

**Title:** Discourse processing is subject to coherence illusions and the binding problem in memory: Eye-tracking and acceptability studies on presupposition resolution with 'again'

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**Abstract:**

*Background:* Language processing frequently requires the resolution of dependencies between different linguistic items. Memory research has primarily focused on syntactic dependencies, where matching distractors can elicit "grammaticality illusions" and facilitate the processing of ungrammatical structures (Wagers et al., 2009). Misrepresentation accounts (e.g., Marking and Morphing (see Eberhard et al., 2005), and misretrieval accounts (e.g., Cue-Based Retrieval (Lewis and Vasishth, 2005), predict this facilitatory effect in ungrammatical contexts but they diverge in their predictions for grammatical contexts. A combination of misrepresentation and misretrieval was proposed by Dempsey et al. (2022): features might be intact but their binding/linking could be recalled incorrectly. Furthermore, this misbinding effect was only found for post-interpretative processes. We studied the predictions regarding the role of distractors in discourse-level dependencies, using presupposition resolution with 'again' and following recent research on presuppositions with 'too' (Schmitz et al., 2025). Our study (i) shows that misrepresentation accounts would better suit our data, though extending it to discourse-semantics is not straightforward, and (ii) provides evidence for a binding problem (Dempsey et al., 2022; also see Wheeler & Treisman, 2002) in online reading measures. *Method:* We conducted an eye-tracking study and several acceptability studies on short Dutch discourses. Each discourse described two events that could either match or mismatch the following presupposition with 'again'; one of these (the distractor) appeared linked to a different discourse referent, making it inappropriate to resolve the presupposition (see Fig. 1). *Results & Discussion:* Bayesian analyses of both eye-tracking data (see Fig. 2, 3) and offline acceptability revealed slower RTs and lower acceptability when the target mismatched compared to when it matched, confirming that a matching target was critical to license the presupposition and maintain coherence. In target-mismatch (incoherent) conditions, matching distractors sped up processing and increased acceptability. This aligns with predictions from both misrepresentation and misretrieval and favors the notion of "coherence illusions" in discourse. The pattern for target-match (coherent) conditions was more complex: eye-tracking showed a speed-up effect of matching distractors in early measures, appearing to align more with a misrepresentation account. Simultaneously, offline acceptability data showed that matching distractors lowered acceptability, which aligns more with misretrieval and prior findings on inhibitory effects in coherent/grammatical cases present in post-interpretative processes (Laurinavichyute and Von der Malsburg, 2024). Critically, the eye-tracking data revealed a novel negative interaction in regression measures, which is the opposite of what misretrieval predicts. Analyses showed longer RTs at the critical region following matching distractors in incoherent discourse, comparable to an inhibitory effect, and shorter RTs following matching distractors in coherent discourse. Descriptively, readers regressed more when either the target or the distractor—but not both—matched the presupposition, regardless of coherence. We argue that this is a clear case of failed binding in memory: in their memory representations, readers fail to bind the referent and the event that should resolve the presupposition, which triggers regressions. This finding, to the best of our knowledge, is novel evidence of such a "binding problem" in online sentence processing. More broadly, our study shows that presupposition resolution is a productive domain to study memory mechanisms at the discourse-level and to advance memory models beyond syntax.

|                    |                                                                                        |                                                                                                                                                 |                                                                                                                                       |
|--------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| T-MATCH<br>D-MATCH | Jan had honger maar gelukkig stond er een volle fruitschaal in de lobby van het hotel. | Jan heeft een gele appel gegeten en Max heeft een groene appel gegeten.<br><i>Jan has a yellow apple eaten and Max has a green apple eaten.</i> | Jan heeft de ochtend erna [ opnieuw ]Pre-critical<br>[een appel gegeten]critical<br>[want hij wilde]post-critical<br>meer fruit eten. |
| T-MATCH<br>D-MIS   |                                                                                        | Jan heeft een gele appel gegeten en Max heeft een groene peer gegeten.<br><i>Jan has a yellow apple eaten and Max has a green pear eaten.</i>   |                                                                                                                                       |
| T-MIS<br>D-MATCH   | Jan had hunger but luckily stood there a full fruit bowl in the lobby of the hotel.    | Jan heeft een gele peer gegeten en Max heeft een groene appel gegeten.<br><i>Jan has a yellow pear eaten and Max has a green apple eaten.</i>   | Jan has the morning after [ again ] [ a apple eaten ]<br>because he wanted more fruit eat.                                            |
| T-MIS<br>D-MIS     |                                                                                        | Jan heeft een gele peer gegeten en Max heeft een groene peer gegeten.<br><i>Jan has a yellow pear eaten and Max has a green pear eaten.</i>     |                                                                                                                                       |

Figure 1: Example stimulus across the four conditions. Four additional versions were created where the order of target-distractor referents was reversed. The final sentence contained the critical region.



Figure 2: Eye-tracking: Comparison of Right-Bounded reading times and Regression-Path Duration

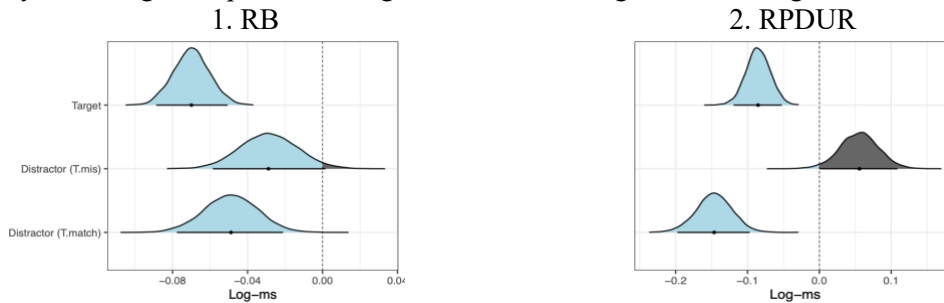


Figure 3: Eye-tracking at critical region: Posteriors of Target, and Distractor effects nested in within T(target) type. The dot denotes the mean, the thick lines the 95% credible intervals. Positive value = Match slower than Mismatch; Negative value = Match faster than Mismatch.

## References

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