

# Different structural boundaries have different effects on dependency resolution

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## Memory Domains & Linguistic Structure

Common idea: Some units of linguistic structure correspond to *memory domains*, units that influence storage and access during online processing [5, 8, 13].

How (if at all) is retrieval of linguistic content affected by segmentation of that content into memory domains?

## Two views of segmentation effects

- Prosodic and pragmatic segmentation sometimes reduces the accessibility of previous content, because crossing domain boundaries induces memory decay [5, 13].
- Prosodic segmentation enhances memory for linguistic content [8], because domains lessen the burden on working memory and reduce potential of interference [10].

## Hypotheses

**Visibility:** Boundaries create structural divisions in the memory representation of a sentence. This hinders access to content outside the current unit.

**Partition:** Boundaries create structural divisions in the memory representation of a sentence. This makes all the sentence's content more easily accessible.

## Appositives in memory

**A notable test case:** Appositive relative clauses (ARCs).

- Sub-sentential units that are semantically, pragmatically, and prosodically demarcated from their host clauses [12].
- Argued to be **less impactful on later processing than restrictive relative clauses** (RRCs) [4, 5, 9, 11], so-called “appositive discounting” [6].

**ARC:** The cat, who loves to eat tuna in the morning, came running into the kitchen.

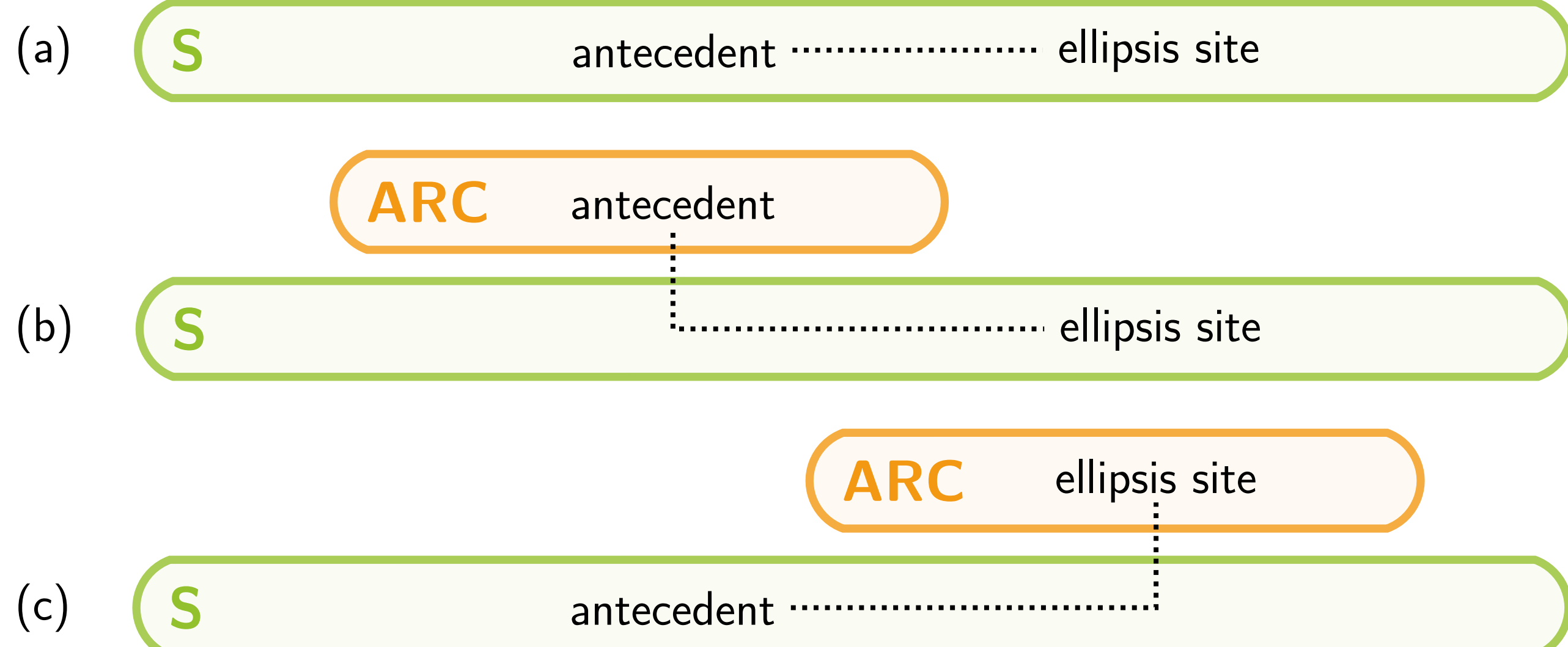
**RRC:** The cat that loves to eat tuna in the morning came running into the kitchen.

**Two explanations:** Appositives are stored in separate domains that are...

- less accessible in memory due to loss/compression of structure [5, 13], or
- easier to target directly and/or bypass during memory retrieval [10].

Probing NP ellipsis resolution, we [1] have found evidence more in line with ②:

- The syntactic structure of appositive-internal content is remembered better.
- NPE resolution across appositive boundaries is not hindered: (a)  $=_{RT}$  (b)
- Boundaries can even facilitate NPE resolution, in line with **Partition:** (c)  $<_{RT}$  (a)



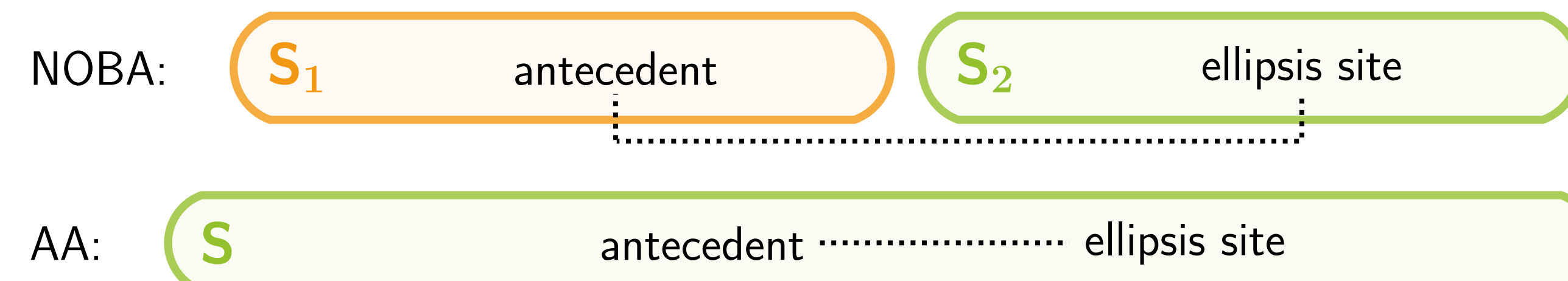
## Other units in memory

**Q:** To what extent is facilitated retrieval across ARC boundaries driven by their independent prosodic status, as opposed to their discourse status?

**The current experiment** aims to investigate retrieval across prosodic boundaries without varying pragmatic structure or at-issueness.

We compare two focus-sensitive coordination constructions:

- not only X, but also Y** (NOBA) which requires a prosodic boundary
- X and also Y** (AA) which does not require a prosodic boundary



## Design and methods

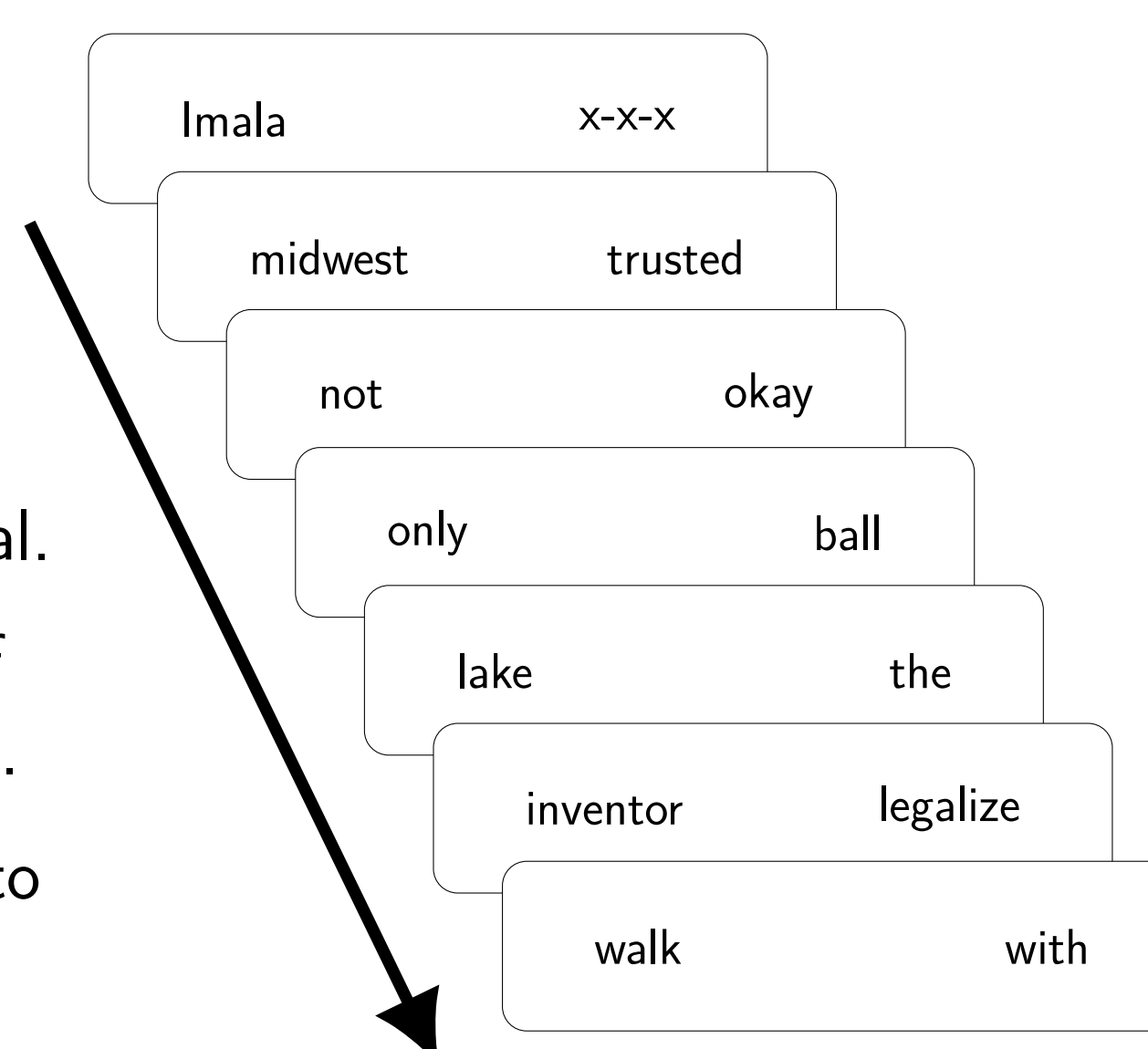
2×2 Maze task crossing STRUCTURE (NOBA vs. AA) with ±NP ELLIPSIS across 48 items (+ 48 fillers).

In **+NPE**, an ellipsis site within the second coordinate targets an antecedent in the first coordinate. In **-NPE** that antecedent is simply repeated.

<b>NOBA</b>	Imala trusted not only the inventor with fifty gizmos, but also the one with three (-NPE: gizmos) <b>after the collaboration</b> last winter.
<b>AA</b>	Imala trusted the inventor with fifty gizmos and also the one with three (-NPE: gizmos) <b>after the collaboration</b> last winter.

## The Maze Task [2, 7]

- 2AFC decisions between grammatical continuations vs. high-surprisal foils.
- Choosing a foil terminates the trial.
- Success requires representation of structural and conceptual context.
- Response latency (RT) assumed to index lexical access, integration, and decision making.



## Predictions

RTs at the critical region will be slower in +NPE, indexing retrieval of the ellipsis antecedent in memory.

**Visibility:** RTs will be especially delayed in NOBA, indexing difficult retrieval when the antecedent is outside the current unit.

**Partition:** RTs will be less delayed in NOBA, indexing easier retrieval because all content is more accessible.

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## Results ( $n = 44$ )

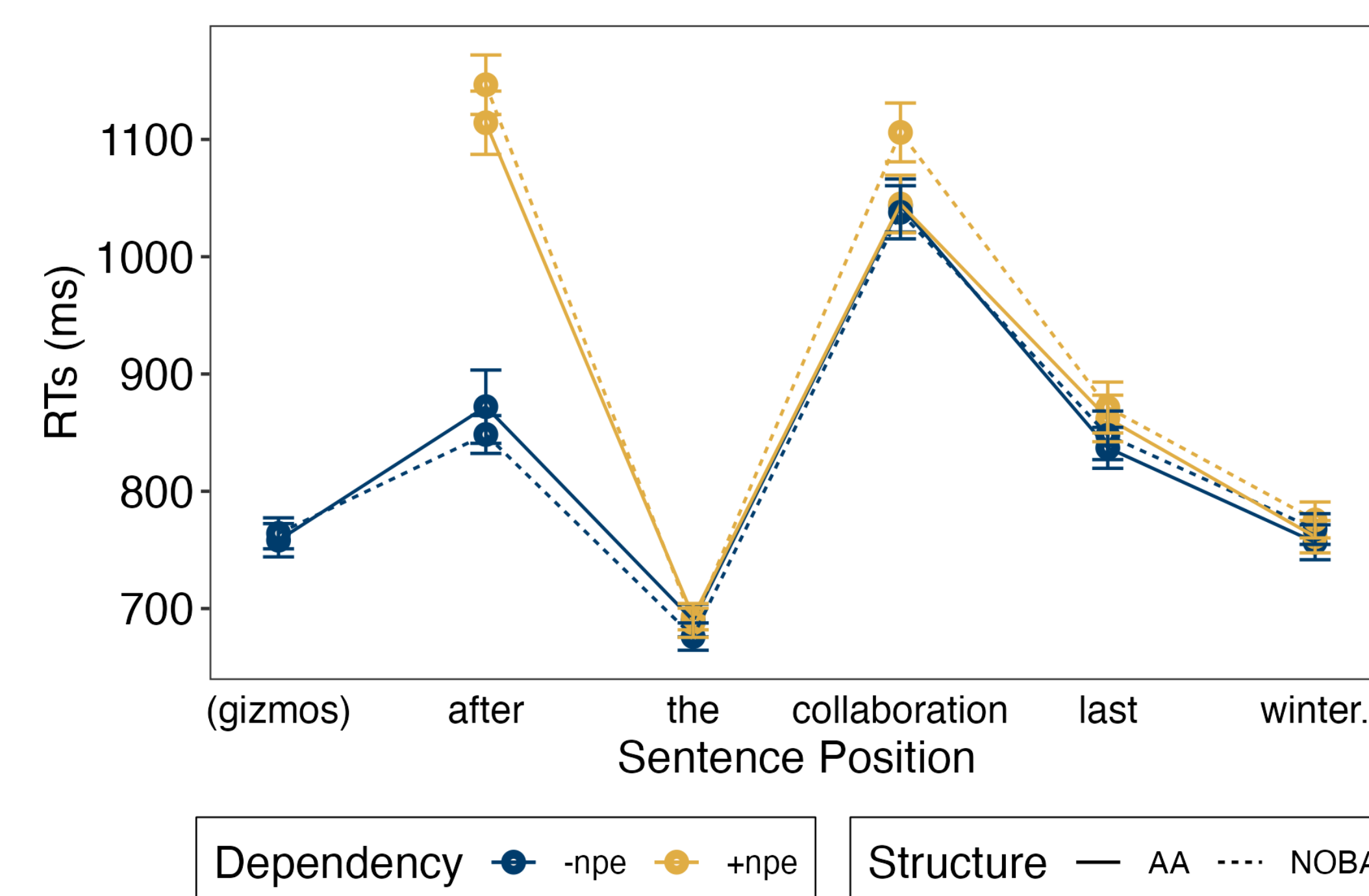


Figure 1: Maze response latencies by region.

Critical	$\hat{\beta}$	95% CrI	Spill 2	$\hat{\beta}$	95% CrI
Struc	0.02	(-0.02, 0.06)	Struc	0.02	(-0.02, 0.05)
<b>NPE</b>	0.25	(0.20, 0.30)	NPE	0.02	(-0.02, 0.05)
Struc x NPE	0.03	(-0.05, 0.11)	Struc x NPE	0.06	(-0.01, 0.12)

Table 1: brms linear m/e model over log RTs.

× **Partition:** No difference in NPE resolution across NOBA vs. AA.

? **Visibility:** Late penalty for NPE across a NOBA boundary only.

## Discussion

We find no influence of intervening prosodic boundaries on dependency resolution [3].

We do find an emerging late penalty for +NPE across NOBA, perhaps due to focus structure revision cued by the NPE.

- More difficult for NOBA because it cued early commitment to focus structure?
- Or: Revising focus structure across a prosodic boundary is more difficult [13].

Observed boundary effects with ARCs (discounting, facilitated retrieval) continue to appear ideosyncratic [6], not a property of boundaries alone.

## Conclusions

We find evidence of Partition benefits only for some constructions:

- NOBA does not impose a partition in memory representations.

We find suggestive evidence in favor of Visibility-like difficulty elsewhere:

- NOBA (through semantic processing at segment boundaries) may make previous content *less* available for semantic revision.

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