

Discourse status and asymmetric agreement attraction effects

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A large body of research has shown that a content-addressable memory retrieval mechanism mediates sentence comprehension process in real time [1-2], but it remains an open question whether linguistic units with different discourse status should be differentially organized and maintained in working memory. Recent work in [3-4] examined wh-dependency formation involving two types of relative clauses that serve different discourse functions--appositive relative clause (ARC) and restrictive relative clause (RRC) (e.g., "The butcher asked who the lady(,) who bought Italian ham(,) was cooking dinner for."). The integration of the filler and its gap is found to be more difficult with intervening RRCs compared to ARCs, suggesting working memory support is not uniform for different discourse units. The current study investigates the question further by examining the number agreement attraction effects with ARCs, using RRCs as control comparisons. Results from three self-paced reading experiments found the standard agreement attraction effect with ARC structures only when the distractor noun is in the main clause and the target agreement site is in the ARC clause, but not vice versa. This suggests that working memory retrieval tracks and targets information encoded in the main clause unit even when the focal attention is on the subordinate discourse unit, but not vice versa.

Method & Material. We compared the number agreement attraction effects of sentences with ARCs and RRCs. The attraction effect predicts that the ungrammatical plural verb (e.g., "were", "praise") will be read faster in the presence of a plural distractor noun (e.g., "the girls", "the musicians") compared to a singular distractor noun (e.g., "the girl", "the musician") (1). ARCs are syntactically and semantically considered to be fairly 'independent' of the main clause, unlike RRCs [5 for a review]. The empirical question is whether similar number agreement attraction effects will be observed for RRCs and ARCs. In three self-paced reading experiments, we varied grammaticality (grammatical vs. ungrammatical), distractor noun (singular vs. plural), and clause (ARC vs. RRC) (a 2x2x2 design, see examples in (1)). Each trial was followed by a comprehension question.

In **Experiment 1** (subj n=120; item n=48), the distractor noun ("the girl(s)") appeared as the PP argument *inside the relative clause* (1), and the critical agreement region is on the main clause verb. For RRCs, there was a 2-way interaction of distractor and grammaticality (standard number agreement attraction effect) at the spill-over region ($b=0.01$, $SE=0.01$, $t=2.02$), replicating earlier findings [6]. However, no such interaction (standard number agreement attraction effect) was found with ARCs at the spill-over region ($b=0.00$, $SE=0.01$, $t=0.53$) (Figure 1), consistent with findings in [7-8]. In **Experiment 2** (subj n=96; item n=48), the distractor noun ("the musician(s)") appeared as *the subject inside the main clause* (2), and the critical agreement site was within the ARC/RRC. We found a standard number agreement attraction (2-way interaction of distractor and grammaticality) at the spill-over region, irrespective of clause type ($b=0.01$, $SE=0.00$, $t=2.98$) (Figure 2) (attraction effect with RRCs replicating the results in [9]). This is different from Experiment 1 as we found the attraction effect even with ARCs. To test whether the attraction effect in Experiment 2 was due to the constant maintenance of an open dependency (i.e., the subject NP is yet to be integrated with a verb), in **Experiment 3** (subj n=96; item n=48), the distractor noun ("the musician(s)") appeared as *the object* of the main clause, which closes off the argument structure of the main clause verb. But we still found the standard agreement attraction effect (2-way interaction of distractor and grammaticality) regardless of clause type at the spill-over region ($b=0.02$, $SE=0.01$, $t=-2.69$) (Figure 3).

In sum, the current study found that distractor nouns within the main clause always introduce attraction effect, regardless of whether the target of integration is in the same discourse unit (RRCs) or not (ARCs). But distractor nouns within the subordinate content (ARCs) do not introduce agreement attraction. The findings suggest that what memory retrieval can target is constrained by how information is organized into different discourse units.

References. [1] McElree et al. (2003). JML. [2] Lewis & Vasishth. (2005). Cog Sci. [3] Dillon et al. (2014). Lang. Cog. Neuroscience. [4] Dillon et al. (2017). JML. [5] Koev. (2013). Rutgers University Doctoral Dissertation. [6] Parker & An. (2018). Fpsyg. [7] McInerney & Atkinson. (2020). CUNY. [8] Ng & Husband. (2017). CUNY. [9] Wagers et al. (2009). JML.

(1) **Examples.** ARCs are marked with commas. Critical regions are bold-faced. Distractor nouns are underlined. The ‘/’ sign indicates regions. The ‘*’ marks ungrammaticality.

- a. **Experiment 1** (RRC version adapted from [6])
The waitress(,) who / sat / near / the girl(s)(,) / **{was/*were}** / **surprisingly** / unhappy about / all / the noise.
- b. **Experiment 2** (RRC version adapted from [9])
The / musician(s)(,) / who / the / reviewer / **{praises/*praise}** / **so** / highly(,) / will / probably / win / a / Grammy.
- c. **Experiment 3**
Alicia / met / the / musician(s)(,) / who / the / reviewer / **{praises/*praise}** / **so** / highly.

Figures 1-3. Critical regions in grey box.

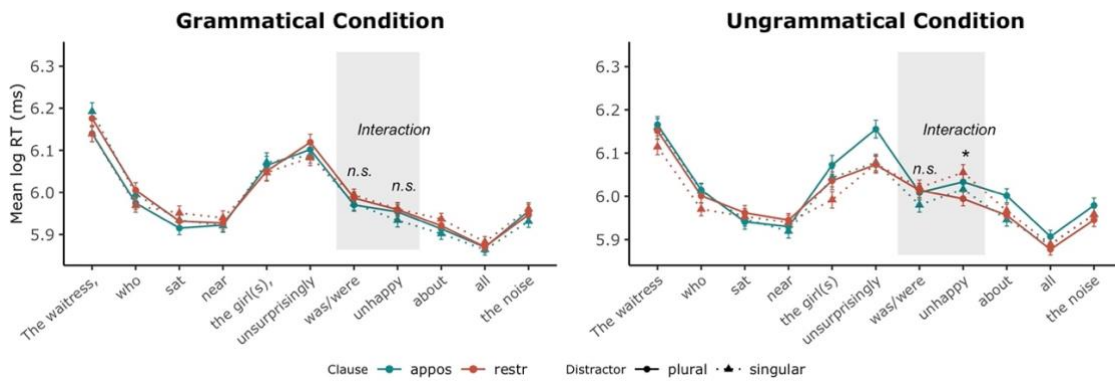


Figure 1. Mean log reading times for Experiment 1.

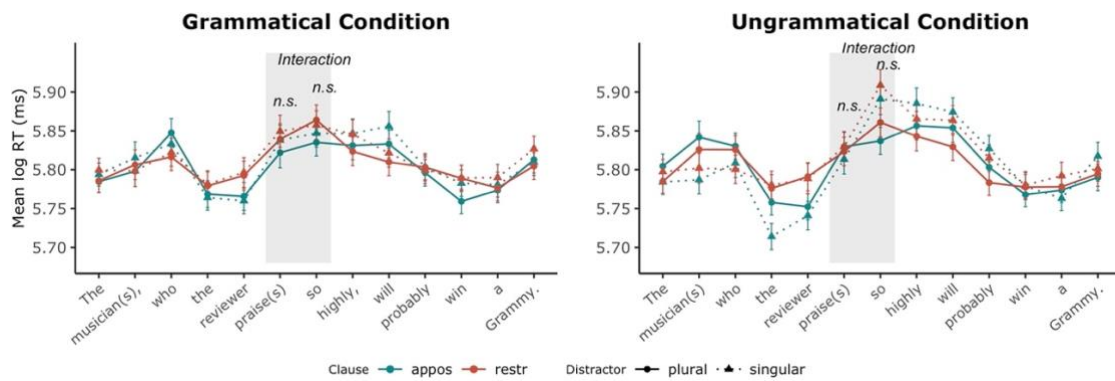


Figure 2. Mean log reading times for Experiment 2.

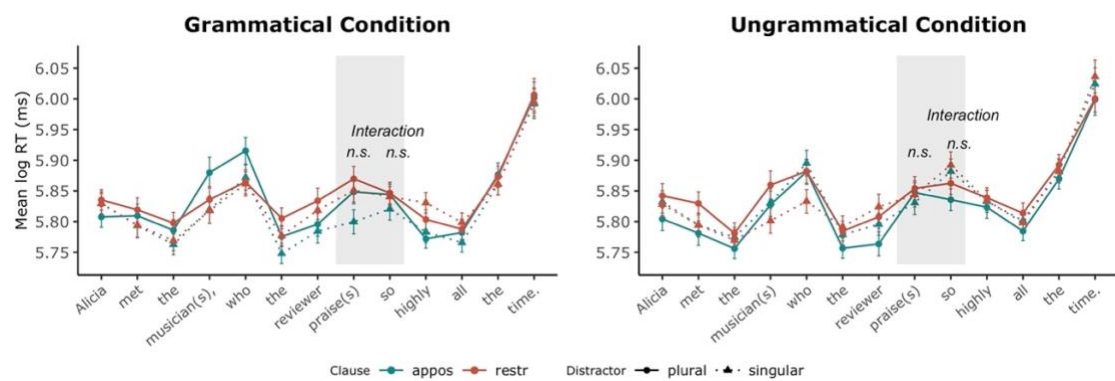


Figure 3. Mean log reading times for Experiment 3.