

## A cross-sectional study of non-native Spanish sentence processing

Russell Simonsen & Dustin A. Chacón (University of Minnesota)

simon479@umn.edu

Second language (L2) learners are argued to construct “shallow” (i.e., less detailed) sentence structures and underuse grammatical information when processing their non-native language [1]. For instance, English-speaking learners of Spanish often struggle to interpret non-SVO sentences [2]. As an additional complication for L2 Spanish learners, variations in word order are closely linked to verb type: SVO word order is canonically used with verbs denoting an action (*escribir* ‘to write’), but OVS is canonical with verbs denoting a psychological experience (‘psych verbs’, *importar* ‘to matter’). Native Spanish speakers process these canonical patterns more easily than non-canonical ones and also use word order cues to predict the lexical class of upcoming verbs [3,4]. We explored whether L2 learners are sensitive to the canonicity of word order/verb class, and tracked the development of this in a cross-sectional study, filling a critical void in L2 research [5].

We examined the sensitivity to verb class and word order in native speakers and three groups of L2 Spanish learners. We found that all four groups read SVO word order more quickly than OVS. Native Spanish speakers read SVO word order more quickly with action verbs (= non-psych), replicating the results in [3]; advanced L2 learners showed this same interaction between SVO word order and action verbs. Unlike advanced learners/native speakers, beginner/intermediate learners only showed sensitivity to word order differences—not to the interaction between verb class and word order. We propose that beginner and intermediates construct detailed grammatical representations in processing, but are unable to use syntactic information to make predictions about verb class like advanced learners/native speakers [4].

**Experiment.** A self-paced reading task (24 items; 40 fillers) was completed by three L2 Spanish speaker groups with different proficiencies: beginner (4<sup>th</sup> semester students; n=33), intermediate (Spanish majors; n=30), and advanced (Spanish MAs/PhDs; n=26). A control group of native Spanish speakers (n=26) also completed the task. Target sentences appeared in four conditions in a 2 × 2 design: SVO/action verb; SVO/psych verb; OVS/action verb; OVS/psych verb. Sentences were presented in segments, with three critical regions and two spillover regions. In all conditions, the critical regions were: (0) the first NP argument, (1) the verb, and (2) the second NP argument. All sentences were followed by a comprehension prompt. In all conditions, comprehenders only needed to read regions 0 and 1 (first argument and the verb) to determine whether their word order/verb class expectations were met. The second NP region was included in the analysis as a spillover region.

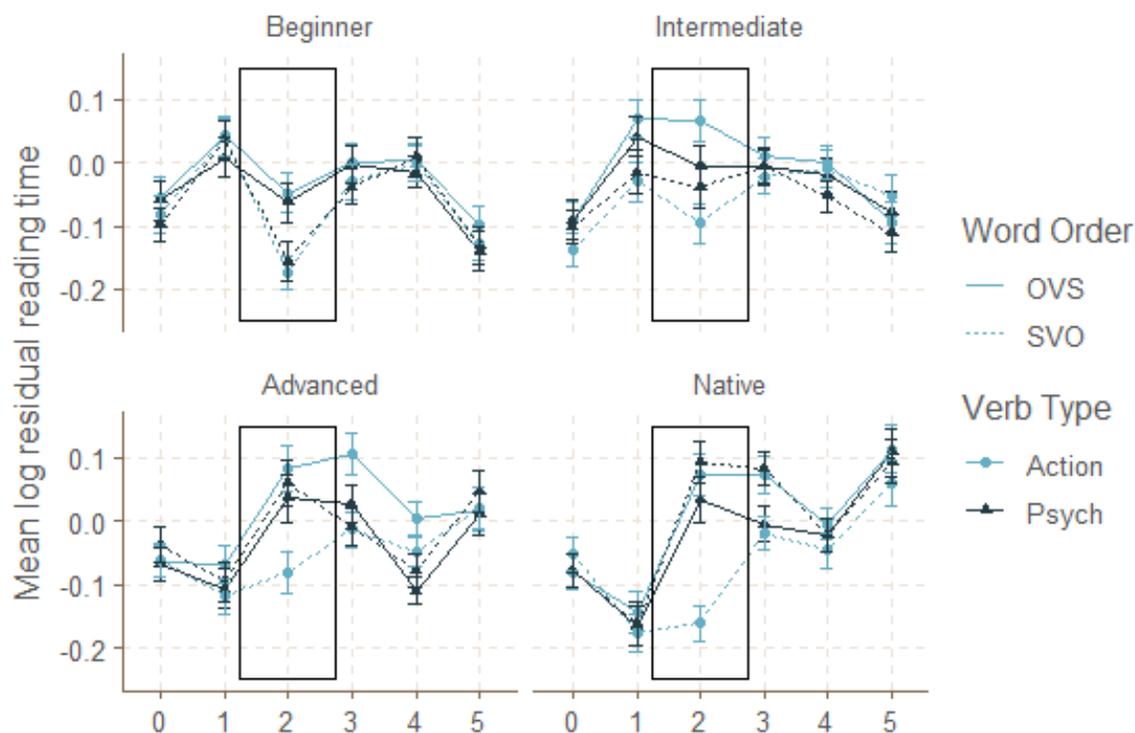
All correctly answered trials were included for analysis (85% beginners; 90.1% intermediates; 94.4% advanced; 91.7% natives). Following [5], we constructed mixed effects models for each population with log residual reading times as the dependent variable and Verb Type and Word Order as factors. In all groups (beginner; intermediate; advanced; native), region two was read significantly faster in SVO sentences than in OVS sentences ( $\beta = -0.09$ , SE = 0.04,  $t = -2.31$ ,  $p = 0.02$ ;  $\beta = -0.11$ , SE = 0.04,  $t = -2.5$ ,  $p = 0.01$ ;  $\beta = -0.16$ , SE = .05,  $t = -3.124$ ,  $p = .002$ ), which shows that all groups were sensitive to word order. However, in the advanced and native groups, there was also a significant interaction between word order and verb type at the same region ( $\beta = 0.18$ , SE = 0.07,  $t = 2.48$ ,  $p = .01$ ;  $\beta = 0.30$ , SE = 0.07,  $t = 4.45$ ,  $p < 0.01$ ). We interpret this to mean that advanced learners/native speakers used word order to make predictions about the class of verb that would appear in the sentence [4].

Making such predictions in real time requires a sophisticated understanding of the interaction between word order and verb type. While beginner/intermediate learners do not show sensitivity to this interaction, they do pay attention to different syntactic patterns (SVO vs. OVS), like advanced and native speakers. The results indicate that the main difference between groups is the ability to relate word order/verb class information in real time, not the “shallowness” of the computed sentence structure [1].

<b>SVO</b>					
<i>Brenda</i>	<i>le canta/ le importa</i>	<i>a Ernesto</i>	<i>y no entiende</i>	<i>la razón..</i>	
Brenda	'sings/ matters'	to Ernesto	'and doesn't understand'	'the reason...'	
<b>OVS</b>					
<i>A Brenda</i>	<i>le canta/ le importa</i>	<i>Ernesto</i>	<i>y no entiende</i>	<i>la razón..</i>	
To Brenda	'sings/ matters'	Ernesto	'and doesn't understand'	'the reason...'	
Region:	0	1	2	3	4

**Table 1.** Sample set of stimuli in Experiment, with region labels.

## Self-paced reading results



**Figure 1.** Mean log reading times by word order and verb type. The boxed reading time corresponds to the region in which analysis was conducted (the first post-verbal region).

**References.** [1] H. Clahsen and C. Felser. (2006). *Applied Psycholinguistics* 27 [2] C. A. Isabelli. (2008). *Hispania* 91 [3] C.A. Gattei et al. (2015). *Quarterly Journal of Experimental Psychology* 68. [4] C.A. Gattei et al. (2015). *Brain and Language* 150. [5] Jegerski and VanPatten. (2013). Routledge. [6] [hplab.wordpress.com/2008/01/23/modeling-self-paced-reading-data-effects-of-word-length-word-position-spill-over-etc/](http://hplab.wordpress.com/2008/01/23/modeling-self-paced-reading-data-effects-of-word-length-word-position-spill-over-etc/)