

Topichood and temporal interpretation of DPs guide clause-internal, causal coherence

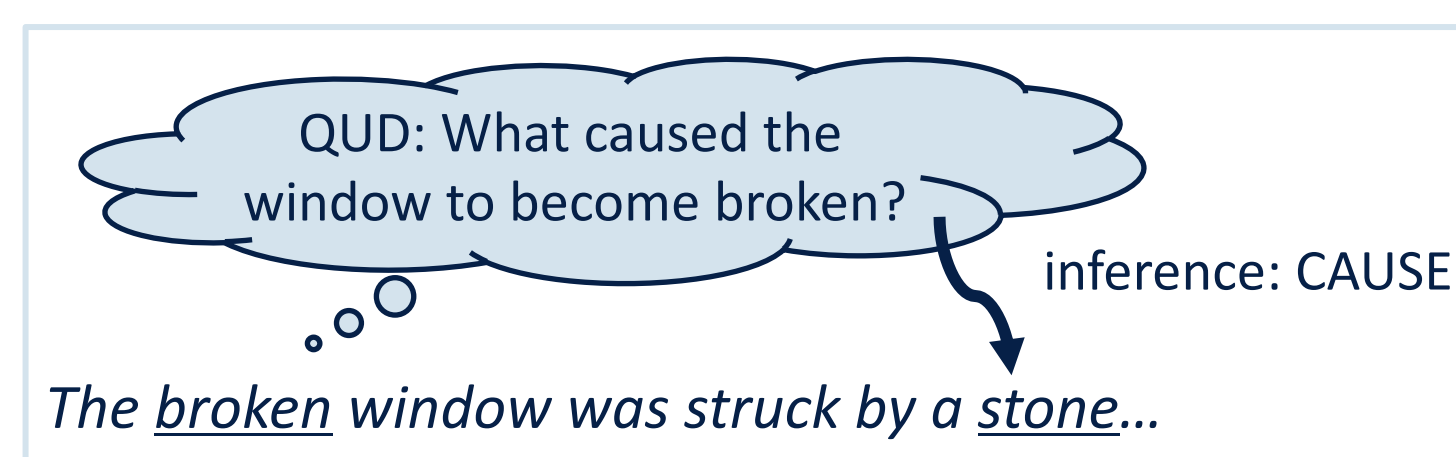


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Clause-internal Coherence

While most studies of coherence focus on the the relationships that are established between sentences, **coherence relations may be more widespread**:

- Smaller material, such as RCs and even **non-clausal elements**, can also enter coherence relations [1].
- **Clause-internal causal coherence** appears to be triggered by resultative adjectives.
 - E.g., *The broken window got struck with a stone* → ‘broken because of the stone’ (Fig 1-a) [2]
 - Resultative adjectives denote the result states of causal events [3], may potentially raise a sub-QUD that invites causal inferences within the clause.
 - However, it is unclear at present **what elements permit or constrain such inferences**.



Grammatical Cues Guide Coherence

Inter-sentential coherence inferences can be guided by grammatical cues [4], and the same appears to hold true for clause-internal coherence as well:

- E.g., *A broken window got struck with a stone/A stone stroke the broken window.* → ‘broken before the event’ (Fig 1-b)
- A potential explanation: **Topichood**, which can be modulated by **Subjecthood** and **Definiteness**, guides clause-internal causal coherence.

❖ Main hypothesis

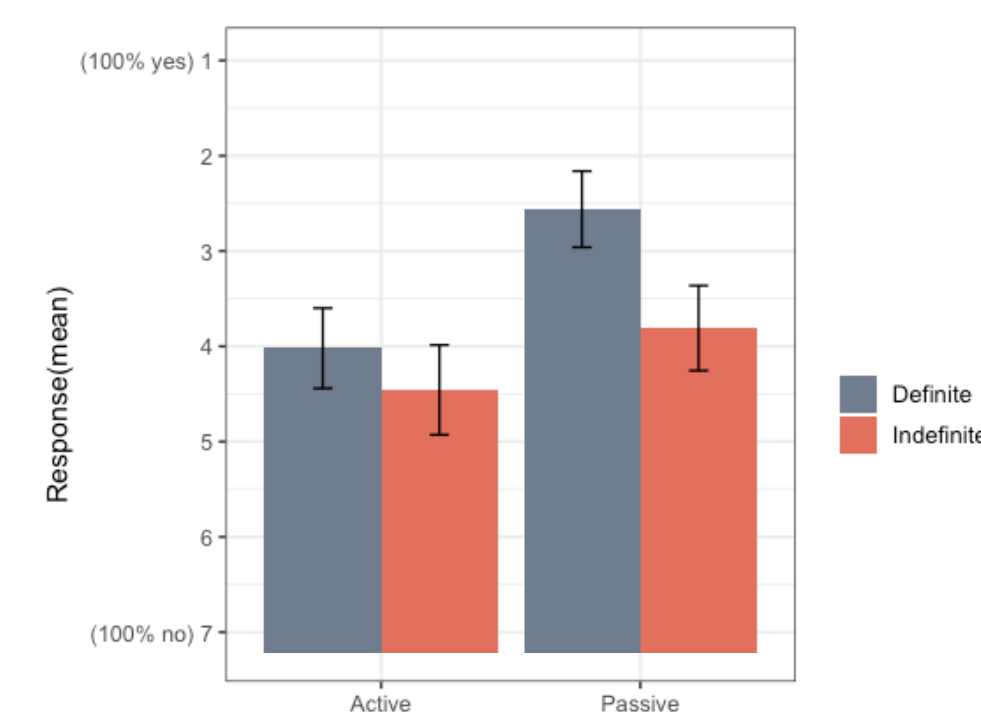
While resultative adjectives permit causal inferences within clauses, the causal inference is governed in part by the grammatical cues of **Structure** and **Definiteness**.

Design

- Comprehension task using 7-point Likert scale.
- Written and host on PCIBex Farm.
- 40 experimental items in a 2 (**STRUCTURE**: passive vs. active) by 2 (**DEFINITENESS**: definite vs. indefinite) design.
- Filler items designed to elicit responses across the whole scale.
- Results were analyzed with CLMM in R.
- Prediction: causal inference was stronger in the passive-definite condition than others, reflected in scores.

Pilot study

- 48 Prolific-recruited native English speakers; 40 fillers.
- Results align with prediction, see below for a summary:



	Est	z	Pr (> t)
Structure	-1.03	-5.43	<.001***
Definiteness	-0.80	-6.14	<.001***
Interaction	-0.83	-3.23	.0013**

Contrast: Definite - Indefinite			
	Est	z	Pr (> t)
Active	-0.44	-2.85	.0044**
Passive	-1.25	-5.86	<.001***

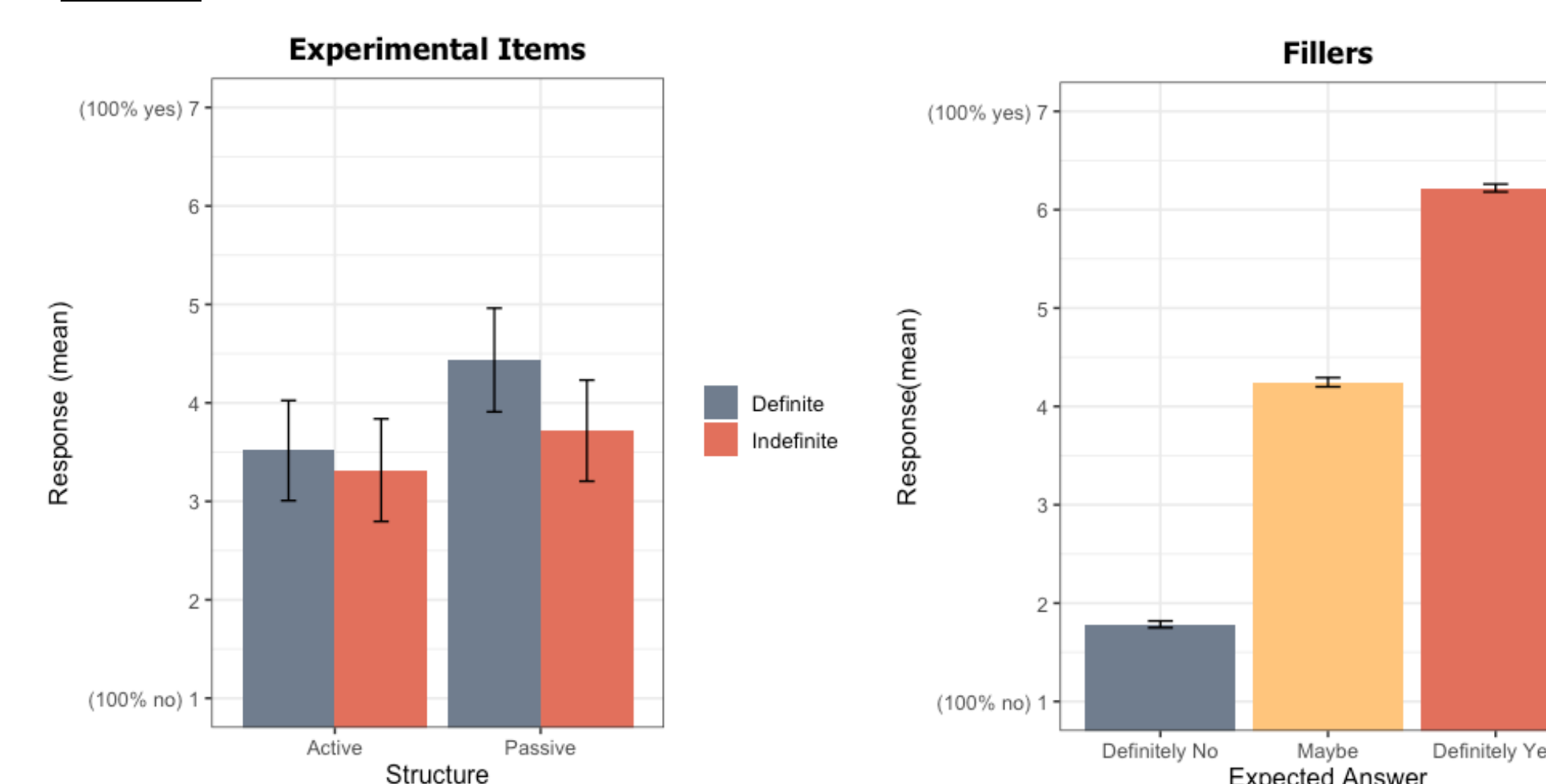
- However, a further question was found: We mixed **deverbal** resultative adjectives and **non-deverbals** (e.g., *clean*) in the pilot study, while some studies indicate deverbals can trigger stronger causal inferences than non-deverbals [2].

Experiments

Main study

- Specifically focused on **deverbal resultative adjectives** to trigger stronger causal inferences.
- 64 Prolific-recruited native English speakers; 80 fillers.

Result



Output of CLMM model and pairwise comparisons

	Est	z	Pr (> t)
Structure	0.58	4.23	<.001***
Definiteness	0.40	3.81	<.001***
Interaction	0.44	2.15	.0315*

Contrast: Definite - Indefinite			
	Est	z	Pr (> t)
Active	0.20	1.64	.1008
Passive	0.72	3.54	<.001***

Discussion

- The results were similar to the pilot study.
- Average ratings of experimental items across all conditions were intermediate compared to that of fillers, while the responses to the fillers demonstrated that participants made use of the full scale:
 - Evidence that, overall comprehenders tend to infer Explanation relations between (deverbal) resultative adjectives and associated instruments within sentences.
- Explanation inference was **strongest** in the **Passive-Definite** condition, as we predicted:
 - Suggests that comprehenders used **Definiteness** and **Structure** as cues when establishing Explanation relations in offline processing.

Sample Stimuli

Structure	Definiteness	Coherence (Expected)	Sentence
Passive	Definite	Yes	The broken window got struck with a stone from the sidewalk next to the building.
Passive	Indefinite	No	A broken window got struck with a stone from the sidewalk next to the building.
Active	Definite	No	Bethany struck the broken window with a stone from the sidewalk next to the building.
Active	Indefinite	No	Bethany struck a broken window with a stone from the sidewalk next to the building.

Question*	Do you think the window became broken because it got struck with the stone?
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*Comprehension questions in the pilot study were slightly different; a sample should be: *Was the window broken because of the stone?*

Fig 1-a: **Passive-Definite condition**

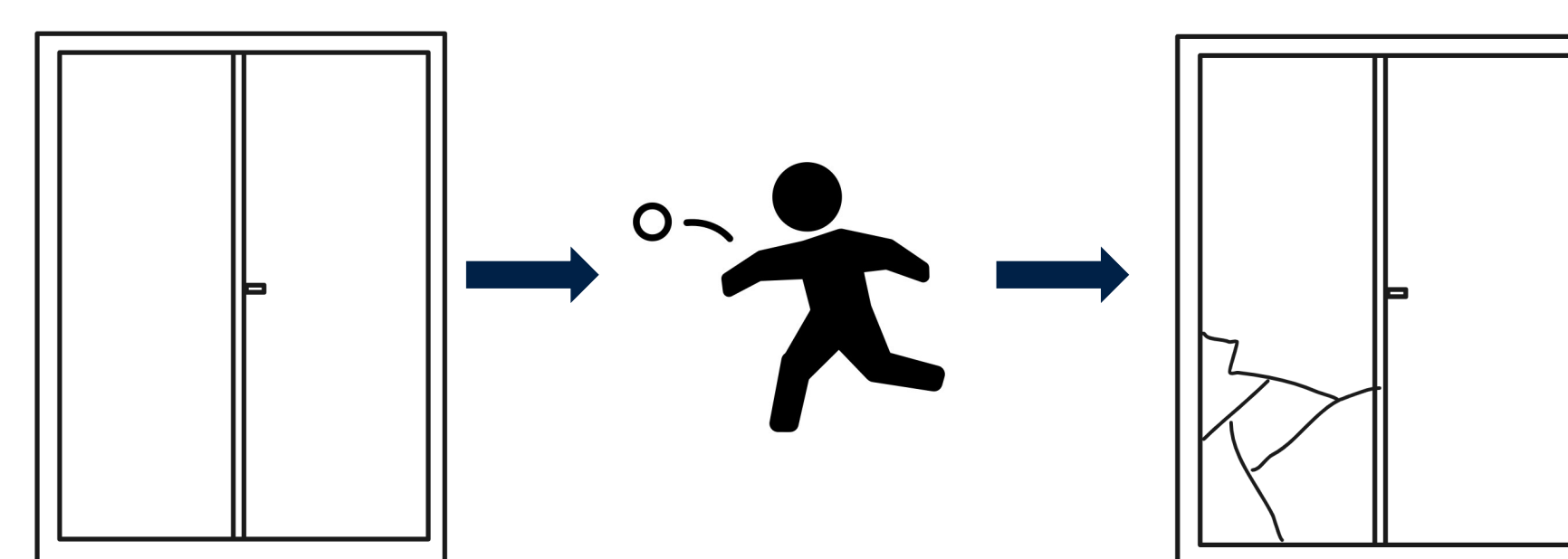
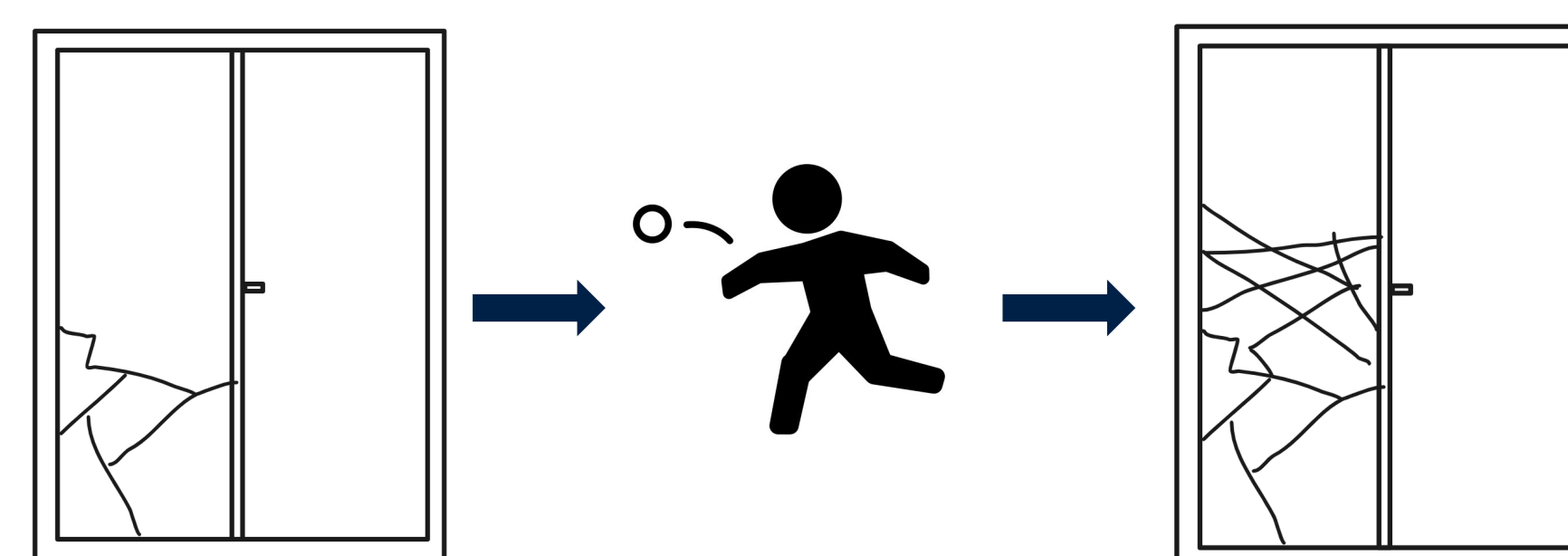


Fig 1-b: **All other conditions**



Analysis

Causal relations depends on **temporal relations**:

- To permit a causal relation between the resultative adjective (e.g., *broken*) and the verb (e.g., *struck*), the DP (e.g., *the/a broken window*) needs to be **temporally independent**.

Sentence topics are proposed to be interpreted outside the scope of an event quantifier so can be temporally independent [5]:

- Sentence topics are closely connected to **subjects** in English [6] and need to be **familiar** to comprehenders [7].
- Definite DPs are **presuppositional** while Indefinite DPs are **non-presuppositional** [8], therefore:
 - Only **definite subjects** (e.g., *the broken window*) are preferentially taken to be **topics** and can have a different temporal interpretation to the predicates (e.g., *struck*).
 - E.g., sentences in the **Passive-Definite** condition may be interpreted as (a) while others may be interpreted as (b):

- (a) $\exists x[\text{window}(x) \& \exists s[\text{broken}(s) \& \text{In}(s,x)] \& \exists e[\text{strike-with-a-stone}(e) \& \text{Theme}(e,x)]]$
 $\rightarrow e_s = e$
- (b) $\exists e[\text{strike-with-a-stone}(e) \& \exists x[\text{Theme}(e,x) \& \text{window}(x) \& \exists s[\text{broken}(s) \& \text{In}(s,x)]]]$
 $\models e_s < e$

General Discussion

We take this logic to be a special case of **Tonhauser's generalization of nominal temporal interpretation** [9][10]:

- Tonhauser: **non-presuppositional DPs** display a stronger tendency than **presuppositional** ones to be temporally interpreted at the verbal predication time.
- The nature of temporal (in)dependence of DPs might be their **familiarity condition** in the current discourse model.
- The current study link her proposal to **topichood**.
 - We also expect other presuppositional DPs to trigger implicit coherence.
 - E.g., *Most of broken windows were struck by a stone.*

Future Research

- Our analysis relies on an indirect relation between temporal interpretation and causal inferences.
 - Future experiments may ask questions to probe temporal relations directly (e.g., *Was the window broken before it was hit by the stone?*)
- Was the relevant **QUDs** raised by adjectives directly or by the comprehension questions? [11]

References

[1] Hoek, J., Rohde, H., Evers-Vermeul, J. & Sanders, T. J. (2021). Expectations from relative clauses: Real-time coherence updates in discourse processing. *Cognition*, 210(1), 104581. [2] Sasaki, K., & Altshuler, D. (2023). Clause-internal coherence: A look at deverbal adjectives. In *Proceedings of Sinn und Bedeutung* (Vol. 27). [3] Nedjalkov, V. P. (1988). *Typology of resultative constructions*. John Benjamins Publishing. [4] Grüter, T., Takeda, A., Rohde, H. & Schafer, A. J. (2018). Intersentential coreference expectations reflect mental models of events. *Cognition*, 177, 172–176. [5] Herburger, E. (2000). What counts: Focus and quantification. MIT Press. [6] Davison, A. (1984). Syntactic markedness and the definition of sentence topic. *Language*, 60(4), 797-846. [7] Gundel, J. K., & Fretheim, T. (2004). Topic and focus. *The handbook of pragmatics*, 175(196), 12. [8] Musan, R. (1999). Temporal interpretation and information-status of noun phrases. *Linguistics and philosophy*, 621-661. [9] A dynamic semantic account of the temporal interpretation of noun phrases. *Semantics and linguistic theory* (Vol. 12, pp. 286-305). [10] Tonhauser, J. (2020). Temporal properties of noun phrases. *The Wiley Blackwell companion to semantics*, 1-25. [11] Yao, R., Sasaki, K., Altshuler, D. and Husband, E.M. (2023). Asymmetric processing effects of intra-sentential explanation coherence. 29th AMLaP poster.