

## Revisiting attachment preferences in Spanish: is there a high attachment bias?

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Psycholinguistic studies carried out in the last decades have found that attachment preferences present crosslinguistic variation and that Spanish speakers usually prefer high attachment (Carreiras *et al.* 1993, Dussias 2001). Many theories, such as Construal (Frazier & Clifton 1996), Recency and predicate proximity (Gibson *et al.* 1996) and Implicit prosody (Fodor 2002), have been proposed to account for the crosslinguistic variation on relative clause attachment. However, another set of theories suggests that crosslinguistic differences in biases may be reduced to individual differences (Swets *et al.* 2007, Wells *et al.* 2009) or to a syntactic difference, namely the availability of pseudo relatives (Grillo *et al.* 2014).

We are conducting a series of experiments to deepen the study of the psycholinguistic processes carried out during sentence parsing in Spanish, specifically in the Rioplatense variety. Here we present the results of our first study, which will serve as a baseline for the following experiments. We conducted a reading task with comprehension questions. We presented ambiguous sentences with relative clauses in two positions (see Sample stimuli): object (ORC) and subject (SRC). After each sentence, participants had to answer a multiple-choice interpretation question, to verify attachment preferences. The items were presented in 3 counterbalanced lists: 18 items and 27 fillers each. The task was programmed and performed in IBEX and 147 people were tested (103 women, age:  $M=34.41$ ,  $SD=13.85$ ).

Regarding response types and attachment preferences, we found a bias towards the second noun-phrase (NP2) for both ORC and SRC (Figure 1). For the SRC, the preference towards low attachment is clear: 75% (low) vs 25% (high). For ORC, the preference is at the level of chance: 57% (low) and 42% (high). We used Generalized Mixed Effects Models for the analysis and find a statistically significant difference on the response types regarding the position of the RC ( $\beta_0=0.4642$ ,  $z= 2.024$ ,  $p= 0.0429$ ;  $\beta_{1\_SRC}= 1.1038$ ,  $z= 3.909$ ,  $p= 9.28e-05$ ).

When analyzing the response times (Figure 2), we found that participants took longer to attach to the first noun phrase (NP1) ( $M=4494$ ,  $SD=4035$ ) than to the second ( $M=3767$ ,  $SD=3601$ ) for both ORC and SRC. We used Linear Mixed Effects Models for the analysis and found an effect of attachment preference (high vs low):  $\beta_0=4234.2$ ,  $t=21.748$ ,  $p<2e-16$ ;  $\beta_{1\_NP2}=-329.9$ ,  $t=-2.149$ ,  $p=0.0318$ . We also found an interaction between the position of the RC: for the ORC there was no statistically significant difference between attaching to the NP1 or to the NP2 ( $p=0.9799$ ). However, this difference was significant for the SRC ( $p=0.0004$ ). Also participants took shorter times to attach the NP1 to an ORC ( $M=4205$ ;  $SD=3378$ ) than to a SRC ( $M=4997$ ;  $SD=4942$ ), the difference was statistically significant ( $p=0.0218$ ).

Firstly, we found a preference for low attachment when the relative clause is in the subject position, as reported in previous studies (Hemforth *et al.* 2015). Secondly, these results show no offline preference for high attachment in Spanish, as suggested by some recent studies (Alonso-Pascua 2020, Hemforth *et al.* 2015). Moreover, we found longer response times for high attachment, which could indicate that, when it occurs, it's an offline and interpretative preference. The analysis of responses to determine attachment bias points out a statistically significant difference between SRC and ORC, but in both cases the bias is towards low attachment, although for the ORC the attachment preferences seem to be at the level of chance. One possible explanation lies on the syntactic characteristics of the stimuli: it could be the case that some sentences allow a pseudo relative (PR) interpretation, which, according to the Pseudo-Relative First Hypothesis (Grillo *et al.* 2014), will be preferred over a genuine RC, forcing thus a high attachment. This hypothesis was not considered in the confection of the stimuli, however, a posterior analysis of the results shows that 6 sentences allow a PR lecture and for 4 of them showed a strong bias towards high attachment. Taken together, these results would suggest that there is no clear Spanish attachment bias, however, further experiments should be done to test de Pseudo-Relative First Hypothesis and the processing of genuine RC in Spanish interpretation.

## Sample stimuli

### 1. ORC:

El joven empujó al sobrino (NP1) de la maestra (NP2) que viajaba en el barco.  
*The young man pushed the nephew (NP1) of the teacher (NP2) who was traveling on the boat.*  
¿Quién viajaba en el barco? a. el marinero; b. el sobrino; c. la maestra; d. la lingüista  
*Who was traveling on the boat? a. the sailor; b. the nephew; c. the teacher; d. the linguist*

### 2. SRC:

El asistente (NP1) del ministro (NP2) que hablaba tres idiomas tuvo un romance prohibido.  
*The assistant (NP1) of the minister (NP2) who spoke three languages had a forbidden romance.*  
¿Quién hablaba tres idiomas? a. el asistente; b. el ministro; c. el intérprete; d. el físico  
*Who spoke three languages? a. the assistant; b. the minister; c. the deputy; d. the physicist*

## Figures

Figure 1: Attachment preferences by RC position

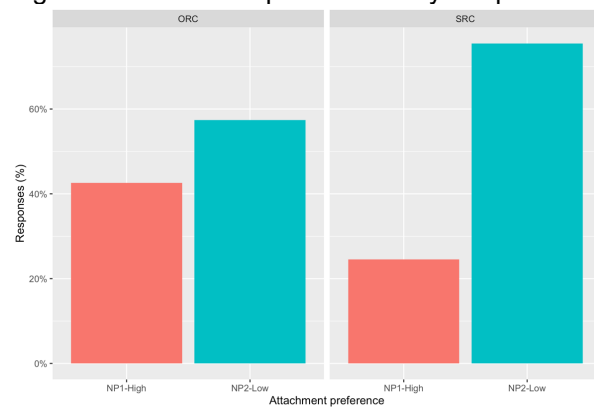
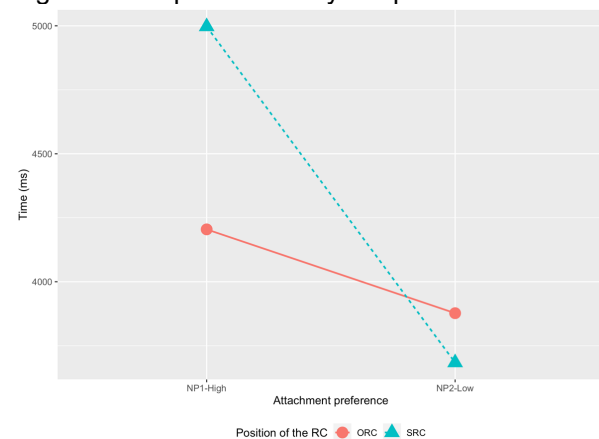


Figure 2: Response time by RC position



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