Language context and written code-switching preferences in Spanish-English and English-Spanish bilinguals

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Code-switching (henceforth CS) is characteristic of bilingual language use (e.g., "The boy throws *la pelota* [the ball]"). What are the mechanisms underlying switching from one language (source language, SL) to another (target language, TL)? What factors determine the location at which speakers switch from one language to another? We report four online studies that investigated where bilingual speakers switch from SL to TL during written production of CS utterances, and specifically whether CS is affected by the ease of activating L1 over L2 and vice versa through the manipulation of language context and direction of the language switch.

In word production, bilinguals find it easier to switch from L1 to L2 than L2 to L1 (e.g., Meuter & Allport, 1999; Costa & Santesteban, 2004; Abutalebi & Green, 2007). If bilinguals have a choice whether to switch or not, they should therefore be more likely to switch from L1 to L2 (rather than stay in L1) than switch from L2 to L1 (rather than stay in L2) (Gollan & Ferreira, 2009). This switch-preference should occur in sentences as well as in word production. Thus, when producing sentences, bilinguals could delay switching from L2 into L1 because of difficulty reactivating L1.

The present study looked at written CS and predicted that the relative ease of activating the L1 vs. L2 lexicon might also affect where bilinguals choose to CS, so that they would be more likely to CS early in the sentence when switching from L1 to L2 than from L2 to L1 and conversely, more likely to CS late in the sentence when switching from L2 to L1 than from L1 to L2.

Using a picture-description paradigm, proficient bilingual participants (Spanish-English, Expt 1: N=87, Expt 3: N=59; English-Spanish, Expt 2: N=79, Expt 4: N=29) read a picture description in Spanish or English (language context). Two types of sentence structures were used for the descriptions: (a) Transitive sentences (Table 1) and (b) NP conjunction sentences (Table 2). Then they completed a picture description which started with a sentence fragment in a specific SL (English or Spanish) (e.g., SL Spanish: "En la foto, el niño...*lanza the ball*"; see Table 1). Participants were instructed to produce a CS at some point in their target description. We manipulated (1) Language context (L1 vs L2) and (2) the direction of CS in the production of written description (L1-to-L2 vs. L2-to-L1)

In separate analyses, we analysed participants' likelihood of CS earlier or later in (a) Transitive sentences: at the verb (early) and at the object (later); (b) NP conjunction sentences, at Item 2 (earlier) and Item 3 (later), using logistic mixed-effects models. Spanish-English bilinguals were more likely to CS earlier in NP conjunction sentences when switching from L1 to L2 than vice versa (Item 2 switch: Expt 1, 59% vs 41%, see panel B; Expt 3, 54% vs 46%, see panel F) and later in both types of sentences when switching from L2 to L1 than vice versa (Object switch: Expt 1, 62% vs 38%, see panel A; Item 3 switch: Expt 1, 58% vs 42%, see panel B, Expt 3: 61% vs 39%, see panel F). English-Spanish bilinguals were overall more likely to CS earlier when switching from L1 to L2 than vice versa (Verb switches: Expt 2, 60% vs 40%, see panel C; Expt 4, : 56% vs 46%, see panel G; Item 2 switch: Expt 2, 71% vs 29%, see panel D; Expt 4, 60% vs 40%, see panel H) and CS later when switching from L2 to L1 (Object switches: Expt 4, 57% vs 43%, see panel G; Item 3 switch: Expt 2, 62% vs 38%, see panel D; Expt 4, 61% vs 39%, see panel H).

In sum, participants tended to code-switch from L1 to L2 earlier than from L2 to L1, both when switching from Spanish to English and from English to Spanish, and both when producing transitive and NP conjunction sentences (though the effect for Spanish to English transitives in Spanish bilinguals was not significant). We interpret these results as suggesting that CS location preferences at the level of sentence production are a results of the ease of activating L1 vs L2. Moreover, there was no evidence for an effect of language context on the location of CS, suggesting that residual activation of language triggered by comprehension is

not as strong as language activation in the sentence production triggered by the SL of the written description (direction of the CS).

Additional Materials

Table 1
Code-switching conditions and examples of Transitive sentences

Language Context	Source Language	Written description (Lang. Context)	Target fragment
(a) English	English	In the picture, the nurse hits a cup	In the picture, the woman …
(b) English	Spanish	In the picture, the nurse hits a cup	En la foto, la mujer…
(c) Spanish	English	En la foto, la enfermera golpea una taza	In the picture, the woman …
(d) Spanish	Spanish	En la foto, la enfermera golpea una taza	En la foto, la mujer…

Table 2
Code-switching conditions and examples of NP conjunction sentences

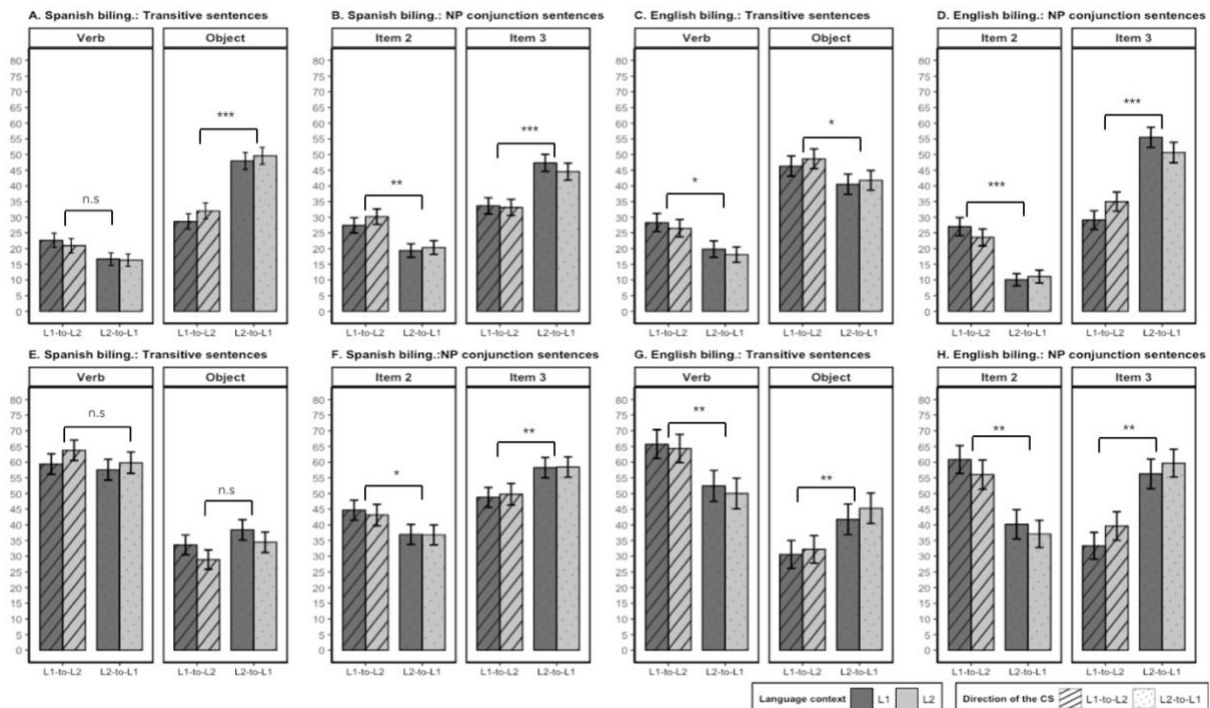| Language Context	Source Language	Written description (Lang. Context)	Target fragment
(a) English	English	There is a table, a bird and a candle	There is a flower …
(b) English	Spanish	There is a table, a bird, and a candle	Hay una flor …
(c) Spanish	English	Hay una mesa, un pájaro y una vela	There is a flower …
(d) Spanish	Spanish	Hay una mesa, un pájaro y una vela	Hay una flor …

Figure 1. Bilingual speakers' mean percentages of each type of written CS response in Transitive sentences and NP conjunction sentences. Experiment 1: (A) and (B); Experiment 2: (C) and (D); Experiment 3: (E) and (F); Experiment 4: (G) and (H) * p<0.05   ** p<0.01   *** p<0.001, n.s = no significance.