

Coherence illusions and failed binding in discourse processing: eye-tracking and acceptability studies on presupposition resolution with '*again*'

Li Kloostra (l.kloostra@uu.nl)*¹, Rick Nouwen¹, Jakub Dotlacil¹

¹Department of Language, Literature and Communication, Institute for Language Sciences

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 [6]. Misretrieval accounts (e.g., Cue-Based Retrieval [4]) and misrepresentation accounts (e.g., Marking and Morphing, see [2]), predict a facilitatory effect in ungrammatical contexts; distractors are erroneously retrieved or cause misrepresentation of the target. However, they diverge in their predictions for grammatical contexts. [1] proposed a combination of the two: features might be intact but their binding/linking could be recalled incorrectly, and this failed binding effect is only present in 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*' [5]. Our study (i) shows that misrepresentation accounts are better suited to our data, when extended to discourse-semantics, and (ii) provides evidence for failed binding in memory [1] in online reading measures.

Method: We conducted an eye-tracking study and several acceptability studies on short Dutch discourses. Each described two events that could (mis)match the following presupposition with '*again*', creating a 2x2 design. Crucially, the distractor event was linked to a different 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 longer reading times and lower acceptability in T-MIS compared to T-MATCH, confirming that a matching target is critical to license the presupposition and maintain coherence. Within T-MIS (incoherent) conditions, RTs for D-MATCH tended to be shorter compared to D-MIS while acceptability was higher. This is in line with predictions of both misrepresentation and misretrieval and favors the notion of "coherence illusions" in discourse. The pattern in T-MATCH (coherent) conditions was more complex: eye-tracking suggested a similar speed-up effect of matching distractors, favoring the misrepresentation account, while offline acceptability data showed that matching distractors lowered acceptability. The latter aligns with misretrieval, as well as prior findings on inhibitory effects in coherent/grammatical cases present in post-interpretative processes [3]. Critically, the eye-tracking data revealed a novel negative interaction in regression measures (RPDUR at critical region 95% CrI [-0.135,-0.060]), the opposite of what misretrieval predicts. The nested model showed longer RTs following matching distractors in T-MIS conditions (95% CrI [0.006,0.110]) but shorter RTs following matching distractors in T-MATCH conditions (95% CrI [-0.188,-0.086]). 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: people fail to correctly bind the referent and the event that should resolve the presupposition, which triggers regressions. This is, to the best of our knowledge, 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.

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

Figure 1: Example of a stimulus across the four conditions in the original Dutch with literal English translations. We included four additional versions where the target and distractor referents appeared in reverse order. The final sentence contained the critical region (underlined) and was identical within each stimulus.

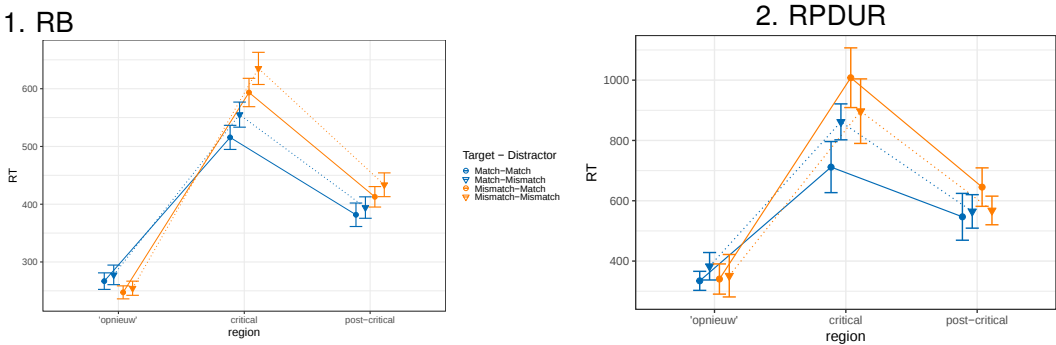


Figure 2: Eye-tracking: Comparison of Right-Bounded reading times and Regression-Path Duration

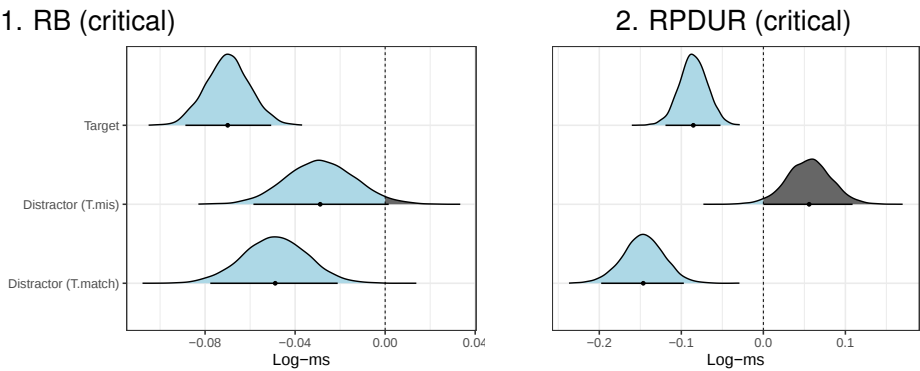


Figure 3: Eye-tracking: Posteriors of Target, and Distractor effects nested in within T(target) type. Positive value = Match slower than Mismatch; Negative value = Match faster than Mismatch.

- [1] Jack Dempsey, Kiel Christianson, and Darren Tanner. Misretrieval but not misrepresentation: A feature misbinding account of post-interpretive effects in number attraction. *Quarterly J. of Exp. Psychology*, 75(9):1727–1745, 2022.
- [2] Kathleen M Eberhard, J Cooper Cutting, and Kathryn Bock. Making syntax of sense: number agreement in sentence production. *Psychological review*, 112(3):531, 2005.
- [3] Anna Laurinavichyute and Titus Von der Malsburg. Agreement attraction in grammatical sentences and the role of the task. *Journal of Memory and Language*, 137:104525, 2024.
- [4] Richard L Lewis and Shravan Vasishth. An activation-based model of sentence processing as skilled memory retrieval. *Cognitive Science*, 29:375–419, 2005.
- [5] Tijn Schmitz, Rick Nouwen, and Jakub Dotlačil. Memory retrieval in discourse: Illusions of coherence during presupposition resolution. *Journal of Memory and Language*, 143:104637, 2025.
- [6] Matthew W Wagers, Ellen F Lau, and Colin Phillips. Agreement attraction in comprehension: Representations and processes. *Journal of memory and language*, 61(2):206–237, 2009.