Effects of language dominance on the predictive processing of L1 relative clauses

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Eye-tracking studies employing the visual world paradigm have demonstrated that listeners actively predict semantic relations and syntactic structure by integrating visual information with auditory language (e.g., Altmann & Kamide, 1999, 2007; Kamide et al., 2003). While the majority of these studies have focused on monolinguals, studies of bilingual processing have demonstrated that first-language processing is “permeable” to the effects of later-learned languages (e.g., Dussias & Sagarrá, 2007), and that relative language dominance modulates the effects of later-learned languages on the first-learned language (e.g., O’Grady et al., 2009).

The present study utilizes eye-tracking in the visual world paradigm to analyze the effects of language dominance on the predictive processing of L1 relative clauses. Psycholinguistic research has demonstrated a robust processing asymmetry between subject relative clauses (SRCs) as in (a), and object relative clauses (ORCs) as in (b), such that ORCs are more time-consuming or costly to process than SRCs in monolinguals of, among other languages, Spanish and English (e.g., Betancort et al., 2009; Traxler et al., 2002). One of the most well-supported accounts of this asymmetry is the active filler hypothesis (Clifton & Frazier, 1989), whereby the parser actively tries to complete unbounded dependencies as soon as possible. In the case of relative clauses, the active filler parsing strategy leads to a subject preference; i.e., in SRCs, the first parse works, while in ORCs, the first parse fails and syntactic reanalysis is required.

(a) El gato, que jala al conejo, corta al oso. (b) El gato, que el conejo jala, corta al oso.

The cat, who pulls the rabbit, cuts the bear. The cat, who the rabbit pulls, cuts the bear.

We compare heritage speakers of Spanish (n=20)—whose first-learned language is Spanish but who were raised in the anglophone US—to Spanish-English late bilinguals (n=20)—who were born in a Spanish-speaking country and moved to the anglophone US at age 17 or later. Language dominance is measured using the Bilingual Language Profile (Birdsong et al., 2012) and a Student’s t-test demonstrates that the late bilingual group is significantly more Spanish-dominant than the heritage speaker group (p < .001). Participants complete a picture-sentence matching task with sentences presented auditorily in Spanish, while the location of their gaze is recorded. Two conditions are presented: SRCs (as in (a)) and ORCs (as in (b)).

Following previous eye-tracking studies, (e.g., Traxler et al., 2002), fixation data is binned to four temporal regions in the stimulus: (1) the onset of the auditory stimulus until the onset of the word following the relativizer que, (2) the relative clause (excluding que), (3) the matrix verb and its object, and (4) the offset of the auditory stimulus until the participant’s response. Proportions of target fixations in each region are fit with beta regression models to test for effects of group and condition.

As seen in Figure 1, late bilinguals are significantly less likely to fixate on the target image during ORCs than SRCs in Region 2 (p < .001) and Region 3 (p < .001), demonstrating a subject preference, while heritage speakers are significantly less likely than late bilinguals to fixate on the target image during SRCs in Region 2 (p < .01, p < .05), demonstrating a lack of the subject preference. In Region 3, however, heritage speakers are significantly more likely than late bilinguals to fixate on the target image during ORCs (p < .01). This suggests that late bilinguals experience an ORC processing penalty in Region 3 caused by the subject preference, which heritage speakers do not exhibit.

In order to account for these results, we propose that greater dominance in the first-learned language causes more active prediction in first-language processing. While the active prediction exhibited by late
bilinguals causes a processing advantage during SRCs in Region 2, it causes a processing penalty during ORCs in Region 3, neither of which are exhibited by heritage speakers.

Figure 1

![Proportion of Target Fixations](image)