THE EFFECT OF CONTEXT ON LOCAL SYNTACTIC COHERENCY PROCESSING
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We present an eye-tracking reading study investigating whether or not contextual information can guide parsing towards ungrammatical processing of local syntactic coherences (LSCs). LSCs have been shown to interfere with grammatical processing in various constructions, languages, and experimental paradigms (e.g. Tabor et al. 2004). The effect has been attributed to a variety of sources, such as self-organizing parsing (ibid.), simple recurrent networks (Konieczny 2005, Konieczny et al., 2009), bottom-up/top down balancing (Gibson 2006), good enough processing (Ferreira & Patson 2007), rationality (Hale 2011), and noisy channel processing (Levy 2008). To what extent these accounts would predict potential context effects remains to be debated.

This study investigates the effect of supporting contexts on the processing of German verb-final subordinate clauses, such as (1). An ambiguous adverb (“erfreut”/delightful) succeeds a dative pronoun and a nominative NP. The adverb is formally identical with a finite verb (delights). As a finite verb, it could locally be combined with the proper noun Daniela and the subsequent NP her boyfriend to form a short transitive sentence (Daniela delights her boyfriend). This combination however should be ruled out by the preceding dative pronoun him, which cannot be integrated in such a construction (*ihn Daniela erfreut ihren Freund/ him Daniela delights her boyfriend).

(1) Als ihm Daniela erfreut ihren Freund vorstellt, lächelt Mark über das ganze Gesicht. When him Daniela delightful/ delights her boyfriend introduces, smiles Mark over the all face. (German word order)
When Daniela delightful introduces her boyfriend to him, Mark smiles all over the face.

Experimental target sentences like (1) containing a LSC were contrasted with controls, where the ambiguous adverb (“erfreut”) was replaced by an unambiguous mostly synonymous adverb („heiter”/lively). Both were preceded by short contexts. Crucially, these contexts contained a proposition either entailing (2) or inhibiting (3) the local coherence meaning.

(1) Danielas new boyfriend ate nothing better than Tiramisu. To make him happy, Daniela had made some herself. Mark was also invited to dinner. (engl. translation)
(2) Danielas new boyfriend detested nothing more than Tiramisu. To annoy him, Daniela had made some herself. Mark was also invited to dinner. (engl. translation)

Two factors, i. expcond (experimental/lsc vs. control sentences), and ii. context (local support vs. global support) were crossed in a 2x2 design. 21 German native speakers were each presented with 40 items in each condition. Hypothesis 1: If the local syntactic structure is processed as such, which assumes that the ambiguous word is interpreted as a finite verb, processing the subsequent actual finite verb should result in a garden-path alike reading time increase. Hypothesis 2: If a context containing a proposition entailing the local coherence meaning (=local support) facilitates the processing of the LSC, this effect should be elevated, compared to the condition in which the context does not contain such a proposition (=global support).

Residual first pass reading times (FPRT) and regression path durations (RPD) were each fitted in a linear mixed effects model with the two design factors and region (4 levels) as fixed effect predictors (including all interactions), and participant and items as random factors (including fixed effect slopes). As predicted by hyp. 1, FPRTs (fig. 1) revealed significantly longer reading times on the verb in the locally coherent (experimental) condition than in the control condition, regardless of context (t = 3.495, p <.001). RPDs (fig. 2) however showed a significant interaction of expcond and context at the verb (t = 2.315, p <.05), as predicted by hyp. 2.

The results suggest that contextual information can guide parsing towards ungrammatical processing of LSCs. The findings will be discussed with respect to their compatibility with the aforementioned accounts, and in particular good enough processing and connectionist models. We are currently running a follow-up study with a third neutral context condition and to replicate our findings.
Figure 1: Residual first pass reading times as a function of context, expcond (experimental/lsc vs. control), and region of interest (adverb encodes the ambiguous word (full verb/adverb), ambiguous refers to the words between the adverb and the finite verb referred to as verb, and verb+1 represents the subsequent word.

Figure 2: Residual regression path durations as a function of context, expcond (experimental/lsc vs. control), and region of interest.

References


