

# Interference Effects in the Memory Retrieval of Presuppositional Dependency

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## Presupposition & Memory Retrieval Process

Anaphoric presupposition triggers such as *too* are thought to establish a dependency relation between the trigger and its presupposed content.

Like other dependencies, establishing presuppositional dependencies is likely to rely on memory retrieval. Three hypotheses on the market:

- If the presupposed content is maintained in focal attention → no distance effects on availability.
- If there is a retrieval process → availability should be reduced as distance increases;
  - If via direct access → retrieval speed should not be affected as distance increases.
  - If via serial search → retrieval speed should be slowed as distance increases.

The two retrieval mechanisms make different predictions about the retrieval behaviors:

- A serial search process is sensitive to the distance of licensed antecedents, but avoids interference from structurally inaccessible antecedents;
- A direct access process is insensitive to the distance of licensed antecedents, but suffer interference from structurally inaccessible antecedents.

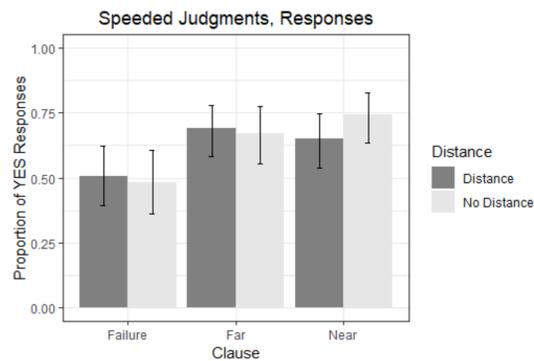
## Experiment 1: The Distance Paradigm

Binary forced choice speeded acceptability judgement study (N = 36, 60 items)

NoDistance_Near	If the writer complained and the editor resigned, then the critics resigned <i>too</i> .
NoDistance_Far	If the editor resigned and the writer complained, then the critics resigned <i>too</i> .
NoDistance_Failure	#If the writer complained and the editor plagiarized, then the critics resigned <i>too</i> .
Distance_Near	If the writer complained and the editor resigned, then [everyone at the publishing house would be shocked to hear that] the critics resigned <i>too</i> .
Distance_Far	If the editor resigned and the writer complained, then [everyone at the publishing house would be shocked to hear that] the critics resigned <i>too</i> .
Distance_Failure	#If the writer complained and the editor plagiarized, then [everyone at the publishing house would be shocked to hear that] the critics resigned <i>too</i> .

### Results & Analysis

- Helmert-coded contrasts revealed a significant effect of Dependency Length on Near vs. Far ( $z = 2.046$ ,  $p = .041$ ), replicating previous results (Chen & Husband, 2018).
- Distance worsened accessibility in the Near condition (9.3%,  $z = 1.853$ ,  $p = .064$ ), but not in the Far condition (-1.7%,  $z = -0.444$ ,  $p = .657$ )



- This suggests that having a single clause between the presupposed content and the trigger is enough to push that content out of focal attention and thus requiring memory retrieval.

- Once outside of focal attention, memory retrieval appears to be directly accessible, suggesting that interference effects should be expected from inaccessible antecedents that are incidentally retrieved.

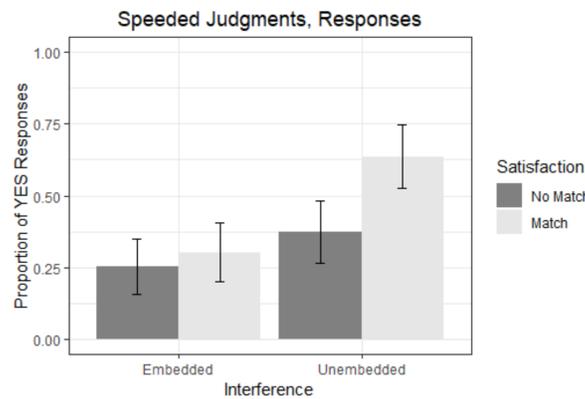
## Experiment 2: Interference Paradigm with Negation

Binary-choice speeded acceptability judgement study (N = 36, 64 items)

Unembedded_Match	If the editors resigned, then everyone at the publishing house would be shocked to learn that the critics resigned <i>too</i> .
Unembedded_NoMatch	#If the editors plagiarized, then everyone at the publishing house would be shocked to learn that the critics resigned <i>too</i> .
Embedded_Match	#If the editors did not resign, then everyone at the publishing house would be shocked to learn that the critics resigned <i>too</i> .
Embedded_NoMatch	#If the editors did not plagiarize, then everyone at the publishing house would be shocked to learn that the critics resigned <i>too</i> .

### Results & Analysis

- Sum-coded contrasts revealed a significant interaction of Embedding and Matching ( $z = 3.772$ ,  $p < .001$ ):
- Unembedded Match and NoMatch conditions were distinct from each other (26.2%,  $z = 4.621$ ,  $p < .001$ )
- Embedded Match and NoMatch conditions were not significantly different (4.9%,  $z = 1.599$ ,  $p = .117$ ).



- This runs counter to the predicted interference from inaccessible content in a direct access account; a surprising result if a direct access retrieval process is indeed at play.

Concerns: manipulation for the interference effect might have been too obvious

- Critical condition: #If the editors did not resign, then ... the critics resigned *too*.
- But also: #If the editors resigned, then ... the critics did not resign *too*.
- The infelicity of *too* is symmetric. What if we use an asymmetric pattern?

## Experiment 3: Interference Paradigm with Modal

Binary-choice speeded acceptability judgement study (N = 64, 64 items)

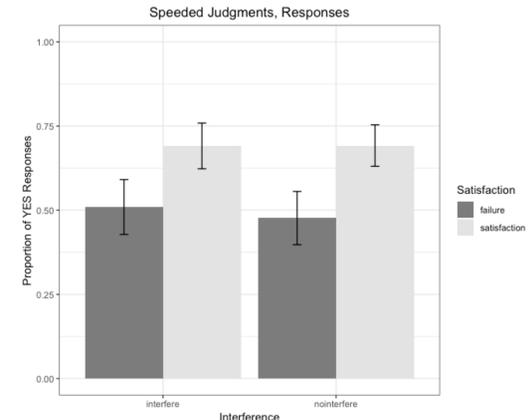
Unembedded_Match	If the editors resigned, then everyone at the publishing house would be shocked to learn that the critics resigned <i>too</i> .
Unembedded_NoMatch	#If the editors plagiarized, then everyone at the publishing house would be shocked to learn that the critics resigned <i>too</i> .
Embedded_Match	#If the editors might have resigned, then everyone at the publishing house would be shocked to learn that the critics resigned <i>too</i> .
Embedded_NoMatch	#If the editors might have plagiarized, then everyone at the publishing house would be shocked to learn that the critics resigned <i>too</i> .

Motivation: a more subtle way to induce the interference effect

- Critical condition: #If the editors might have resigned, then ... the critics resigned *too*.
- But: If the editors resigned, then ... the critics might have resigned *too*.
- This asymmetry may give us a better shot at finding interference effects

### Results & Analysis

- No interaction between Embedding and Matching ( $t = 1.042$ ,  $p = .302$ )
- A significant main effect of Matching ( $t = 5.867$ ,  $p < .001$ )
- But no significant main effects of Embedding ( $t = -1.048$ ,  $p = .299$ )
- Crucially, Embedded Match is not significantly different from Unembedded Match, but is distinct from Embedded NoMatch.



- This result suggests interference from inaccessible content in a direct access account, which is exactly what we would expect if a direct access retrieval process is at play.
- Consistent with the lack of distance effects on retrieval speed as reported in our previous analysis using Drift Diffusion Modelling (Chen & Husband, 2018).

## Discussion

Taken together, our results provide evidence that the processing of the presuppositional dependency of *too* shows signatures of direct access memory retrieval processes:

- This retrieval of the presupposed content is insensitive to the distance of licensed antecedents;
- Additionally, the retrieval process is interference-prone, suffering interference from structurally inaccessible antecedents embedded under (possibility) modals

Finding interference: Negation vs. Modals, why the difference?

- Does it have to do with the symmetric vs. asymmetric pattern in licensing the felicitous use of *too*?
- Or does it actually tell us about the size of the antecedent that is being retrieved: phrasal negation is still part of the antecedent content, but a modal is too high in the structure.

Implications

- Retrieval of the presupposed content of *too* via a direct access mechanism fits well with evidence for other types of anaphoric dependencies, such as pronoun resolution (Foraker & McElree, 2007), VP ellipsis (Martin & McElree, 2008), and sluicing (Martin & McElree, 2011).
- The current findings contribute to a growing body of empirical evidence suggesting that the memory representations of discourse dependencies formed during comprehension are content-addressable and retrieved with a direct-access process.

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## Selected References

Beck, S. (2007). Quantifier dependent readings of anaphoric presuppositions. • Foraker, S., & McElree, B. (2007) The role of prominence in pronoun resolution: Active versus passive representation • Heim, I. (1992). Presupposition projection and the semantics of attitude verbs. • Kim, C. S. (2015). Presupposition satisfaction, locality and discourse constituency. • Kripke, S. (1990/2009). Presupposition and anaphora: Remarks on the formulation of the projection problem. • van der Sandt, R. (1992). Presupposition projection as anaphora resolution. • Tiemann, S. et al. (2015). Presupposition Processing and Accommodation: An Experiment on *wieder* ('again') and Consequences for other triggers. • Martin, A. E., & McElree, B. (2008). A content-addressable pointer mechanism underlies comprehension of verb-phrase ellipsis. • Martin, A. E., & McElree, B. (2011). Direct-access retrieval during sentence comprehension: evidence from sluicing. • Martin, A. E., & McElree, B. (2011). Direct-access retrieval during sentence comprehension: evidence from sluicing. • McElree, B. (2000). Sentence comprehension is mediated by content-addressable memory structures. • Tiemann, S., Schmid, M., Bade, N., Rolke, B., Hertrich, I., Ackermann, H., & Beck, S. (2011). Psycholinguistic evidence for presuppositions: On-line and off-line data.  
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