Gender agreement attraction in Spanish sentence comprehension: Evidence for cue-based parsing

Jorge González Alonso¹, Ian Cunnings², Hiroki Fujita², David Miller³, Jason Rothman¹⁴
1. UiT The Arctic University of Norway; 2. University of Reading; 3. University of Illinois at Chicago; 4. Universidad Nebrija

Cue-based parsing (Lewis et al., 2006) predicts that differently matching grammatical cues will result in interference during sentence processing, as in the resolution of morphosyntactic dependencies. Number-agreement attraction—a noun with a distinct number specification intervening between the actual head-noun and verb seemingly controlling agreement, e.g., ‘The key to the cabinets were rusty’—is a well-studied example (Lago et al., 2015; Wagers et al., 2009). The majority of existing research has tested subject-verb number agreement attraction. Herein, we investigated gender agreement attraction during comprehension in Spanish, as in (1/2). In (1), the adjective (castigada) matches the gender of the head-noun (hija), while (2) is ungrammatical as the head-noun (hijo) mismatches the gender of the adjective. A distractor noun (jardinero/a) matches the adjective’s gender in (1a/2a) but not in (1b/2b).

Acuña-Fariña et al. (2014) found longer reading times for sentences like (1b) compared to (1a), arguing that the distractor’s gender led to a faulty encoding of the head noun’s gender. This is unexpected under cue-based parsing, which predicts retrieval interference from distractor that match, rather than mismatch, the adjective’s gender. An attenuation of the ungrammaticality effect in (2a), where the distractor matches the adjective’s gender, compared to (2b) would constitute the clearest evidence for cue-based parsing. We examined attraction in four experiments (n=32 each). Experiments I and II employed animate nouns with biological (natural) gender (sentences 1/2), while Experiments III and IV had the same structure but replaced the animate nouns in 1/2 with inanimate ones (sentences 3/4). Experiments I and III were offline judgement tasks, while II and IV adopted eye-tracking during reading. Finally, experiment V combined all previous items in a speeded judgement task.

In Experiments I and III, participants rated ungrammatical sentences significantly less acceptable than grammatical sentences (p<.001), while the distractor did not influence ratings. In the online experiments, agreement attraction became more apparent. Experiment II showed significantly longer reading times (ps<.001) at and after the adjective for ungrammatical sentences, with a significant interaction in regression path times (p=.020). Here, reading times were reliably shorter in condition (2a) than condition (2b), but did not differ in the grammatical conditions. Experiment IV showed the same numerical trends, with a significant grammaticality effect and an attenuation of the ungrammaticality effect showing most clearly at the spillover region, although the interaction was not statistically significant (p=.144). A combined analysis of experiments II and IV indicated a significant grammaticality by distractor interaction (p=.005) but no interactions with experiment, suggesting attraction effects hold even when gender is purely syntactic. Experiment V also showed a significant grammaticality by distractor interaction, whereby participants were less accurate rejecting ungrammatical sentences where the distractor matched the gender of the adjective.

We did not replicate Acuña-Fariña et al. (2014), but found evidence of attraction in ungrammatical sentences, similar to subject-verb agreement. These findings suggest that retrieval interference, not a faulty encoding of the features of the head noun, is the source of attraction during comprehension, as predicted by cue-based parsing. These data paint a more accurate baseline picture for comparisons with bilingual populations, underscoring how agreement issues can also pertain to monolingual populations, especially relevant since grammatical gender is a widely-used domain to explore differences between native and non-native grammars (Hopp, 2013).
Example sentences from Experiments I and II (biological gender):

(1a) Grammatical, Distractor Match
La hija de la jardinera estaba siempre castigada sin poder salir de casa.

(1b) Grammatical, Distractor Mismatch
La hija del jardinero estaba siempre castigada sin poder salir de casa.

(2a) Ungrammatical, Distractor Match
El hijo de la jardinera estaba siempre castigada sin poder salir de casa.

(2b) Ungrammatical, Distractor Mismatch
El hijo del jardinero estaba siempre castigada sin poder salir de casa.

“The daughter(1)/son(2) of the gardener-FEM(1a,2a)/-MASC(1b,2b) was always grounded FEM from leaving the house.”

Example sentences from Experiments III and IV (lexical gender):

(3a) Grammatical, Distractor Match
La madera de la puerta era realmente dura y aguantaba sin problemas.

(3b) Grammatical, Distractor Mismatch
La madera del cuadro era realmente dura y aguantaba sin problemas.

(4a) Ungrammatical, Distractor Match
El marco de la puerta era realmente dura y aguantaba sin problemas.

(4b) Ungrammatical, Distractor Mismatch
El marco del cuadro era realmente dura y aguantaba sin problemas.

“The wood-FEM(3)/frame-MASC(4) of the door-FEM(3a,4a)/painting-MASC(3b,4b) was really hard-FEM and resisted without problems.”

Fig. 1. Regression path times in Experiments II and IV.
(a) = Grammatical, Distractor Match, (b) = Grammatical, Distractor Mismatch
(c) = Ungrammatical, Distractor Match, (d) = Ungrammatical, Distractor Mismatch

References