Title: Maximizing Parallelism in the Processing of Gapping: Evidence from Argument Structure Mismatches

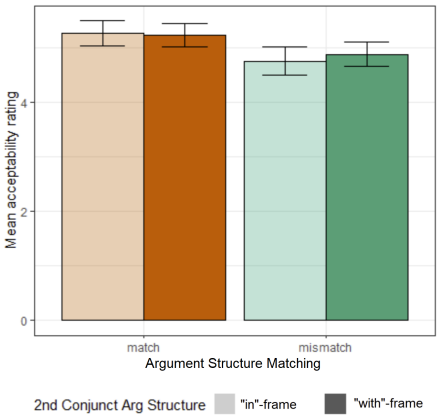
Introduction. Previous literature on the processing of the gapping construction (e.g. *John ate an apple and Mary a pear*) found that the parser by default assumes the most parallel analysis of the conjoined structure when gapping is present (Parallelism Hypothesis: [1,2,3,4]). In support of this hypothesis, the processing of the gapping construction is shown to be more costly when there is mismatch in argument animacy [1], the position of adverbs [5], or the voice [6] across conjuncts. In this study, we aim to test if the parser assumes the matching of the argument structures of the conjuncts. There are certain verbs in English that allow for different argument structure realizations [7]. One example is figure-alternating verbs like *load* and *spray* that participate in locative alternation, which have two different argument structure frames: the "in"-frame (e.g. *John loaded the boxes (in the truck)*), and the "with"-frame (e.g. *John loaded the truck with the boxes*) [7,8]. Following the Parallelism Hypothesis, we hypothesize that when processing gapping constructions with such locative alternation verbs, the parser assumes matching of the argument structure between conjuncts. Mismatching in argument structure is predicted to lead to higher processing cost, instantiated as lower acceptability ratings. We test this hypothesis in an offline acceptability judgment experiment.

Experimental Design. A total of 52 participants were recruited on Prolific. The task was to read sentences and rate how acceptable they sound on a 7-point Likert scale. All critical items are of the gapping construction, with the main verb in both conjuncts being a locative alternation verb (e.g., *load*). There are 16 critical items, each instantiated as four conditions in a 2X2 factorial design, with *Argument Structure Matching* (match vs. mismatch between the two conjuncts conjoined with the coordinating coordinative, *and*) and *Second Conjunct Argument Structure* ("in"-frame vs. "with"-frame) manipulated as factors. A list of sample stimuli is shown in Table 1. The *Argument Structure Matching* factor is included to test our hypothesis that the matching between the argument structure of the verbs is assumed in gapping processing. The *Second Conjunct Argument Structure* factor is included to control for incompatibility between any argument structure and gapping, independent of whether the argument structures of the two conjunct verbs match or not.

Table 1. Example Stimuli

Argument Structure Matching	Second Conjunct Argument Structure	Example Stimuli
Match	"with"-frame	William loaded the boat with the cargo, and Lauren the truck with the sack.
Match	"in"-frame	William loaded the cargo onto the boat, and Lauren the sack onto the truck.
Mismatch	"with"-frame	William loaded the cargo onto the boat, and Lauren the truck with the sack.
Mismatch	"in"-frame	William loaded the boat with the cargo, and Lauren the sack onto the truck.

Results. Mean acceptability rating of each condition is shown in the figure on the right. The results were analyzed using a linear mixed effect model with fixed effects of *Argument Structure Matching*, *Second Conjunct Argument Structure*, and their interaction, and random by-participant and by-item intercepts and slopes. We found a significant effect of *Argument Structure Matching* (β=-.52, SE=.18, t=-2.92, p=.006) with the mismatching condition lower in acceptability than the matching condition. We found no significant *Second Conjunct Argument Structure* effect (β=-.04, SE=.17, t=-.24, p=.81) or its interaction with *Argument Structure Matching* (β=.15, SE=.23, t=.64, p=.52). This suggests that the two argument structures tested are equally compatible with the gapping construction, and the main effect of *Argument Structure Matching* is not driven by any interaction between the factors.



Discussion. The significant main effect in *Argument Structure Matching* suggests that the mismatch between the argument structures of the conjuncts leads to an acceptability degradation, which supports the Parallelism Hypothesis: the parser by default assumes the most parallel analysis of the conjuncts in a gapping construction, and thus assumes the elided verb of the second conjunct to have the exact same argument structure as its antecedent in the first conjunct ([4]). When there is a mismatch in the argument structures, the parser would have to reanalyze the second conjunct, leading to higher processing cost and thus degraded acceptability ratings. Results suggest that the category information, meaning, and the linking information (specific type of PPs that the argument roles are linked to) encoded in the antecedent verb are actively retrieved by parsers at the gapping site to maximize parallelism between the conjuncts.

Conclusion. In gapping constructions where the elided verb has a different argument structure from its antecedent, the acceptability of the sentence is degraded compared to sentences without such argument structure mismatch. Although the verb is, in principle, grammatically compatible with both argument roles and meaning of the argument structure, readers maximize parallelism by sharing the same syntactic argument structure in the processing of gapping constructions ([1,2,3,4]).

References

[1] Carlson, 2001. *Lang & Speech*. [2] Dickey & Bunger, 2010. *LCP*. [3] Carlson, Dickey & Kennedy, 2005. *Syntax.* [4] Frazier & Clifton, 2000. *Syntax*. [4] Kim, Carlson, Dickey & Yoshida, 2020. *QJEP*. [5] Arregui, Clifton, Frazier, & Moulton, 2006. *JML*. [6] Levin, 1993 [7] Kim & Phillips, 1999. *BUCLD 23*.