The Cost of Enriched Composition: Eye-Movement Evidence from German

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Reading research in English has shown that the processing of logical metonymy as in "The student began the book" is costly compared with, e.g., "The student read the book" (McElree et al., 2001; Traxler, Pickering, & McElree, 2002). An explanation for this is that the interpretation of "began the book" requires type shifting of the object noun ("book") into an event representation (e.g. "began reading the book"), a mechanism also known as enriched composition (cf. Pustejovsky, 1995).

The present experiments were designed to answer two important questions: **(A)** Are the results explainable in terms of subcategorization preferences? (Corpus counts suggest that many verbs of the *begin* type prefer VP over NP complements). **(B)** Does a manipulation of the subject-NP contribute to the cost of enriched composition? (Sentence completion results suggest such an influence; cf. Lapata, Keller, & Scheepers, 2003).

Our main experiment was an eye-tracking study in German, comprising six conditions (see literal translations below): (1) contains a metonymic verb, (2) and (3) non-metonymic *control* verbs, and the (a) vs. (b) versions refer to the subject-NP manipulation. Note that, in German, a potential complement verb of "began" (1) would have to occur in clause-final position (e.g. "The student began the book with great pleasure *to read*"); early processing difficulty around "the book" in (1) would therefore be difficult to explain in terms of a subcategorization-preference violation (contrasting with English, where a complement verb would have to follow the matrix verb "began").

The materials were pre-tested by means of plausibility ratings and sentence completion studies assessing the predictability of the object noun ("book"). Reading times in the critical regions (verb, object-NP) were analysed in two steps. First, we conducted multiple regression analyses with reading time per region as criterion and number of characters, plausibility, and object-predictability as predictors. Second, comparisons between conditions were performed on *residual times* (raw reading times minus predicted times from the multiple regressions).

The residual time analyses revealed a reliable increase in processing load for the metonymic verb conditions (1) as compared to the control conditions, (2) and (3), which was particularly prominent in residual regression-path duration on the object-NP and residual total time on the verb (i.e., clearly before the clause-boundary, where no effects were found: Fs < 1). This can be taken as a replication of previous results from English.

Interestingly, there were no significant effects of the subject-NP manipulation - not even in (2) or (3). An analysis of raw reading time (where the expected subject-NP effects in (2) and (3) *did* show up) suggested that this was due to the fact that residual times were adjusted for plausibility differences across conditions (plausibility was found to be a significant predictor of raw reading time in multiple regression; calculating residual times obviously eliminated the effects of the subject-NP across conditions).

Hence, with respect to question **(B)**, we conclude that influences of the subject-NP on reading time do not go beyond plausibility. With respect to question **(A)**, we found that previous results from English are unlikely to be due to a subcategorization-preference violation upon encountering "the book" in (1) – the present German findings cannot be explained in this way. At first glance, it appears that our German data could be construed as some sort of temporary *ambiguity* or *prediction* effect (locally, "the book" may be the object of "began" or of a predicted complement verb of "began"); however, the absence of even just a marginal effect at the clause boundary suggests that no complement verb was predicted in the first place. This also explains why our German readers performed a ('potentially unnecessary') type shifting operation upon encountering "the book" in (1): apparently, there is a subcategorization-preference independent tendency to initially interpret "the book" as direct object of "began" (in line with findings from Pickering, Traxler, & Crocker, 2000). Taken together, we conclude that converging results from German and English provide strong support for the cost of enriched composition.

Examples

(1)   The {a. student, b. author} began the book with great pleasure,..
(2)   The {a. student, b. author} read the book with great pleasure,..
(3)   The {a. student, b. author} wrote the book with great pleasure,..

References

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