Gap-filling in English syntactic islands: Evidence from Forced Choice and Maze Tasks

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Natural language allows for filler-gap dependencies (FGDs) between non-adjacent words in a sentence (as *what* and *solved* in ***What*** *do you think that Lisa* ***solved*** *__?*; the underscore indicates the *gap*). FGDs are ungrammatical if the gap is inside certain prohibited structures, metaphorically called *islands* to capture the idea that nothing can "move" out of them [1]. Islands come in two flavors: strong and weak. Strong islands block *any* extraction – simple (*what, who*) and complex wh-phrases (*which NP*) are equally unextractable. Weak islands are claimed to only block the extraction of simple wh, while allowing the extraction of complex wh [2]. However, recent acceptability studies have shown that the strong/weak island distinction is more nuanced: the extraction of complex wh-phrases from weak islands results in an intermediate judgment, suggesting that the island effect is only reduced [e.g. 3].

The psycholinguistic literature has traditionally been interpreted as supporting the categorical strong/weak island distinction: the active search for a gap site (*active gap filling*) is suppressed inside of islands (e.g. [4,5]). However, the acceptability results reviewed above raise the question as to whether gradient effects are also observed in online islands processing: are speakers more willing to posit a gap inside of islands with smaller island effects? The ungrammaticality of islands renders standard tools for investigating gap-filling (self-paced reading or eye-tracking) inadequate, as speakers tend to skim through the sentence as soon as ungrammaticality is detected. We thus approach this question from a slightly different angle and ask how likely speakers are to posit a gap inside of an island when we vary how much information they receive about the continuation of the sentence. Our linking hypothesis is that when less information is available, speakers' choice is more likely to be the result of **early structure-building mechanisms**, while when more information is available, a **late reanalysis mechanism** is more likely to be at play. With this aim, we employed two tasks that differ in the amount of information at the critical choice point: (1) **Forced Choice** (FC) – participants read two fully presented sentences, one with a gap inside of the island and one without, and are asked which one they prefer (**maximum information**); (2) **Maze Task** (MT) [6] – a sentence is presented word-by-word and, at the critical gap position, participants are presented with a choice between two words, one compatible with positing a gap and one with not positing a gap, and must select one to continue the sentence (**minimum information**) (Fig.1).

We conducted 12 experiments testing 3 island types (Whether, Complex NP, Adjunct), 2 wh-types (simple, complex) using 2 experimental tasks (FC and MT). The 3 islands form a gradient cline in judgment studies: fully weak (Whether), intermediate (Complex NP), and fully strong (Adjunct) [3]. Each experiment included six conditions: (1) a grammatical wh-question to establish the ceiling of gap selections; (2) a grammatical yes-no question to establish the floor of gap selections; (3) the critical island condition; (4) a grammatical yes-no question with the island structure to detect any impact of the structure itself; (5) a wh-question spanning an unrelated syntactic violation (word transposition) to detect effects of (unrelated) syntactic violations on gap selection; and (6) a yes-no question with word transposition. Participants saw 8 tokens per condition, plus 48 fillers for a total of 96 items. 48 English native speakers were tested per experiment on Mechanical Turk.

Results from logistic mixed effects regression models for both tasks show: (i) fewer gap continuations for all island types as compared to the corresponding grammatical wh-controls (p<.001); (ii) more gap continuations for Whether island with complex wh relative to their simple wh counterparts (p<.001), as well as for Complex NP, although to a lesser extent, but not for Adjunct islands (Fig.3). These results thus replicate the cline observed in acceptability and suggest a correlation between gradient acceptability and gradient gap-selections. The convergence of FC and MT, however, does not allow us to decide whether the same or different mechanisms underlie the two tasks. Future work must tease apart these hypotheses. That said, these results potentially raise a challenge for any theory of dependency processing that assumes islands are categorically impenetrable.

Example conditions (for both simple and complex wh) illustrated for Whether island (the first choice point is underlined; the 4 remaining choice points are in italic below):

(1) Grammatical wh: What/which puzzle did you think that the candidate solved the/before…
(2) Grammatical y/n: Did you think that the candidate solved the/before…
(3) Island wh: What/which puzzled did you wonder whether the candidate solved the/before…
(4) Island y/n: Did you wonder whether the candidate solved the/before…
(5) Transposed wh: What/which puzzle did you that think the candidate solved the/before…
(6) Transposed y/n: Did you that think the candidate solved the/before…

… problem before the interview?
… the interview in Paris?

Example for Complex NP and Adjunct island conditions:

Complex NP island: What/which puzzle did you hear the rumor that the candidate solved the/before…

Adjunct island: What/which puzzle did you smile because the candidate solved the/before…

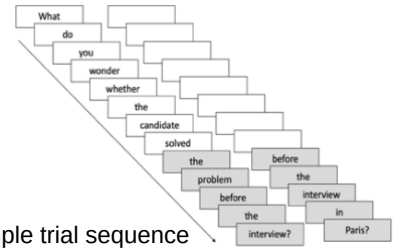


Fig. 1 Sample trial sequence in the Maze Task

Fig. 2 Proportion of selection for gap-sentences in the Forced Choice Task

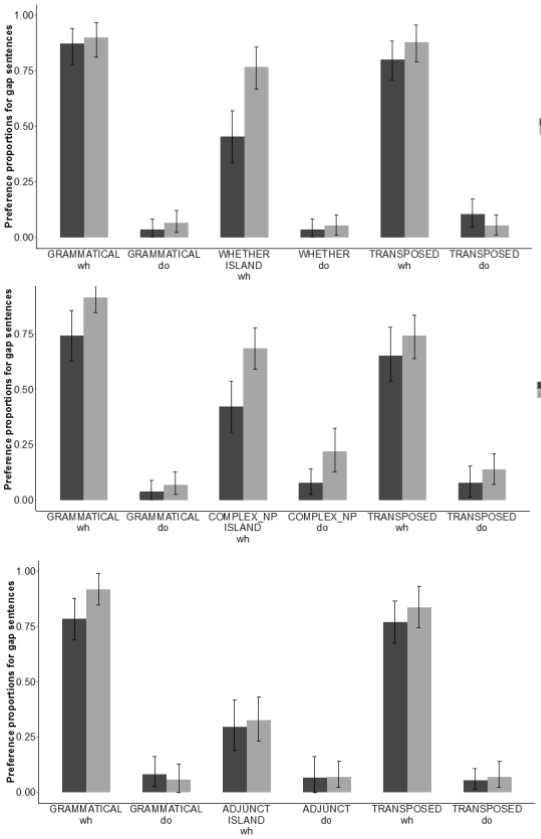
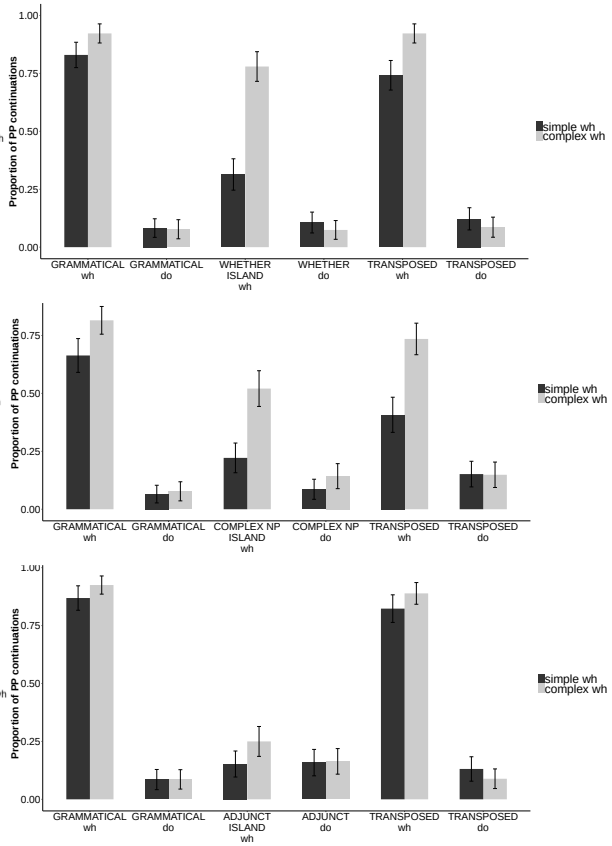


Fig. 3 Proportion of gap-selection in the Maze Task



References: [1] Ross, J. R. (1967). Constraints on Variables in Syntax. MIT, Cambridge, Mass. [2] Szabolcsi, A., & T. Lohndal. (2017). Strong vs. Weak Islands. In The Wiley Blackwell Companion to Syntax, M. Everaert and H. C. Riemsdijk (eds). [3] Sprouse, J., I. Caponigro, C. Greco, & C. Cecchetto. (2016). Experimental syntax and the variation of island effects in English and Italian. *NLLT*. [4] Stowe, L. A. (1986). Parsing WH-constructions: Evidence for on-line gap location. LCP. [5] Traxler, M. J., & M. J. Pickering. (1996). Plausibility and the processing of unbounded dependencies: An eye-tracking study. JML [6] Forster, K. I., Guerrera, C., & Elliot, L. (2009). The maze task: Measuring forced incremental sentence processing time. Behav. Res. Methods.