Working memory effects of information structure in German left dislocation (GLD)

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Sentences with object-before-subject (OS) orders have been shown to place a greater demand on working memory than subject-before-object (SO) orders (e.g. Hemforth 1993). Additionally, it has been shown that the processing demand for OS orders can be alleviated through contextual licensing of a given information structure (IS: contrast, focus, givenness; e.g. Stolterfoht & Bader 2004; Bornkessel & Schlesewksy 2006). In our study we investigate whether IS-marking (via intonation) influences the processing of GLD sentences with SO vs. OS orders. GLD is a construction where a DP occurs at the left periphery and is taken up later in the clause by a resumptive d-pronoun (RP) with the same case/number/person features:

(1) Der Fuchs, der jagt den Wolf.
   the.NOM fox RP.NOM chases the.ACC wolf
   *Rough translation: 'The fox chases the wolf.'*

GLD has been argued to mark topics (Frey 2004) but (2)&(3) show that it can also mark foci. In (2) a focus particle (*only*) associates with the dislocated phrase; (3) answers a *wh*-question.

(2)  Context: Nobody understands this theorem right away.
    Nur der Streber dort, der hat's natürlich sofort gecheckt.
    only the.NOM teachers.pet there RP.NOM has.it of.course right.away understood
    'Only that teacher's pet over there, he got it right away of course.'

(3)  Context: Who went to the contest?
    Der Direktor, der ist gegangen.
    the director RP.NOM is gone
    'The director, he went.'

The structures that mark topics vs. foci are differentiated prosodically. Topics have a rising accent, the RP being deaccented. Foci have a falling accent, with the RP also carrying a falling accent. In the examples below (see (4-7)) accents are marked with small capitals. A forward slash marks a rising accent, a backward slash marks a falling accent.

In our study, 40 participants listened to pre-recorded GLD sentences like (4-7) where SO order and IS were varied, yielding four conditions: $S_{TOP}$-O, $O_{TOP}$-S, $S_{FOC}$-O, $O_{FOC}$-S. All sentences were transitive (NOM-ACC). In the SO sentences the subject was left-dislocated, in the OS sentences the object was left-dislocated. The TOP-sentences ($S_{TOP}$; $O_{TOP}$) had topic intonation, the FOC-sentences ($S_{FOC}$; $O_{FOC}$) had focus intonation.

(4) $S_{TOP}$-O Der /FUCHS, der jagt den Wolf.
    the.NOM fox RP.NOM chases the.ACC wolf
   *Rough translation for (4)-(7): 'The fox chases the wolf.'*

(5) $O_{TOP}$-S Den /WOLF, der jagt der Fuchs.
    the.ACC wolf RP.NOM chases the.NOM wolf

(6) $S_{FOC}$-O Der /FUCHS, der jagt den Wolf.
    the.NOM fox RP.NOM chases the.ACC wolf

(7) $O_{FOC}$-S Den /WOLF, der jagt der Fuchs.
    the.ACC wolf RP.NOM chases the.NOM wolf
After participants heard a trial, they judged the correctness of a mathematical equation, which served to engage their working memory in a non-linguistic domain. Then they saw a prompt (subject or object noun) and recalled the sentence.

Our analysis of reaction times for the judgment of the equation revealed a main effect for order and IS, as well as an interaction. Equations were judged faster (i) after participants had heard an O_{TOP}-S sentence compared to a S_{TOP}-O sentence, (ii) after participants had heard a S_{FOC}-O sentence compared to an O_{FOC}-S sentence, (iii) after participants had heard an O_{TOP}-S sentence compared to a O_{FOC}-S sentence, and (iv) after participants had heard a S_{FOC}-O sentence compared to a S_{TOP}-O sentence. There was no effect of judgment accuracy. Analysis of the reaction times for the recall revealed a two-way interaction of IS and order, and a three-way interaction of prompt type, IS and order. After a subject prompt, recall was (i) faster for S_{TOP}-O than for S_{FOC}-O, (ii) faster for O_{FOC}-S than for O_{TOP}-S, (iii) faster for S_{TOP}-O than for O_{TOP}-S, and (iv) faster for O_{FOC}-S than for S_{FOC}-O. After an object prompt, recall was faster for S_{FOC}-O than for S_{TOP}-O.

The results of the maths task suggest that in GLD an OS order has a processing advantage over a SO order regarding working memory during processing, if the object is clearly marked as topic by the appropriate prosody in this specific structure. The typical SO advantage is overwritten in this case. We suggest that this is because an object cannot be interpreted as topical in its canonical position so left dislocation can be considered a canonical position for topical objects. Marking topical objects this way is advantageous for discourse organization, where topics are addresses for storing information (Reinhart 1981). Subjects are prototypical topics. Therefore a special marking is superfluous and costly – leading to higher processing costs (reflected in the reaction times in the non-linguistic task). If subjects are focus-marked in an SO sentence, they have the usual advantage over an OS sentences with a focused object. For the recall our results suggest that a subject prompt facilitates retrieval of a SO sentence if the subject of that sentence is a topic rather than a focus. This suggests that the sentence was stored under the topic address when it was processed, confirming the idea of the address function of topics in discourse: information stored under a specific address can be retrieved faster. Further, a subject prompt facilitates the recall of an OS sentence if the sentence-initial dislocated object is a focus rather than a topic. We suggest that in the former case the non-dislocated subject is the topic, again confirming the address metaphor. Similarly, an object prompt facilitates the recall of a sentence where the dislocated subject was a focus, i.e. not topical, in comparison to a sentence where that subject was the topic.

References:


