Misinterpretation errors in context

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Misinterpretation errors for sentences with noncanonical word order have had a major impact on theories of the human sentence processing mechanism (HSPM) since Ferreira (2003). Recently, Grillo et al. (2018) and Paolazzi et al. (2019) showed that passive sentences, in which thematic roles occur with noncanonical order, but syntactic functions do not, are read as fast as, or even faster than, corresponding active sentences. Error rates were slightly higher for passive sentences when questions targeting thematic role assignments were used to test comprehension. Taken together, this suggests that passive sentences are at a disadvantage in comparison to active sentences only with regard to offline processing, but not with regard to online processing. The studies also confirm the need to combine online and offline measures to better understand the mechanisms that bring misinterpretation effects about (Ferreira and Yang, 2019).

The current paper extends the discussion to a sentence type in which both thematic roles and syntactic functions occur with noncanonical order, namely sentences with object-before-subject (OS) word order in German. We present an experiment combining online processing (self-paced reading) with offline performance (answering wh-questions asking for subject or object). In addition to varying word order (SO versus OS), we varied sentence context, which was either neutral or supportive for OS order (see page 3). It is known that supportive context information reduces online processing difficulty for certain types of OS sentences (Weskott et al., 2011). However, it is unknown whether context affects the likelihood of misinterpretations.

Sixty participants read 20 two-sentence texts using a non-cumulative word-by-word moving-window display. One half of the texts was followed by a question asking for the subject of the preceding clause; the other half was followed by a question asking for the object. As in English, a subject question has SO order whereas an object question has OS order.

Accuracy of answers to questions Figure 1 shows the accuracy of question answering. A generalized mixed-effects model did not reveal any significant effect of context, but significant effects of word order and question type as well as a significant interaction between word order and question type. Accuracy for subject questions was much higher for SO than for OS order; an opposite effect of smaller size was found for object questions.

Reading times Table 2 shows reading times (RTs) for different sentence regions. Two major findings are: (1) For the region consisting of the noun of the initial NP and the immediately following verb, RTs were significantly higher for OS than for SO sentences in neutral contexts but no significant difference showed up in supportive contexts. (2) In all following regions, RTs were higher for OS than for SO sentences. In addition, two regions exhibited shorter RTs in supportive contexts. No later region exhibited a significant order $\times$ context interaction.

Discussion The experiment shows that OS sentences lead to a substantial number of misinterpretation errors and are more difficult to read than SO sentences with the exception of the sentence initial NP and the following finite verb. Context did not affect comprehension accuracy, but affected reading times in addition to the effect of word order. In comparison to Grillo and colleagues' results for passive sentences, OS sentences are thus substantially more difficult to process, even with a supporting context and naturally sounding comprehension question. We will argue that passive and OS sentences differ in that way because passives have non-canonical order only with respect to thematic roles but OS sentences with respect to thematic roles and syntactic functions. We will further argue that this feature of OS sentences explains a further finding, namely the strong effect of question type on SO sentences but the absence of such an effect for OS sentences. To account for this interaction, a cue-based retrieval mechanism has to be combined by a search-process operating on syntactic structures.

Table 1: A complete stimulus item including an object question

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Context:	Neutral	Wie jedes Jahr hat auch dieses Jahr wieder ein rauschendes Fest im Schloss stattgefunden.
		'Like every year, a wonderful celebration took place at the castle this year.'
	Supportive	Der betagte König hat auf der großen Feier einen Botschafter in einem ausgefallenen Kostüm begrüßt.
		'The old king greeted an ambassador during the great celebration.''
Target:	SO	Der König hat den Botschafter dabei trotz der Maske erkannt.
		'The king recognized the ambassador despite the mask.'
	OS	Den Botschafter hat der König dabei trotz der Maske erkannt.
		'The king recognized the ambassador despite the mask.'
Question:		Wen hat jemand erkannt? – König – Botschafter
		'Who recognized someone? – king – ambassador'
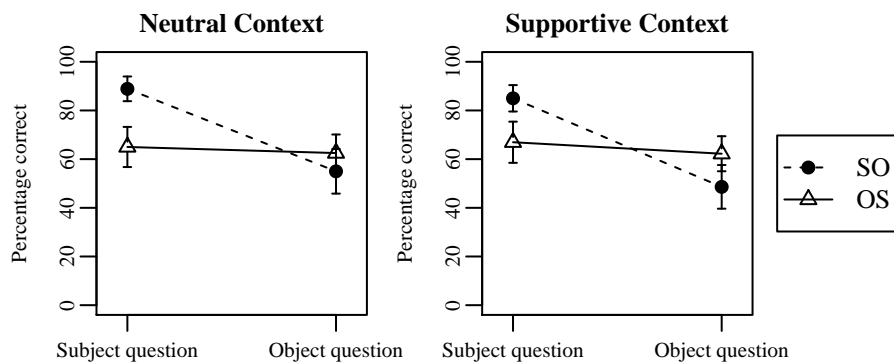
Figure 1: Percentages of correct answers to the comprehension questions.

Table 2: Mean reading times and results from linear mixed-effects models

		Der Det1	König hat Noun + V_{fin}	den Botschafter dabei Midfield1	trotz der Maske Midfield2	erkannt. V_{end}
Context	**Order**					
neutral	SO	481	861	1371	1423	875
	OS	476	942	1458	1497	989
supportive	SO	528	890	1313	1388	810
	OS	536	906	1402	1498	958
MEM	Order		**	**	***	**
	Context	***		*		*
	O × C		*			

(*: $p < .05$; **: $p < .01$; **: $p < .001$)

References

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Additional Information on German

German is slanguage with relatively free word order, where "relatively free" means that subject and object can often appear in both subject-before-object (SO) order and object-before-subject (OS) order. For sentences with agentive verbs, as in the experiment, SO order can be used quite freely. The use of OS order, however, is subject to discourse constraints. For example, fronting the object to sentence-initial position is licensed when the object is discourse given in the sense of Prince's theory of givenness. In the experiment, this is the case in the supportive context condition. In the neutral context condition, OS order is no licensed. Note that SO sentences do not show this kind of restriction; they are thus discourse-licensed in both neutral and supportive contexts.