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Conference or Workshop Item:

Aguilar, Miriam and Grillo, Nino orcid.org/0000-0002-8224-365X (2019) Prediction and generation of fine-grained grammatical structure aligns with parsing preferences : The case of Relative Clauses. In: Psycholinguistics in Iceland, 19-20 Jun 2019.

Prediction and generation of fine-grained grammatical structure aligns with parsing preferences: The case of Relative Clauses.

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A strong hypothesis in Psycholinguistics posits shared mechanisms for comprehension and production (Pickering & Garrod, 2007; Momma & Phillips, 2018). Following this single mechanism view, if the parser and the generator are identical (Momma & Phillips, 2018), parsing preferences observed in the language processing literature should also be suited to generation.

In this study, we tackle the case of Relative Clauses (RCs). We know that when it comes to RCs, avoidance is well documented in parsing (e.g. see Staub et al. 2018 for RC versus complement clause interpretation). Grillo & Costa (2014) illustrate this in ambiguous contexts that license both a RC and a Pseudo-Relative (PR) reading, where PR-compatibility leads to higher acceptability and shorter fixation durations (Grillo et al., 2015, Fernandes et al., 2018). Single mechanism approaches would predict a similar preference to be observable in production.

We present evidence from two sentence completion studies eliciting RCs in Spanish (a PR-compatible language) and English (a PR-incompatible language) showing that prior predictions built while reading modulate generation of fine-grained grammatical structure in ways comparable to comprehension.

Participants (Spanish, N=40, English N=40) completed snippets containing a perceptual or stative verb + object + complementizer (e.g. *Ian saw/worked with the dentist that…*). Complementizers introduce exclusively RCs in both conditions in English, and only with statives in Spanish. PRs and RCs continuations are both licensed under perceptual predicates in Spanish. Therefore, only RCs are allowed in all conditions of this experiment with one exception, in eventive predicates (with perceptuals) in Spanish (1), where both RCs and PRs are available..

(1)   Ian vio al chico que estaba corriendo.

'Ian saw the boy running.'   'Ian saw that boy that was running.'

PR interpretation   RC interpretation

Availability of PRs is heavily restricted: PRs require perceivable eventive predicates, tense-match between matrix/embedded verb and imperfectivity. RCs, on the other hand, do not impose any restrictions on any of these variables. Preference for PR-generation would thus lead us to expect greater variability in each of the aforementioned variables in unambiguous RC environments than when PRs are available, i.e. we expect participants to produce a greater proportion of continuations involving perceivable eventive predicates, matching the matrix predicates in tense and imperfective aspectual form in the environment of perceptual verbs exclusively in Spanish. Using these factors as criteria to evaluate participant's productions (see Table 1 for an example of evaluation), the number of PR-compatible continuations was compared in ambiguous PR/RC environments (i.e. after perceptuals) and unambiguous RC environments (i.e.after stative verbs) in both languages. The results show an interaction between language (English vs Spanish) and verb type (stative versus perceptuals) (p <.001). Pairwise comparisons show an effect of verb type in both English (p=.03) and Spanish (p<.001), but the interaction is explained by a clear different pattern only in perceptuals between both languages (p<.001) with a clear polarization in Spanish (50% in Spanish versus 17% in English) where half of the continuations obey criteria for PR-compatibility, versus English with just 17% of completions that could fit criteria to be considered PR-compatible. No difference between both languages is observed in the condition with statives (7% in Spanish versus 6% in English, p>.05).

The data we present here are compatible with the idea of a single underlying system for production and comprehension, and along these lines, parsing preferences rooted within it modulate both parsing and generation. The results further suggest that the scope of the projected structure built while reading includes fine-grained grammatical and semantic information, including tense and inner and outer aspect.

Table 1. Example of continuations and criteria used to evaluate PR-compatibility.

|	Eventive predicate	Tense-match	Imperfective	PR-compatible
Andrea oyó al niño que **estaba llorando**. Andrea heard the boy that **was crying**.	✓	past-past ✓	✓	✓
Javi vio a la chica que **se había caído por las escaleras.** Javi saw to the girl that **had fallen down the stairs**.	✓	past-past ✓	✗	✗
Eduardo miró al piloto que **perdió a su familia.** Edward looked at the pilot that **lost his family**'	✕	present-past ✗	✗	✗
Martín trabajó con el ingeniero que **le gusta a María.** Martin worked with the engineer that **Mary likes**.	✗	past-present ✗	✗	✗
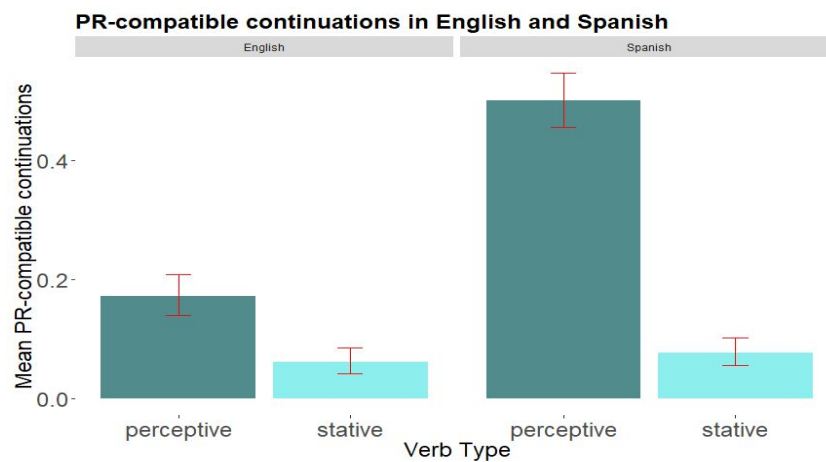
Figure 1. Mean PR-continuations per condition in English and Spanish.

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