Illusions in bilingual gender predictions

Linguistic illusions have been mostly studied in experiments about the comprehension of retrospective or backward-looking relations, e.g., those between an anaphor and a previously mentioned antecedent, or between a verb and its preceding subject [1,2]. But illusions may also arise in the comprehension of predictive relations, such as gender agreement between a possessive pronoun and a following noun [3]. Here we ask: do predictive illusions occur in bilingual/L2 speakers? If so, are they modulated by their native/L1 language, which is frequently invoked to explain L2 errors? [4] We conducted a visual world experiment on possessive pronouns that compared Spanish and English speakers of L2 German. We found that both L2 groups exhibited predictive illusions but that the size of illusions did not depend on speakers’ L1.

**DESIGN.** German possessives have a bi-directional pattern of gender agreement: their stem encodes agreement with a previously mentioned referent (as in English *his/her*). Further, their suffix encodes agreement with a following noun (as in Spanish). Thus, upon encountering a German possessive, comprehenders can use its gender features to both retrieve an antecedent and to predict an upcoming noun. Crucially, only the suffix gender is relevant for the noun prediction. Our research question was whether the (syntactically irrelevant) antecedent gender feature would affect predictions, specifically by facilitating them when the antecedent and upcoming noun matched in gender (an “illusory advantage”). To assess whether the illusion strength depended on speakers’ native language, we compared 54 Spanish and 63 English advanced German learners (matched in German proficiency and age of acquisition). We expected Spanish speakers to be more prone to an illusion, given previous findings that Romance speakers often produce gender errors with possessives in Germanic languages, e.g., *The dad put *her little girl...* [5,6]. These errors suggest that in production, Romance speakers wrongly establish an agreement relationship between the possessive stem and the following noun (L1 influence).

**METHOD & RESULTS.** Participants heard an instruction with a possessive pronoun, e.g.: ‘Click on *his/her* blue button’, while seeing a display with a target object and a competitor of different gender. In the match condition, the antecedent and target noun in the instruction matched in gender; in the mismatch condition, they didn’t. A bootstrapping analysis was used to estimate the onset of predictive looks to the target object [7]. We found a clear illusory advantage in both groups: in comparison with the mismatch condition, the prediction onset in the match condition was on average 139 ms earlier in the English group and 214 ms earlier in the Spanish group (Figure 1). While this illusory advantage was numerically larger in the Spanish group, the evidence of L1 influence was inconclusive: the effect’s 95% credible interval spanned both positive and negative estimates: 75 [-74, 223] ms. The existence of L2 illusions is interesting because it shows that L2 speakers can rapidly process both gender features of the possessive—otherwise they wouldn’t get the illusion or predict the object—although each group is missing one of the dependency directions in their L1. Further, the lack of L1 influence provides an interesting contrast between production and comprehension, specifically regarding the mechanisms used to generate expectations in each modality [5,6,8].
Materials

**Figure 1.** Percentage of fixations to each object in English and Spanish learners of L2 German. The temporal window to assess the existence of predictions extended from the possessive onset until the noun onset (shifted 200 ms to the right). Black circles denote the average onset of predictive effects together with a temporal 95% credible interval. For both groups, the onset of predictions occurred earlier in the match than in the mismatch condition, consistent with an illusory advantage.