

Processing noncanonical sentences: online and offline effects on misinterpretation errors

Markus Bader (University of Frankfurt), Michael Meng (Merseburg University of Applied Sciences)

Sentences with noncanonical argument order (e.g., patient/theme-before-agent instead of the more common agent-before-patient/theme order) have provided a longstanding challenge for theories of human sentence comprehension. Experimental studies on noncanonical sentences have been dominated by two issues. First, does discourse context facilitate the online processing of noncanonical sentences? Second, what is the source of offline misinterpretation errors observed by Ferreira (2003) and others?

Here, we report the results of two experiments that examined whether factors that modulate online processing difficulty also affect comprehenders' final interpretation. Both experiments investigated noncanonical object-before-subject (OS) sentences in German, using self-paced reading to assess online processing difficulty and offline comprehension questions presented without delay to probe the content of the final interpretation. Besides varying word order (SO versus OS), we varied the type of NP serving as object and the question probing offline comprehension.

In Experiment 1, 62 participants read 24 three-sentence texts using a non-cumulative word-by-word moving-window display. The object of the target sentence was either a definite NP (*den Verteidiger*) or a demonstrative NP (*diesen Verteidiger*, see Table 1). In a corpus study (see Bader, 2020), a rate of 76% OS order for demonstrative objects contrasted with a rate of 29% OS order for definite objects. Demonstrative objects were therefore hypothesized to reduce online processing difficulty, as compared to definite objects. The subject and object of the target sentences were both given in the preceding context sentences. *Order* and *Object Type* were within-sentence factors. The additional between-sentence factor *Question Type* varied whether the comprehension question asked for the subject/agent or the object/patient of the preceding clause. As in English, a subject question has SO order whereas an object question has OS order. Figure 1 and 2 show the results. A reading time disadvantage was found on the initial NP for definite objects but not for demonstrative objects. On the sentence-final verb, however, reading slowed down for OS sentences regardless of object type. For offline comprehension, the object manipulation had a marginal effect, whereas the question type manipulation led to a robust effect. Accuracy was high when target sentence and question had both SO order, but was reduced to varying extents in the other conditions.

Experiment 2 tested 32 participants using the same presentation method. All 24 target sentences were either SO or OS sentences with a demonstrative object. Question Type was now a within-sentence factor. The question asked again for either the agent or patient. However, instead of containing two arguments as in Experiment 1 (subject and object), all questions had a single argument (a subject). To this end, all target sentences now contained an optionally transitive verb. Intransitive active questions asked for the agent of the target sentences; passive clauses without a by-phrase asked for the patient. Reading times revealed a similar OS disadvantage as Experiment 1, but, as shown in Figure 3, accuracy was quite high across all conditions in Experiment 2.

In sum, small effects of the object manipulation contrast with large effects of the question type manipulation. Importantly, even a most favorable discourse context together with a preferred referential expression did not prevent misinterpretations when comprehension was probed by a two-argument question. When probed by a one-argument question, in contrast, answer accuracy was generally high, which strongly argues that the target sentences were parsed correctly. Since the crucial difference between Experiment 1 and 2 was whether a two- or a one-argument question was used to probe comprehension, we hypothesize that misinterpretation errors reflect difficulties of extracting retrieval cues for querying the target sentence representation held in working memory.

Table 1: A complete stimulus item for Experiment 1 and Experiment 2. Target sentences with definite objects were only included in Experiment 1.

Context:	[C1]	Schon vor dem Spiel war der Ton ziemlich rau gewesen. 'Already before the game, the atmosphere had been rather charged.'
	[C2]	Der eingewechselte Stürmer hatte nämlich einen Verteidiger des Gegners mehrfach beleidigt. 'The new striker had insulted a defender of the opposing team several times.'
Target:	SO	Der Stürmer hat den/diesen Verteidiger dann auch ziemlich rüde gefoult. 'The striker then fouled the/this defender very badly.'
	OS	Den/Diesen Verteidiger hat der Stürmer dann auch ziemlich rüde gefoult. 'The/This defender, the striker then fouled very badly.'
Question:	Exp1	Wer hat jemanden gefoult? / Wen hat jemand gefoult? / Stürmer – Verteidiger 'Who fouled someone? / Who did someone foul? / striker – defender'
	Exp2	Wer hat gefoult? / Wer wurde gefoult? / Stürmer – Verteidiger 'Who fouled? / Who was fouled? / striker – defender'

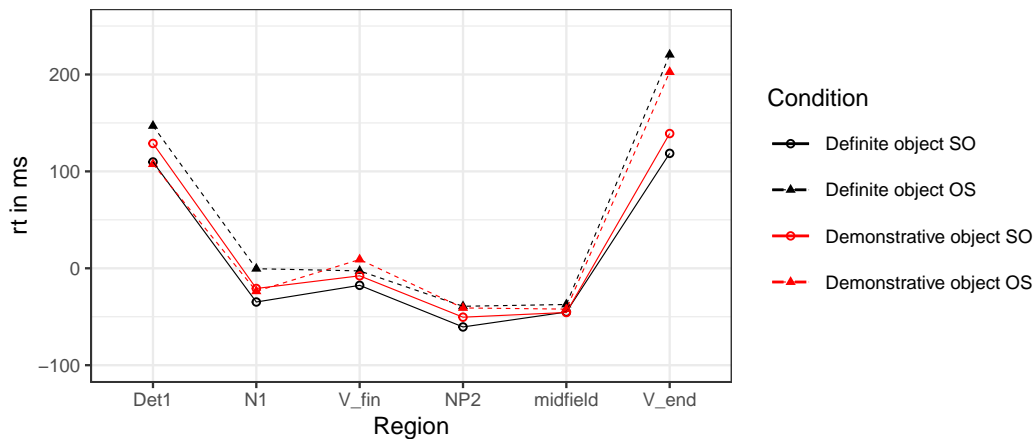


Figure 1: Mean residual reading times in Experiment 1.

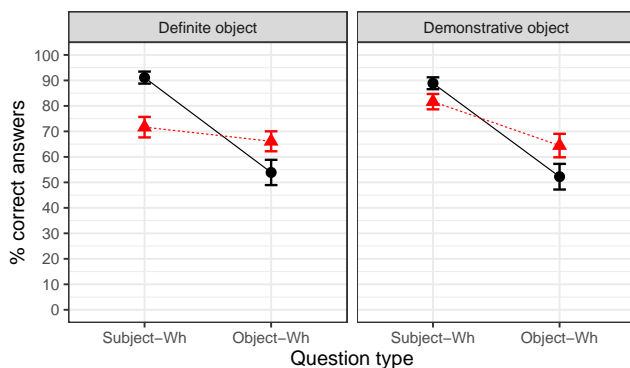


Fig. 2: Answer accuracy in Experiment 1

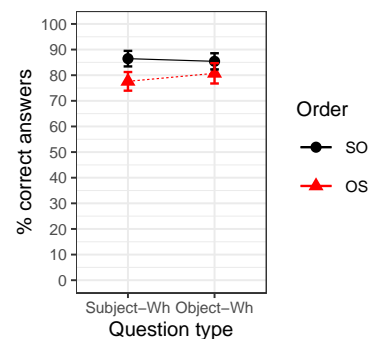


Fig. 3: Answer accuracy in Experiment 2

References

- Bader, M. (2020). Objects in the German prefield: A view from language production. In Woods, R. and Wolfe, S., editors, *Rethinking verb second*, pages 15–39. Oxford University Press, Oxford.
- Ferreira, F. (2003). The misinterpretation of noncanonical sentences. *Cognitive Psychology*, 47(2):164–203.