

Information structure and the processing of word order variation in the first and second language.

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Traditionally, psycholinguistic research has supported the view that non-canonical word orders are inherently more difficult to process than their canonical counterparts [4]. This asymmetry has been explained by arguing that sentences with non-canonical word order are syntactically more complex and pose a greater working memory load. However, few of these studies have taken into account the influence of *information structure*—the relative ordering of given and new information in discourse—on word order variation. It has been shown that there seems to be a cross-linguistic preference to place given information in first position (i.e., given-new structure) and that this ordering is especially relevant for non-canonical constructions [1]. Thus, it is possible that much of the difficulty that has been observed in past studies when speakers process sentences with non-canonical word order might be due to the fact that their discourse requirements have not been met [5]. One question that arises is if similar effects of information structure on the processing of word order variation surface in the second language (L2). The literature thus far has provided divergent results: while some studies have reported that bilinguals are sensitive to information structure and can use it to process non-canonical structures in their L2, especially at high proficiency levels [3], others have shown that they appear to be insensitive to it or show consistent difficulties using it regardless of their proficiency level [6].

Given this, the study described here uses eye-tracking to examine what the effects of information structure are on the online comprehension of active (canonical) and passive (non-canonical) constructions in the L2, in a group of 31 L1-Spanish L2-English learners and a monolingual control group. We examine these constructions because past research has shown that the non-canonical word order that characterizes passives has consequences for its processing: passives place themes, rather than agents, as the grammatical subject. Participants were presented with contextualized sentences in which the *thematic role* (agent or patient) and *information status* (given or new) of the first or second noun (*critical region*) were manipulated (Table 1). Maximal linear mixed-effects were created for two word-level measures: gaze duration (early measure) and total duration (late measure); these included all the variables mentioned above and their interaction as their fixed effects, as well as in their random-effects structures, which included both by item and by subject random intercepts and slopes. Model comparisons were conducted using likelihood ratio tests.

Results (Tables 2 and 3) suggested that highly proficient learners are sensitive to information structure in their L2 and can effectively use it to process word order variation online. L2 learners and monolinguals showed a strong processing preference (i.e., shorter reading times) for given compared to new nouns, and agents compared to themes. Importantly, the effect of information status was strongest on the first noun for both groups, indicating that they were sensitive to the dispreference for new nouns to occur in first position (e.g. their non-canonical position) in comprehension. There was also a processing preference for given nouns and agents that can be explained in terms of accessibility. First, the privileged role of agents in the encoding of events makes them more accessible, as shown in previous research [2]. Second, because given nouns have been previously mentioned in the discourse, faster reading times may reflect a form of priming, making these nouns more accessible [7]. The fact that given nouns are more accessible makes them easier to process in first position, thus explaining the dispreference for new nouns to appear first. Overall, being more accessible makes both given nouns and agents easier to process and more prone to being placed in first position within the utterance, and, crucially, learners are sensitive to the effects of accessibility even in their L2. Finally, results also showed that passives are not inherently more costly to process than actives; while passive subjects do display longer reading times than active subjects, passive objects exhibit *shorter* reading times than active objects. What appears to take precedence, then, is the thematic role of each individual noun: agents are more easily processed than themes, regardless of whether they occur in an active or passive construction. Thus, the results of the present study suggest that bilinguals are able to exploit discourse patterns in the comprehension of both canonical and non-canonical structures in their L2. In addition, the current findings highlight the crucial role of word-level discursive and thematic information in the processing of word order variation.

References

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Table 1. Experimental Stimuli.

Prior Context	<i>A policeman was patrolling the city streets at night. He heard a strange noise and decided to investigate it.</i>	<i>A criminal planned to do something illegal. He was hiding in a dark street, hoping that nobody would discover him.</i>
Active Target	Condition 1: Given Agent, New Theme Soon after, <u>the policeman</u> saw <u>a criminal</u> in the dark of the night.	Condition 2: New Agent, Given Theme Soon after, <u>a policeman</u> saw <u>the criminal</u> in the dark of the night.
Passive Target	Condition 3: New Theme, Given Agent Soon after, <u>a criminal</u> was seen by <u>the policeman</u> in the dark of the night.	Condition 4: Given Theme, New Agent Soon after, <u>the criminal</u> was seen by <u>a policeman</u> in the dark of the night.

Table 2. Mean reading times (ms).

Group	Factor	Gaze Duration	Total duration
Bilinguals	Thematic Role	<i>Agent</i>	242.06 (81.35)
		<i>Theme</i>	245.37 (78.73)
	Information Status	<i>Given</i>	237.80 (78.95)
		<i>New</i>	249.27 (80.63)
	Region	<i>Noun 1</i>	234.85 (78.56)
		<i>Noun 2</i>	250.44 (80.47)
Monolinguals	Thematic Role	<i>Agent</i>	208.24 (59.31)
		<i>Theme</i>	219.12 (64.413)
	Information Status	<i>Given</i>	208.31 (58.40)
		<i>New</i>	218.97 (65.19)
	Region	<i>Noun 1</i>	200.66 (51.51)
		<i>Noun 2</i>	224.72 (67.97)

Table 3. Significant effects for total duration in bilinguals and monolinguals.

Group	Fixed effects	Estimate	Standard Error	t	χ^2	p
Monolinguals	Information status	0.11	0.01	6.25	24.51	< .01
	Thematic role	0.07	0.01	4.56	15.11	< .01
	Information*Region	-0.11	0.03	-2.94	7.85	< .01
Bilinguals	Information status	0.08	0.01	5.36	19.43	< .01
	Thematic role	0.03	0.01	1.98	2.68	.05
	Region	0.11	0.02	-4.15	13.80	< .01
	Thematic*Information*Region	-.017	0.06	-2.67	7.10	< .01