Syntactic and semantic parallelism guides filler-gap processing in coordination

Stephanie Rich & Matt Wagers (UC Santa Cruz)
skrich@ucsc.edu

Background. The processing of filler-gap dependencies is active and eager, with the language processor postulating a gap at the first grammatically accessible position [1-5]. Therefore, in sentences like (1), comprehenders would likely postulate a direct object (DO) gap early, after *ate*. This would be correct in (1a) but incorrect in (1b), which instead contains a prepositional object (PO) gap, resulting in a filled-gap effect [4]. Prior exposure to PO gaps has been shown to lessen the filled-gap effect [6], suggesting that the parser may alter the default gap-filing strategies given sufficient evidence, or that recovery following a filled-gap is facilitated if similar structures had been recently encountered. Given the general preference for parallel conjuncts in coordination [9, 10], we hypothesize that parallelism will influence the accessibility of later potential gap positions. We test the idea that a suitably parallel first conjunction (without a gap) can facilitate the recovery of a PO gap in the second conjunct. In Experiment 1, we manipulate the presence of the prepositional phrase in the first conjunct, and thus the syntactic parallelism of the two conjuncts. In Experiment 2, we introduce an instrument in a syntactically non-parallel first conjunct, to test whether highlighting particular argument roles could lead to the anticipation of a specified instrument in the second clause as well. We find that an instrument in the first clause reduces, but does not eliminate, the filled-gap effect in the following clause, with and without parallel structure.

Method. We constructed 24 sentences containing two conjuncts (Table 1), manipulating whether the first clause mentioned an instrument (**Instrument**; +instr, -instr) and whether the second clause contained a PO gap (**Gap**; +gap, -gap). In Experiment 1, the +instr condition contained a PP, resulting in parallelism in both syntactic structure and argument role structure. In Experiment 2, the +instr condition highlighted the instrument role periphrastically, using a different syntactic structure and therefore removing the possibility of syntactic parallelism. Both experiments were presented in word-by-word self-paced reading. The critical region in both experiments was the DO in the second clause.

In **Experiment 1 (N = 84)**, the filled-gap effect, or penalty for the +gap conditions, was found at the DO article and DO noun ($p < .05$). The DO noun (*dessert*) showed an interaction ($p < .05$) in which there was a filled-gap effect in the -instr condition, but not in the +instr condition. In **Experiment 2 (N = 88)**, a filled-gap effect was found at the DO article ($p = .06$), and at the DO noun and at the preposition ($p < .05$). There was an advantage for the +instr conditions on the DO noun ($p < .05$) and preposition ($p < .01$) that appears to be driven by a smaller filled-gap effect in the +instr condition compared to the -instr condition, but the interaction was not significant.

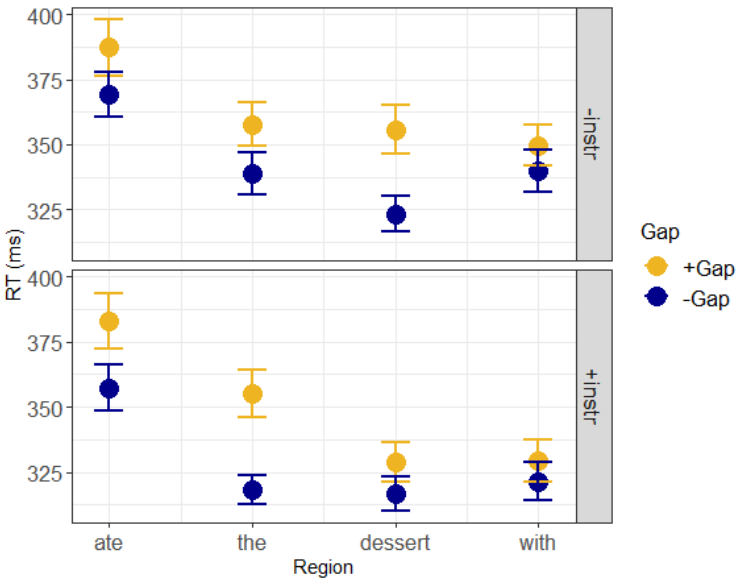
Discussion. We add to previous studies of filler-gap processing by showing that the disruption caused by a filled gap in DO position can be lessened by encountering an earlier PP inside a VP in coordination (Exp. 1). However, the results of Exp. 2 suggest that parallel syntactic structure isn't strictly necessary and that processing later gap sites is facilitated if there are other argument roles comprehenders can expect to encounter (cf. [11]), an effect that depends on semantic as well as syntactic information. A third experiment testing parallelism in information structure is underway.

(1) a. Ben wondered what Carla ate __.
b. Ben wondered what Carla ate the dessert with __.

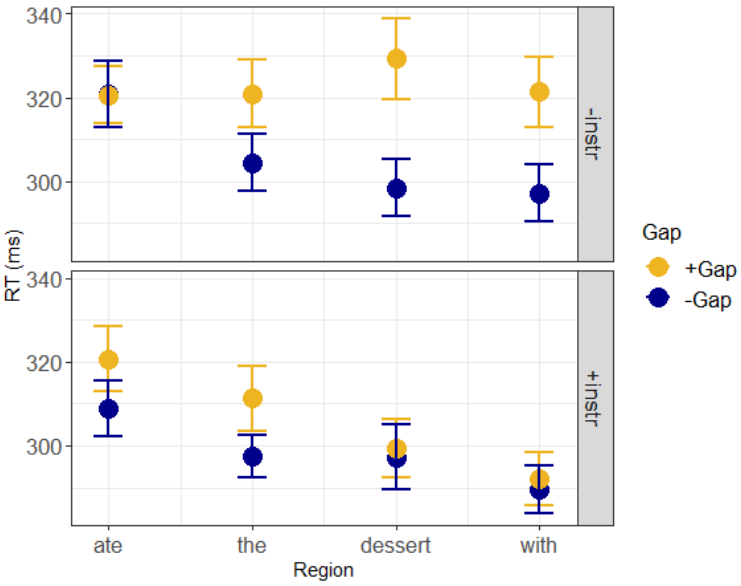
Experiment 1 (n = 84)	Experiment 2 (n = 88)
Ben saw that... +instr Carla ate the dessert with a spoon... -instr Carla ate the dessert...	Ben saw that... +instr Carla used a spoon to eat the dessert... -instr Carla ate the dessert...
+gap ...but he wondered what Dan ate $\|_{critical}$ the dessert with $\|_{spillover}$ at the party on Sunday. -gap ...but he wondered if Dan ate $\|_{critical}$ the dessert with a fork $\|_{spillover}$ at the party on Sunday.	

Table 1. Same item across Experiments 1 and 2.

Experiment 1 reading times



Experiment 2 reading times



Figures 1 & 2. Reading times on the critical region in the second clause in Experiments 1 & 2.

References

[1] Frazier, 1987; [2] Frazier & Clifton, 1989; [3] Traxler & Pickering, 1996; [4] Stowe, 1986; [5] Omaki et al., 2015; [6] Atkinson & Omaki, 2016; [7] Wagers & Phillips, 2009; [8] Parker, 2017; [9] Frazier et al., 2000; [10] Sturt et al., 2010; [11] Boland et al., 1995