



Repetition Priming and Repetition Costs During Sentence Reading



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Background

Previous research has demonstrated that complex semantic constructions lead to processing difficulty when the critical words are in the main clause of a sentence, but this processing difficulty is reduced when one of the words is embedded in a less focused position (Lowder & Gordon, 2012, 2015)

- 1a. The **criminal** injured the farmer in the field beside the barn. (Animate-Simple)
- 1b. The **revolver** injured the farmer in the field beside the barn. (Inanimate-Simple)
- 1c. The **criminal** that injured the farmer was beside the barn. (Animate-Relative Clause)
- 1d. The **revolver** that injured the farmer was beside the barn. (Inanimate-Relative Clause)

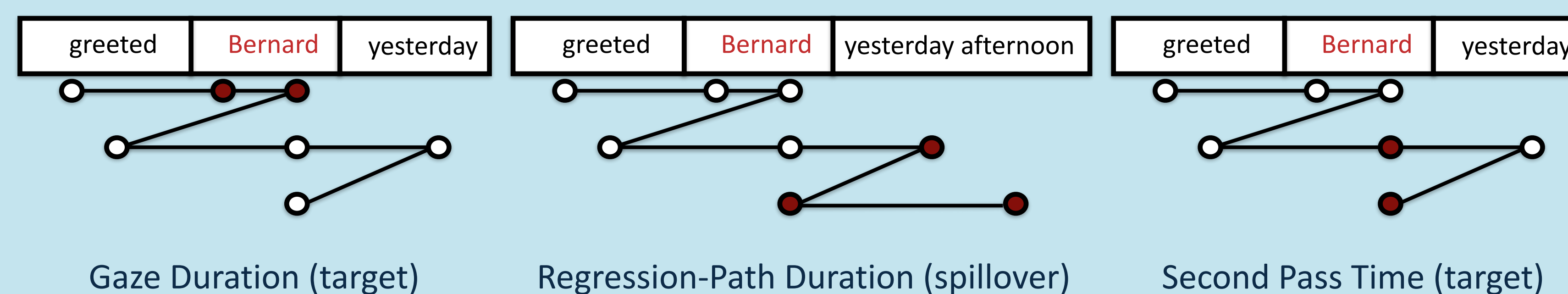
- Longer reading times for 1b vs. 1a at the verb (e.g., “injured”), but no difference for 1d vs. 1c at the verb
- Repetition priming – facilitated processing of a word when it is repeated versus new
- However, when repetition happens in a sentence, this often leads to an odd-sounding sentence
 - Previous eyetracking studies have shown a dissociation of these processes: word repetition is associated with *faster* processing in early eye-movement measures that reflect word recognition, but repetition is associated with *slower* processing in later measures that reflect the plausibility of the sentence (Ledoux, Gordon, Camblin, & Swaab, 2007; Traxler, Foss, Seely, Kaup, & Morris, 2000)
- The current eyetracking experiment was designed to test whether manipulations to the structure of the sentence (simple versus relative clause) affect the processing of lexical repetition

Method

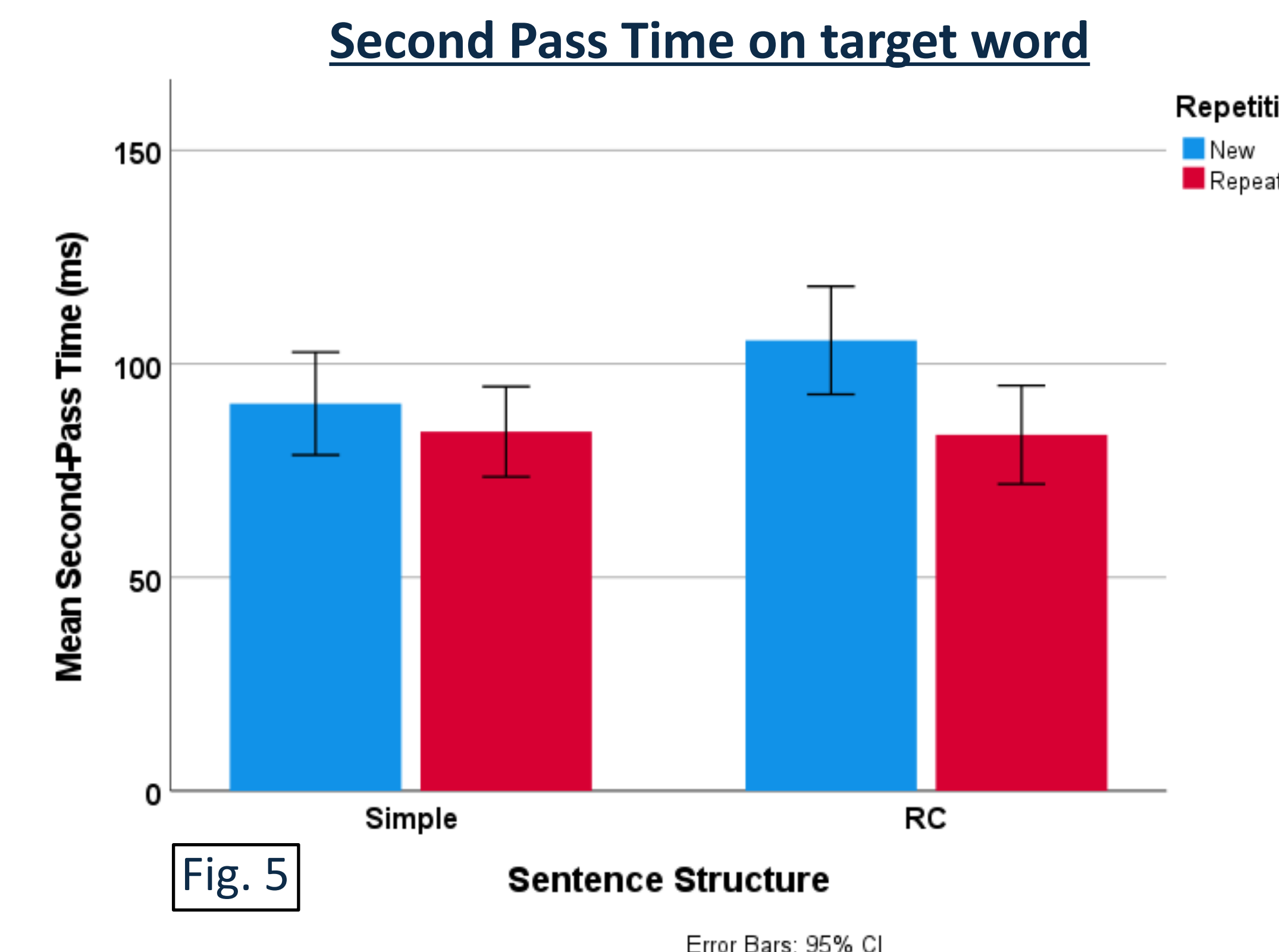
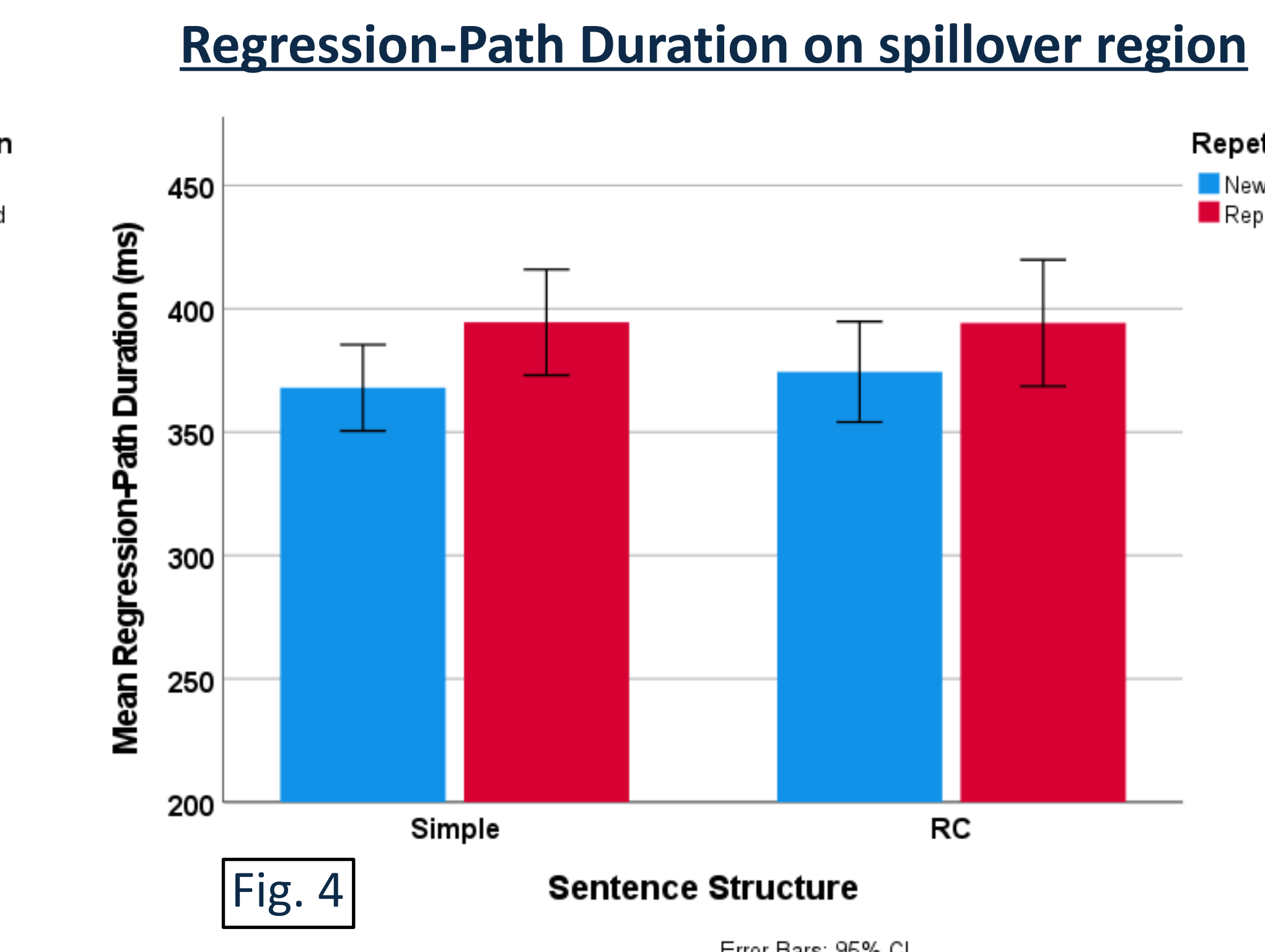
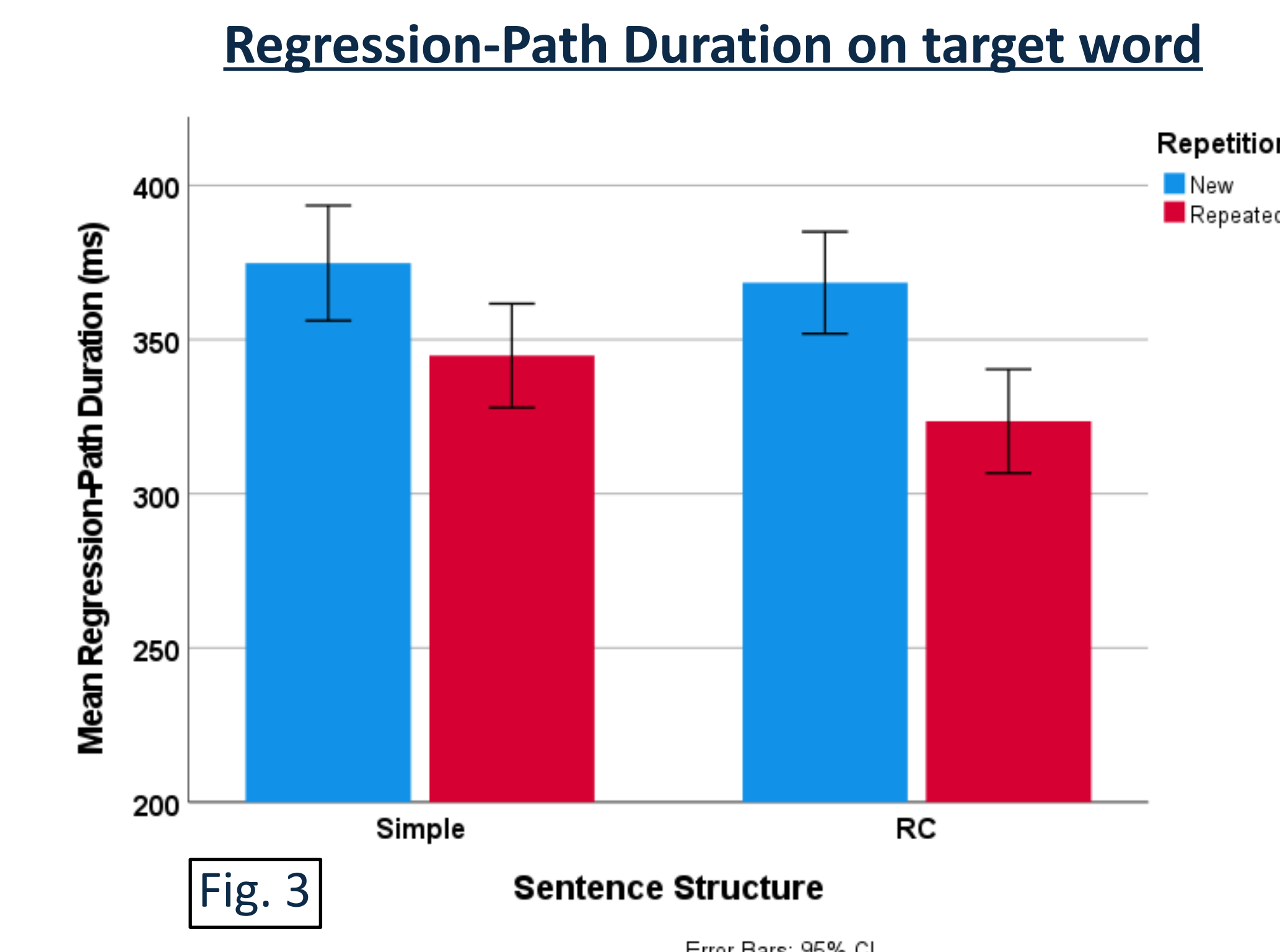
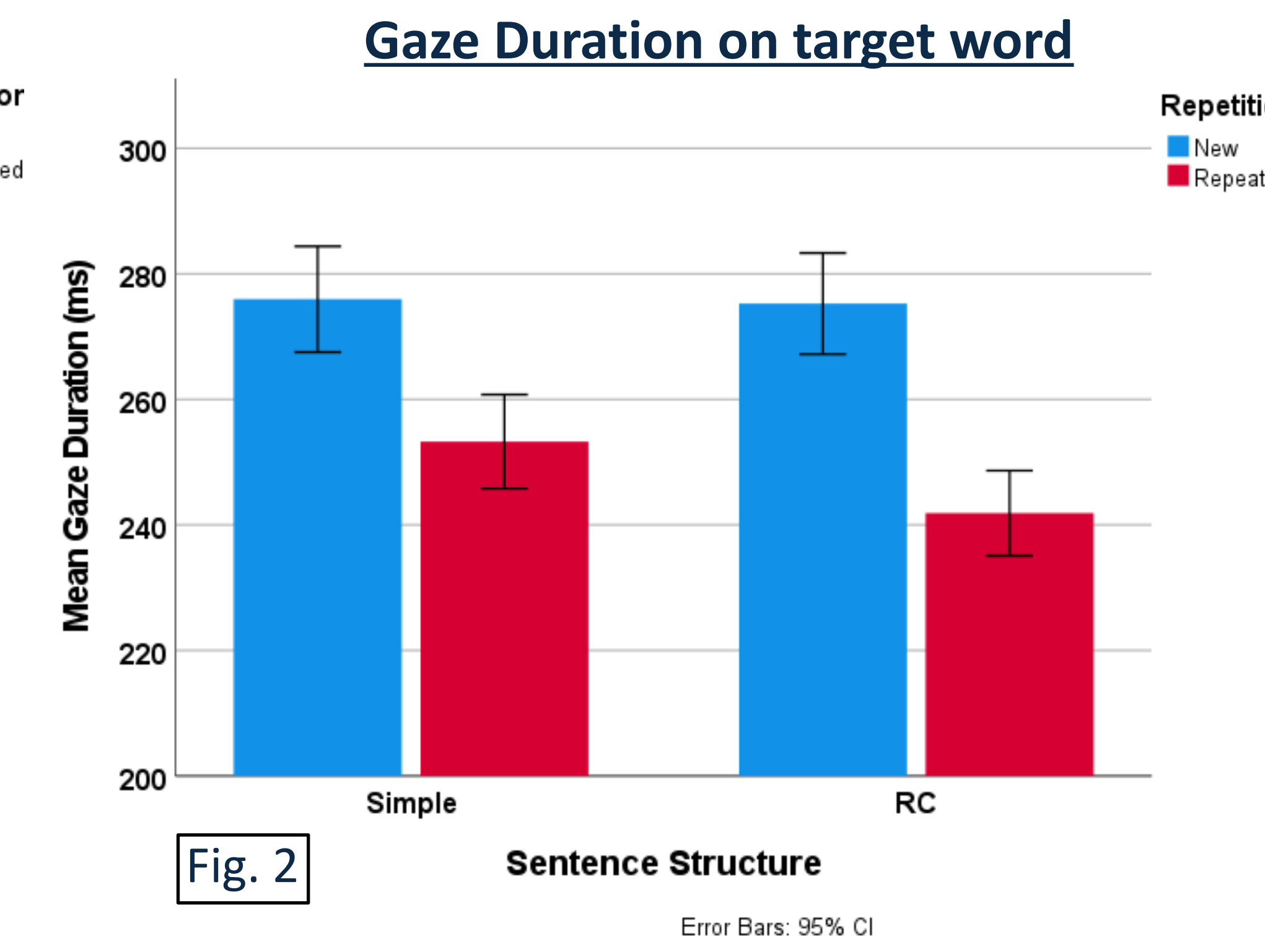
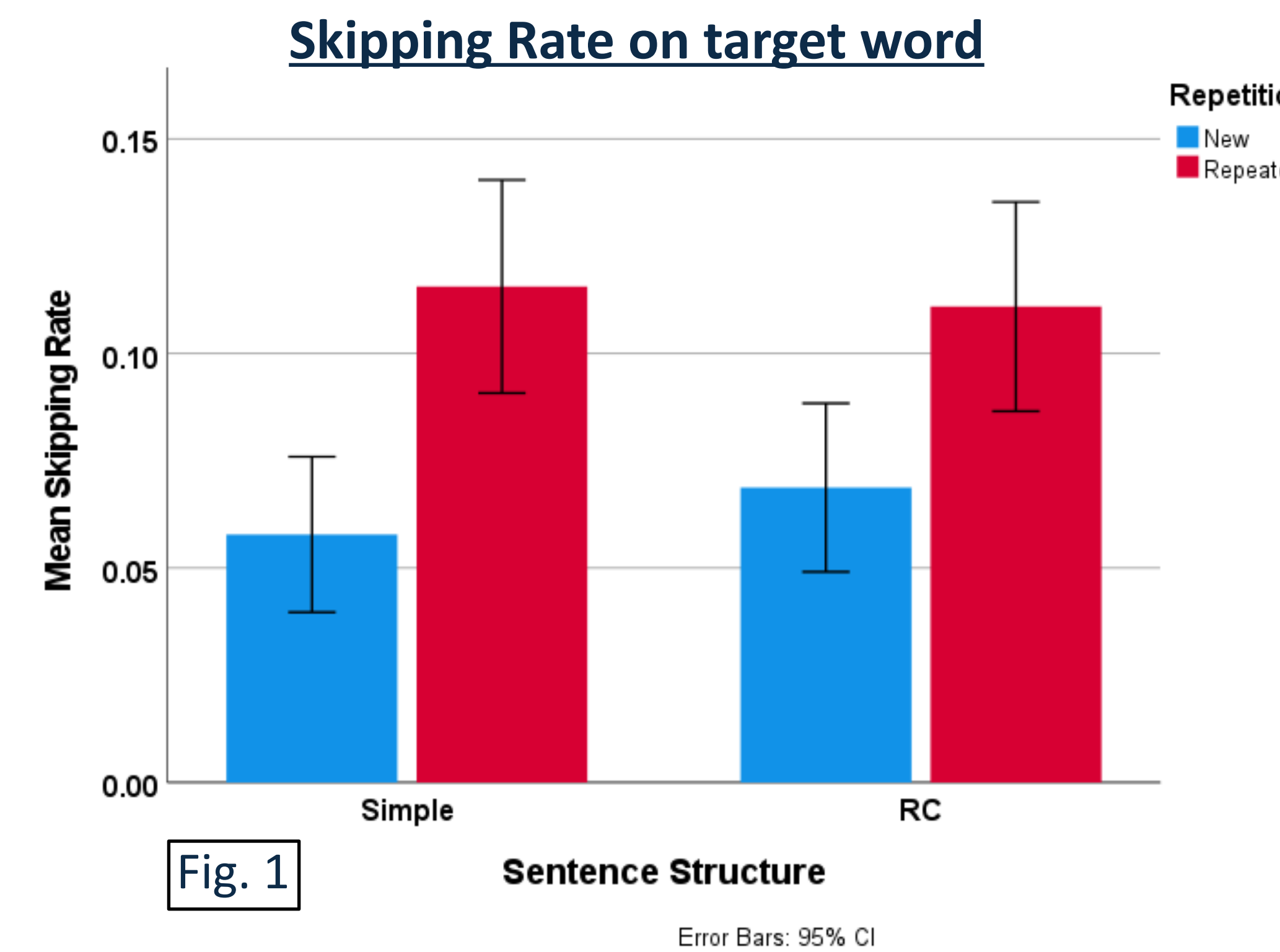
- 72 participants; 8 excluded because English was not their primary language or for problems with attentiveness (i.e., falling asleep)
- Each participant read 124 sentences: 40 experimental, 84 filler (40 from an unrelated experiment, 44 others)

- 2a. **Bernard** warmly greeted **Bernard** yesterday afternoon and spent... (Repeated, Simple)
- 2b. **Malcolm** warmly greeted **Bernard** yesterday afternoon and spent... (New, Simple)
- 2c. **Bernard**, who warmly greeted **Bernard** yesterday afternoon, spent... (Repeated, RC)
- 2d. **Malcolm**, who warmly greeted **Bernard** yesterday afternoon, spent... (New, RC)

- Each experimental sentence appeared in each of the 4 conditions, counterbalanced across four lists
- Sentences were presented randomly, each followed by a true-or-false comprehension question
- Analyzed 4 standard eye movement measures on the target name (e.g., “Bernard”)
 - Skipping rate, Gaze duration, Regression-path duration, Second-pass time
- Also analyzed regression-path duration on two-word spillover region (e.g., “yesterday afternoon”) to test for any delayed effects



Figures



Results

We conducted five 2x2 Repeated Measures ANOVAs. Each of the analyses examined the effect of lexical repetition (repeated vs. new) and syntax (simple vs. relative clause) on the target word and the spillover region (2 words after the target word).

Skipping Rate on target word, the earliest measure of word encoding, showed a significant main effect of repetition ($F(1,63) = 15.87, p < .001$) such that repeated targets were skipped more than the new targets. No significant effect of syntax or interaction were found. (Fig. 1)

Gaze Duration on target word, a measure of early word processing, also showed a significant main effect of repetition ($F(1,63) = 64.04, p < .001$) such that gaze duration was longer on the new targets compared to the repeated targets. No interaction or main effect of syntax were found. (Fig. 2)

Regression-Path Duration on target word, a measure of late processing costs, showed significant main effect of repetition ($F(1,63) = 23.07, p < .001$) such that the duration was longer for the new targets compared to the repeated targets (Fig. 3). An analysis on the spillover region showed a similar trend with only the main effect of repetition ($F(1,63) = 4.45, p = 0.039$) but the duration in the repeated name condition was longer than in the new name condition (Fig. 4). No significant main effects of syntax or interactions were found.

Second Pass Time on target word, a measure of late processing costs, showed a significant main effect of repetition ($F(1,63) = 5.02, p = 0.029$) such that the new names were fixated for longer compared to the repeated names. No significant main effect of syntax and no interaction were found. (Fig. 5)

Discussion

The results show robust evidence of repetition priming during sentence reading, replicating previous studies (Ledoux et al., 2007; Traxler et al., 2000)

There was evidence for a repetition cost in regression-path duration on the spillover region, but not in late measures on the target word itself, which is inconsistent with previous findings.

Crucially, there was no evidence that effects of repetition priming or repetition costs were modulated by sentence structure. Whereas previous work has shown that sentence structure affects the processing of complex semantic constructions (Lowder & Gordon, 2012, 2015), the current results suggest that this does not occur for a lexical-level manipulation.