

Implications of Grammatical Resumption for the Online Processing of Hebrew Islands

Maayan Keshev and Aya Meltzer-Asscher

Tel-Aviv University

Introduction: Psycholinguistic studies have revealed that during the online formation of filler-gap dependencies, the parser tries to posit a gap as soon as possible (Stowe, 1986; Traxler & Pickering, 1996). This Active Filler strategy is exhibited by higher reading times on NPs in a potential gap site (e.g. *us* in (1)), among other findings, indicating a reanalysis due to the disconfirmed gap prediction.

(1) My brother wanted to know who Ruth will bring us home to at Christmas (Stowe, 1986).

However, the parser refrains from postulating gaps in islands, as shown e.g. in Stowe (1986), Traxler & Pickering (1996). These studies assumed that if the parser enters an island while holding an open dependency it has two options: predicting an early (ungrammatical) gap inside the island, or a later gap outside it (a costly option). We suggest that there is a third option: predicting a resumptive pronoun (RP) inside the island. It might be that this was not exhibited previously since RPs do not improve the acceptability of islands in English (e.g. Alexopoulou & Keller, 2007). However, in Hebrew, RPs may provide the parser with an early grammatical resolution for the dependency. In order to test this, we conducted two experiments: Experiment 1 aims to contrast the effect of resumption on the acceptability of two island structures. Experiment 2 uses these islands to test whether the parser is sensitive to the grammatical status of RPs in different islands.

Experiment 1: This experiment tested the acceptability of RPs in complex NP (CNP) and in coordinated structures (CSC), crossing the two island types with two dependency types (filler-gap and binder-resumptive) in 20 sets of experimental items. Subjects were 32 native Hebrew speakers. Results showed higher ratings for CNPs with RPs comparing to gaps ($p < .001$). For CSC, however, there was no significant difference between RPs and gaps ($p = .2$). This suggests that RPs can be considered a grammatical option in CNPs but not in CSCs.

Experiment 2: In this experiment, the graded island effect exhibited in experiment 1 was used to test the Hebrew parser's island sensitivity. We conducted a self-paced reading experiment using a filled-gap design (cf. (1)) to test the Active Filler strategy in those islands. The experiment included 20 sets of items with four conditions each, manipulating movement (relative clauses [RC] vs. sentential complements [SC]) and the embedded island type (CSC vs. CNP, bracketed in Table 1). Each sentence included two critical words (in bold in Table 1): one inside (CNP-in and CSC-in) and one (online) outside the island (CNP-out and CSC-out). Subjects were 38 native Hebrew speakers.

Table 1: Example set from experiment 2

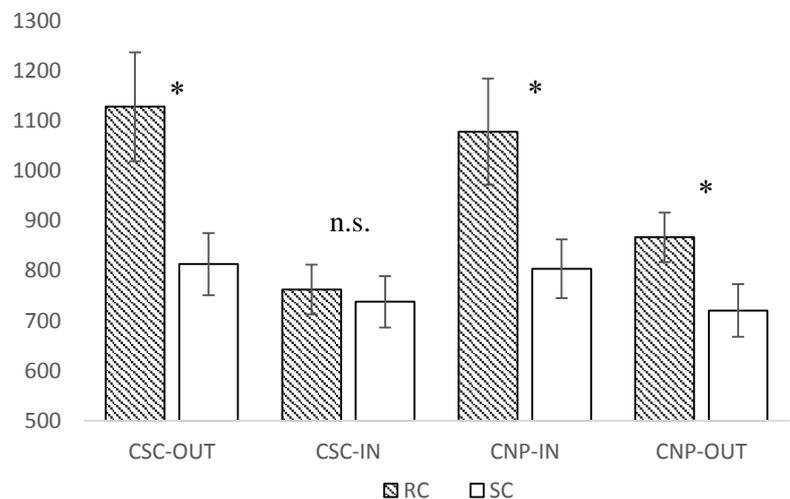
Condition	Example Sentence
CNP-RC	Ha-šotrim mekirim et ha-iša še-ha-xašud [še-takaf et ha-melcar] kilel et ha-tabax axrey še-hu daxaf ota. the-cops knew ACC the-woman that-the-suspect that-attacked ACC the-waiter cursed ACC the-cook after that-he pushed her 'The cops knew the woman who the suspect who attacked the waiter cursed the cook after he had pushed her'.
CSC-RC	Ha-šotrim mekirim et ha-iša še-ha-xašud takaf et ha-melcar [ve-kilel et ha-tabax] axrey še-hu daxaf ota. The-cops knew ACC the-woman that-the-suspect attacked ACC the-waiter and-cursed

	<p>ACC the-cook after that-he pushed her</p> <p>'The cops knew the woman who the suspect attacked the waiter and cursed the cook after he had pushed her'.</p>
CNP-SC	<p>Ha-šotrim imtu et ha-divuax še-ha-xašud [še-takaf et ha-melcar] kilel et ha-tabax axrey še-hu daxaf et ha-iša.</p> <p>The-cops verified ACC the-report that-the-suspect that-attacked ACC the-waiter cursed ACC the-cook after that-he pushed ACC the-woman</p> <p>'The cops verified the report that the suspect who attacked the waiter cursed the cook after he pushed the woman'.</p>
CSC-SC	<p>Ha-šotrim imtu et ha-divuax še-ha-xašud takaf et ha-melcar [ve-kilel et ha-tabax] axrey še-hu daxaf et ha-iša.</p> <p>The-cops verified ACC the-report that-the-suspect attacked ACC the-waiter and-cursed ACC the-cook after that-he pushed ACC the-woman.</p> <p>'The cops verified the report that the suspect attacked the waiter and cursed the cook after he pushed the woman'.</p>

Results (Figure 1) revealed significantly higher reading times (RC>SC) for both non-island positions (CNP-out: $p = .004$ and CSC-out: $p < .001$) and for the CNP-in position ($p = .002$), suggesting that a gap was initially posited in these positions. However, in the CSC-in position, there was no difference between RC and SC ($p = .59$), indicating that there was no attempt to resolve the dependency at this site.

Figure 1: Mean response times (msec) for critical words, Experiment 2

Conclusions: The fact that the Active Filler strategy is available in CNPs (where an RP is possible) but not in CSCs (where an RP is impossible) suggests that the Hebrew parser, unlike its English counterpart, predicts an early RP in islands, rather than a later grammatical gap or an early ungrammatical gap. The results further suggest that RPs are not used to retrieve an inaccessible filler, as the filler is able to actively search for a gap inside the island.



- References: Alexopoulou, T., & Keller, F. (2007). Locality, cyclicity, and resumption: At the interface between the grammar and the human sentence processor. *Language*, 110-160.
- Bourdages, J. S. (1992). Parsing Complex NPs in French. In H. Goodluck & M. Rochemont (Eds.), *Island constraints: Theory, Acquisition and Processing* (pp. 61-87). Springer Netherlands.
- Garnsey, S., Tanenhaus, M., & Chapman, R. M. (1989). Evoked Potentials and the Study of Sentence Comprehension. *Journal of Psycholinguistic Research*, 18(1), 51-60.
- Stowe, L. a. (1986). Parsing WH-Construction: Evidence for Online Gap Location. *Language and Cognitive Processes*, 1(3), 227-245.
- Traxler, M. J., & Pickering, M. J. (1996). Plausibility and the processing of unbounded dependencies: An eye-tracking study. *Journal of Memory and Language*, 35(3), 454-475.