An Eye Tracking Study of Swedish Filler-Gap Dependencies: Processing Relative Clause Extractions

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An eye-tracking study of Swedish filler-gap dependencies: Processing relative clause extractions

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Abstract

The current study tests whether Swedish relative clauses (RCEs) are processed differently than non-island items, such as subject complements (TCEs). To examine this, we conducted an eye-tracking study using a participant group of 59 native Swedish speakers. The results of our eye-tracking study show that RCEs are not processed like syntactic islands, in line with offline intuitions. This suggests that Swedish RCEs are processed more similarly to non-island TCEs during late stages of integration.

Introduction

Complex noun phrases involving relative clauses (1) are standardly treated as instances of “strong islands” structural configurations into which a filler-gap dependency (FGD) cannot be formed between the filler (those kinds of flowers) and the gap (3) (Ross, 1967; den Dikken & Szabolcsi, 2002). This constraint is widely assumed to be universal.

Unexpectedly, Swedish and the other Mainland Scandinavian languages allow relative clause extractions (RCEs) (2) (Engdahl & Ejerhed, 1982; Erteschik-Shir, 1975), thus presenting a challenge to the universality of island constraints.

Existing accounts for the Swedish data

• Discourse-organizational factors (Erteck-Shir & Lapin, 1979)
• Island violation by way of covert resolution (Cirque, 1986)
• Structural reanalysis during parsing (Kush et al., 2013)

Discourse-organizational factors (Erteck-Shir & Lapin, 1979) and island violation by way of covert resolution (Cirque, 1986) are not clearly sufficient to account for the Swedish RCEs, which are intuitively acceptable but also pattern more like TCEs. Structural reanalysis during parsing (Kush et al., 2013) is presumed to occur, while controlling for the possible influence of non-structural factors (e.g., working memory), which might affect the processing of FGDs.

Approaching the question via processing

• No on-line processing data exists for Swedish.
• Not clear whether processing patterns track intuitive well-formedness.

First step:

• look for basic differences in processing between Swedish RCEs and other FGDs at the embedded verb (hiljadde) and the following PP region (a bussbarnkasten) (see examples 3-4) where integration is presumed to occur, while controlling for the possible influence of non-structural factors (e.g., working memory), which might affect the processing of FGDs.

Second step:

• Two studies suggest that in acceptability judgments and in online processing, only non-islands should show any modulating effects from plausibility and working memory on any primary manipulation.

• Sprouse et al. (2012) found no evidence that acceptability-based island-effects show any modulation from individual differences in general processing resource capacity, as measured via two Working Memory Span (WMS) tasks and grammaticality judgment data (cf. Hofmeister & Sag, 2010).

• Traxler and Pickering (1996) demonstrated via eye-tracking that manipulations to the plausibility of a filler as a continuation of a verb only affected integration for non-island structures, with no differences being found for island structures.

If correct, the presence of an interaction between structural and non-structural factors on Swedish RCEs could then serve as a positive heuristic for non-island status. This would help to confirm that processing of such structures is in-line with their intuitive acceptability.

Research goals and predictions

Use eye-tracking to test whether:

• Swedish RCEs elicit processing costs similar to licit or illicit long-distance FGDs at the embedded verb (hiljadde) and the following PP region (a bussbarnkasten).

• Any basic structural differences are modulated by non-structural factors (e.g., plausibility, pragmatic, and working memory).

Possible outcomes:

• Swedish RCEs will pattern more like non-islands, in line with their intuitive acceptability. Such a finding would leave us with at least two possible interpretations:

• Swedish RCEs do not involve island structures, and thus a structural account is still needed.

• True variation exists in island constraints

• Swedish RCEs, although intuitively acceptable will pattern more like island structures. Such a finding would disfavor “deep variation” in the island constraints themselves (see Philips 2013).

Method

Eye-tracking While Reading (EyeLink 1000 tower mount)

Reverse Digit Span (DS) (adapted into Swedish from MacWhinney et al., 2001).

Automated O-span task (OS) (adapted from Swedish from Unsworth, et al., 2005).

Participants complete three interrelated sets: math operation and letter recall, each set size (3-7 count). Total of 75 letters and 75 math problems.

Participants:

48 native Swedish speakers

Results

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Early measures:

• RCE and TCE show similar facilitation relative to RCE in early measures (First Fixation and Gaze Duration) at the verb (Region 1). This similarity was also present in one early measure (Gaze Duration) at the PP (Region 2). In Region 1, RCE also showed additional facilitation against the possible influence of non-structural factors. Thus they exhibit non-island like behavior during the first stages of filler-gap integration.

Late measures:

• For both late measures of processing in Region 1, and for Total Durations in Region 2, RCEs were processed with more ease than RCEs, patterning more similarly to TCEs as both OS and Prag increased. In Region 1 Total Durations, RCEs also showed some facilitation against the possible influence of non-structural factors as Prag increased, but this could just be reflective of a late repair mechanism.

• Interpretation: Swedish RCEs are processed more similarly to non-island TCEs during late stages of integration.

Conclusions

• RCEs appear to be easier to process than TCEs. Facilitation is dependent in part on non-structural factors (working memory span and pragmatic fit).

• Our study thus provides novel evidence that Swedish RCEs are not processed like syntactic islands, in line with offline intuitions.

References

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