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

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2015

Document Version:
Publisher's PDF, also known as Version of record

Link to publication

Citation for published version (APA):
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.

Unusually, Swedish and the other Mainland Scandinavian languages allow relative clause extractions (RCEs) (2) (Engdahl & Szabolcsi, 2002). This constraint is widely assumed to be universal.

Structures, with no differences being found for island formation.

Researchers have looked for basic differences in processing between Swedish RCEs and other FGDs at the embedded verb (tvättade) and the following PP (när... och tvättade [-]). Unfortunately, none of these accounts stands up under closer scrutiny (Christensen, K. R., & Engle, R. W. (2005). An automated version of the operation span task. Behavior Research Methods, 37(3):498–505).

Participants: 48 native Swedish speakers.

Eye-tracking while reading experiment

Materials

Eighty-long-distance FGD sentence items (constructed using the Korg corpus), each appearing in four structural variants (Structure) (3-6) and six distractor items rotated over four lists.

Method

Eyetracking While Reading (Eyelink 1000 tower mount)

Reverse Digit Span (DS) (adapted into Swedish from MacWhinney et al., 2001). Participants hear a series of digits (3-8 infinite set size) and then enter them on a computer keyboard in reverse.

Automated O-span task (OS) (adapted into Swedish from Unsworth, et al., 2010). Mouse-driven recall task. Participants complete three interrelated sets: math operation and letter recall, each set six (3-7 count). Total of 75 letters and 75 math problems.

Early measures:

• pcRCE
• pcRCE + TCE
• TCE
• RCE

Late measures:

• First Fixation Duration, Gaze Duration, Regression Path Duration (note: this measure did not produce interpretable results), and Total Duration (total processing time) from plausibility and working memory on any primary manipulation.

Results

• no differences being found for island formation.

Conclusions

Early measures:

• RCE and TCE show similar facilitation relative to nRCEs 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 prRCE control as OS and Prag increased.

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 nRCEs, patterning more similarly to TCEs as both OS and Prag increased. In Region 1 Total Durations, nRCE also showed some facilitation against the prRCE control as Prag increased, but this could just be reflective of a late repair mechanism.

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

Summary:

• RCEs appear to be easier to process than nRCEs. Facilitation is dependent on the OS duration (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 inferences.

References

Concluding lines

Acknowledgements

The authors wish to thank the following funders for financial support: The Crafoord Foundation and the Bank of Sweden Tercentenary Foundation. We also thank all those who helped with data collection and analysis.

The authors also acknowledge the support of the Swedish Research Council (VR) and the Swedish Research Council for Humanities and Social Sciences (RSH) under grants 2015-03715 and 2015-03680.