

Semantic effects on processing filler-gap dependencies into adjuncts and conjuncts

In processing filler-gap dependencies (FGDs), comprehenders actively search for a gap after encountering the filler [1–2]. However, active gap formation is suppressed in syntactic island contexts, which has been taken to reflect on-line application of grammatical constraints [3–4]. The nature of island effects is disputed, some attributing them to semantic/pragmatic factors [5–6]. For instance, FGDs are perceived to be better depending on the semantics of the main clause [7], e.g., the difference between *which tune did you arrive whistling* __ is better than *?*which tune did you work whistling* __ is attributed to the different predicates.

However, in a judgment study, [8] found no effect of predicate type on extraction from untensed adjunct clauses. But, in on-line measures, they found increased processing difficulty for plausible dependencies with ‘extractable’ predicates, e.g., achievement predicates (*arrive*). They suggested that extraction from adjunct clauses is syntactically unlicensed, and that the improved acceptability is due to a ‘recovery process’. This recovery process is triggered when a plausible interpretation is considered. However, the nature of this proposed ‘recovery process’ is murky, and it is unclear whether it should extend to all islands.

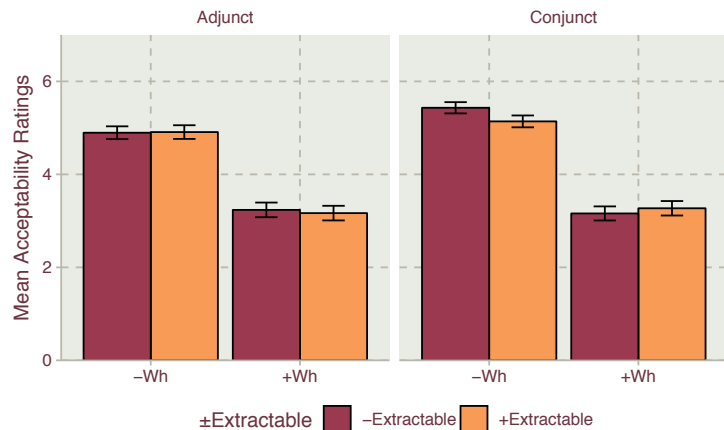
In two experiments, we examined main clause predicate effects on FGDs resolving in adjunct and conjunct clauses. Conjunct clauses are relevant, because they have been argued to permit FGDs depending on the semantics of the sentence, like adjuncts [9–10]. We found a similar complex processing profile in adjunct islands, as [8]. However, increased processing time was found for ‘extractable’ predicates. Importantly, we failed to find this effect in conjunct clauses, suggesting that an unlicensed FGD may only be ‘recovered’ in adjunct clauses.

Experiment 1 was an Acceptability Judgment Task to determine whether main clause predicate affected acceptability of island violations. Thirty-six participants rated 24 sets of sentences on a 1–7 (unacceptable–acceptable). We manipulated whether there was an FGD crossing into an island (\pm Wh), whether the main clause predicate was an “extractable” predicate (\pm Extractability), and Island Type (Adjunct/Conjunct). See Figure 1 for sample sentences.

Figure 1.	\pm Wh		\pm Extractable		Island Type	
John wondered	whether/ which	his best friend	arrived/ worked	at the office	drinking _ / and drank _	late this afternoon

Mixed effects models with rating as dependent variable, manipulations and interactions as fixed effects, and maximal random effects [11] showed reduced judgments for +Wh conditions ($\beta = -1.7 \pm 0.28$, $t = 6.0$, $p < 0.01$), and an interaction effect between \pm Wh and Island Type lowering judgments for extraction from conjuncts ($\beta = -0.57 \pm 0.21$, $t = 2.7$, $p = 0.01$). Pairwise comparisons failed to reveal any effect of \pm Extractability within Island Type and \pm Wh. This suggests that extraction from conjuncts and adjuncts is not affected by main clause predicate type.

Figure 2. Mean acceptability ratings by condition.



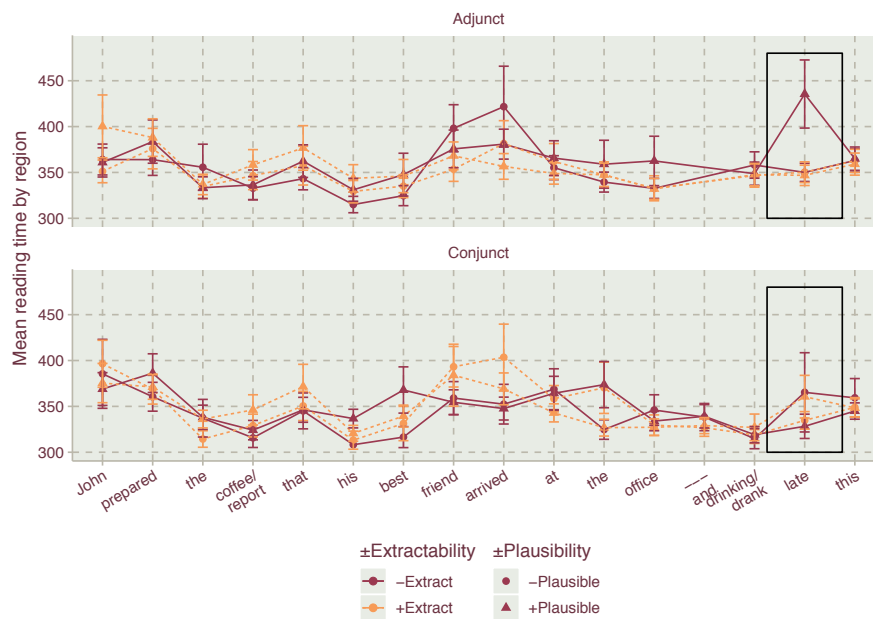
Experiment 2 was a self-paced reading task [12] to determine whether active gap formation applied in adjunct or conjunct clauses as a function of main clause verb type. We used a plausibility mismatch paradigm [2], such that we manipulated the plausibility of the filler as an argument of the verb (\pm Plausibility), \pm Extractability, and Island Type. Figure 3 shows example sentences for these.

±Plausible		±Extractable		Island Type	
John	the coffee/	that his	arrived/	at the	drinking _ /
prepared	the report	best friend	worked	office	and drank _
					late this
					afternoon

Twenty-four participants read the stimuli, which were adapted from Experiment 1. Log residual reading times were analyzed at the region after the critical verb (*late*), using the structure described by [13]. There was a main effect of Plausibility ($\beta=0.09\pm0.03$, $t=2.8$, $p=0.01$), and an interaction effect between Plausibility and Island Type ($\beta=0.12\pm0.04$, $t=2.6$, $p=0.01$). Pairwise comparisons revealed a significant difference between +Plausible and –Plausible within –Extractable, Adjunct clauses only ($\beta=0.09\pm0.03$, $t\text{-ratio}=2.8$, $p=0.01$), suggesting that these effects were driven by the increased difficulty of +Plausible FGDs in +Extractable Adjunct clauses.

Thus, like the findings in [8], we found an interaction between plausibility of the FGD and the main clause predicate that is specific to adjunct clauses, suggesting a ‘recovery’ process selective to adjunct clauses. However, unlike [8], we found increased processing difficulty for

Figure 4. Mean reading times by region and condition.



non-achievement (–Extractable) main predicates. One interpretation of this data may be that gaps are not initially postulated in adjunct clauses. However, if the FGD would be plausible, comprehenders construct it “bottom-up” just in case the main clause predicate was ‘extractable’. The increased processing difficulty in the –Extractable, +Plausible, Adjunct cases reflect detection of an implausible or ungrammatical interpretation.

References. [1] L. Stowe. 1986. *LCP* 1. [2] M.J. Traxler & M.J. Pickering. 1996. *JML* 35. [3] C. Phillips (2006). *Language* 82. [4] M. Yoshida et al. (2014). *LCP* 29. [5] N. Erteschik-Shir (1973). PhD Thesis. [6] B. Ambridge & A. Goldberg (2008). *Cognitive Linguistics* 19. [7] R. Truswell (2011). *Events, Phrases, and Quantification*. [8] A. Kohrt et al. (2018). *CLS* 54. [9] G. Lakoff (1986). *BLS* 21. [10] A. Kehler (1996). *BLS* 22. [11] D.J. Barr et al (2013). *JML* 68. [12] M.A. Just et al. (1982). *Journal of Experimental Psychology: General* 111. [13] <https://hlplab.wordpress.com/2008/01/23/modeling-self-paced-reading-data-effects-of-word-length-word-position-spill-over-etc/>