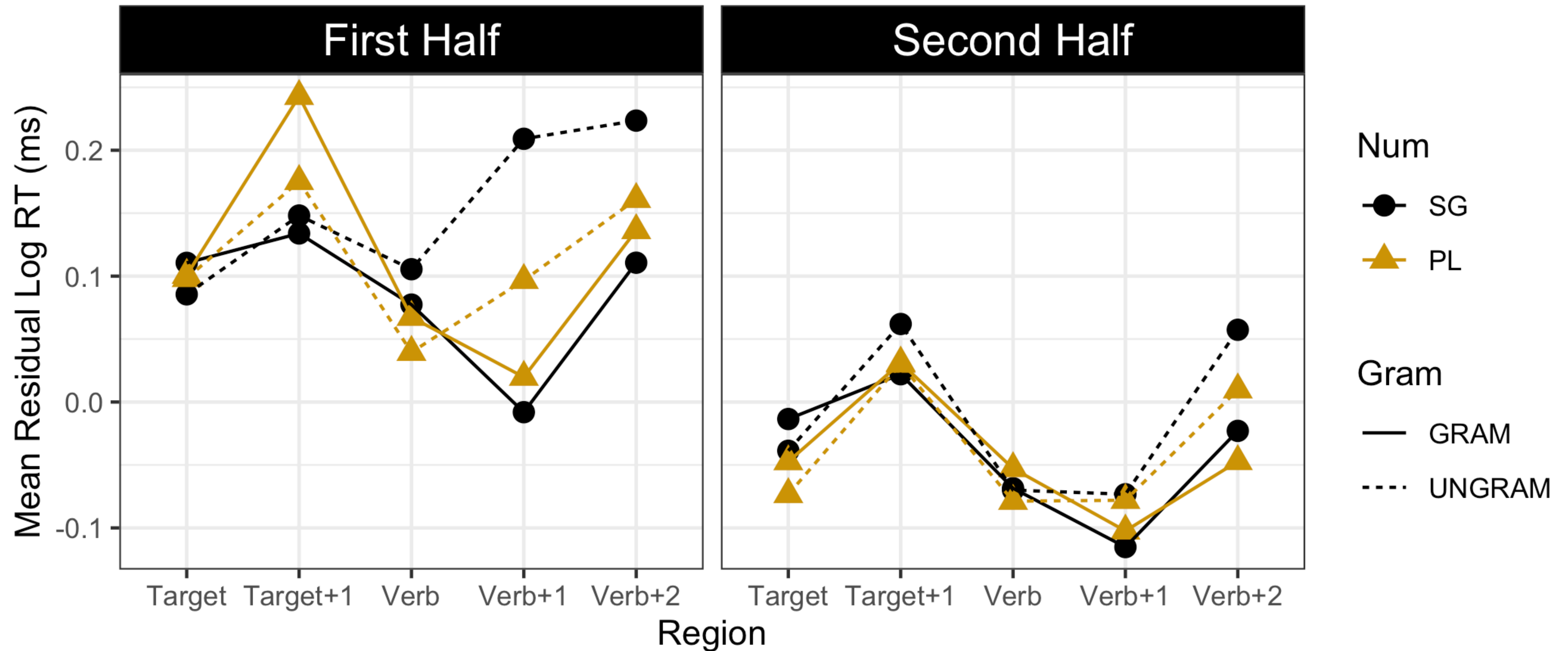
# E1: Trial Order Effects





# E2: Trial Order Effects

- Main effects of TrialHalf throughout
- Gram effect at V+1 is reduced in 2nd Half
- Gram x Num interaction significant in 1st Half



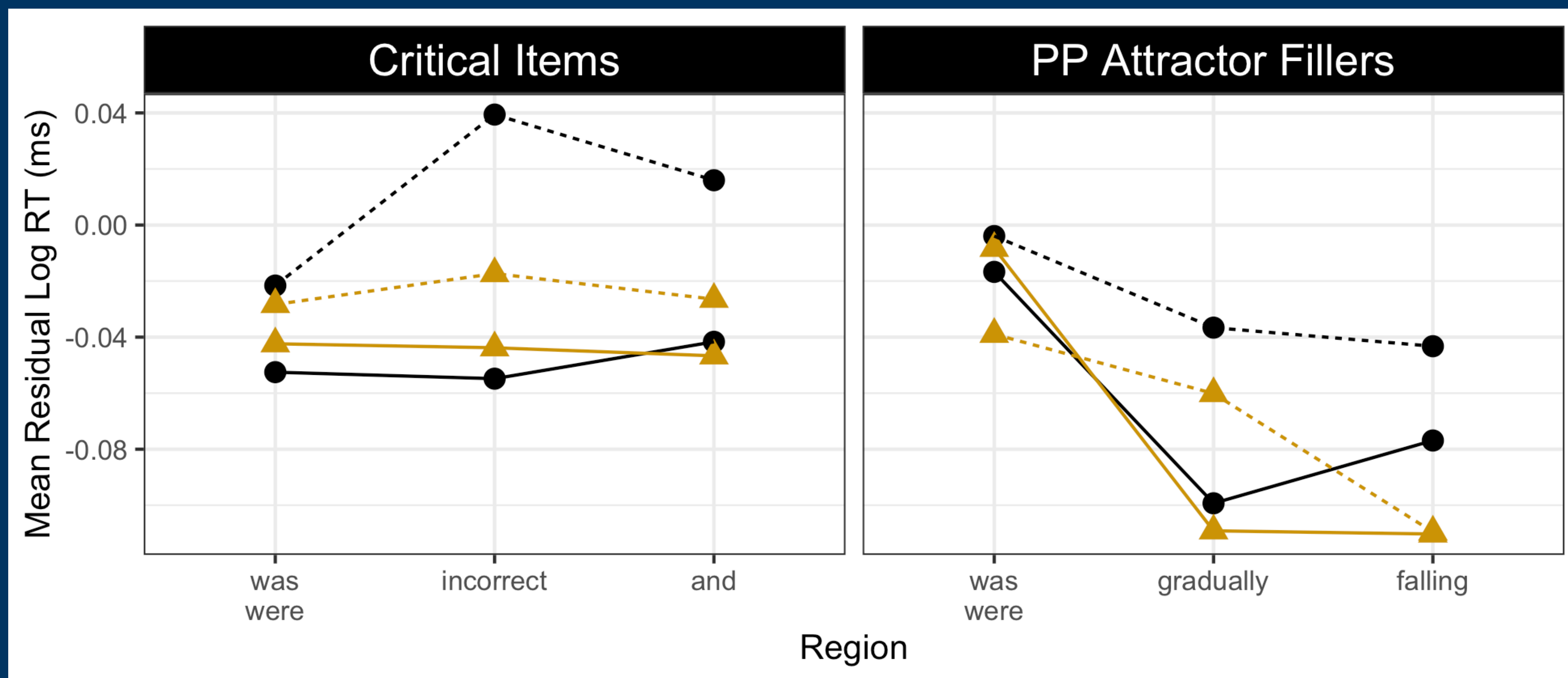
# E2: Post-Hoc Model with TrialHalf

Region:	Verb				Verb + 1				Verb + 2			
	$\beta$	SE	95% HDI		$\beta$	SE	95% HDI		$\beta$	SE	95% HDI	
Intercept	<b>0.08</b>	<b>0.03</b>	<b>0.02</b>	<b>0.13</b>	-0.01	0.03	-0.07	0.06	<b>0.11</b>	<b>0.04</b>	<b>0.04</b>	<b>0.18</b>
Num (PL)	-0.01	0.04	-0.09	0.06	0.03	0.05	-0.07	0.12	0.02	0.04	-0.06	0.10
Gram (UN)	0.03	0.04	-0.04	0.10	<b>0.22</b>	<b>0.05</b>	<b>0.12</b>	<b>0.32</b>	<b>0.12</b>	<b>0.04</b>	<b>0.04</b>	<b>0.19</b>
TrialHalf (2nd)	<b>-0.15</b>	<b>0.03</b>	<b>-0.21</b>	<b>-0.08</b>	<b>-0.11</b>	<b>0.04</b>	<b>-0.19</b>	<b>-0.02</b>	<b>-0.14</b>	<b>0.04</b>	<b>-0.21</b>	<b>-0.06</b>
Num:Gram	-0.04	0.05	-0.15	0.05	<b>-0.15</b>	<b>0.07</b>	<b>-0.28</b>	<b>-0.01</b>	-0.08	0.05	-0.18	0.03
Num:Half	0.03	0.05	-0.12	0.07	-0.01	0.06	-0.14	0.11	-0.04	0.05	-0.14	0.07
Gram:Half	-0.02	0.05	-0.12	0.07	<b>-0.19</b>	<b>0.06</b>	<b>-0.31</b>	<b>-0.06</b>	-0.03	0.05	-0.14	0.07
Num:Gram:Half	0.01	0.07	-0.13	0.15	-0.14	0.09	-0.04	0.31	0.04	0.08	-0.11	0.19

# E0: Two-sentence stimuli

The teacher looked at the exam.  
The word "neighbor" unfortunately  
was incorrect and it bothered her.

The farmer had stopped  
maintaining his equipment.  
The gate to the pasture  
unfortunately was gradually  
falling down due to disrepair.



The patterns look the same, but at  $n = 84$ , even the PP Attractor grammaticality effect remains insignificant! Long = noisy.