Processing Effects of Code-Switching

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The study investigates the processing effects of code-switching (CS) on sentence parsing when CS occurs between typologically distant languages: Portuguese, Norwegian, English and Russian. They form the following CS pairs: Portuguese-English, Norwegian-English and Russian-Norwegian. The main research question is whether CS imposes a prosodic break at the place of language change, and whether this break affects processing and attachment resolution of the restrictive relative clause (RC) as predicted by the Implicit Prosody Hypothesis (IPH, Fodor 2002). The linguistic target is an ambiguous RC (1), which can be parsed to either high attachment (HA) in (1a) or low attachment (LA) (1b).

The IPH claims that languages with a preference for HA have a prosodic break before the RC (2a) whereas, languages with a preference for LA have a prosodic break before the preposition 'of' (2b). The claim was supported by auditory experiments demonstrating that a change in the placement of a prosodic break entails a change in RC resolution (Goad et al. 2017, Fromont et al. 2017). The present experiment checks whether CS imposes an equivalent prosodic break when the language change occurs at the places predicted by the IPH.

The design compares RC resolution in a unilingual sentence to the RC parsing in sentences with CS, as exemplified in (3). In sentences (3a) and (3b), the place of CS favors either HA or LA, respectively. In sentence (3c), the default prosody of the English language has a break inside the complex DP and returns LA (see Fodor 2002 for full review). Similar reasoning holds true for Russian (HA), Norwegian (LA) and Portuguese (LA, as established in our previous experiment). Please, note that the target languages pairs combine languages with different default preference in in RC parsing: Portuguese-English (LA-LA), Norwegian-English (LA-LA) and Russian-Norwegian (HA-LA). With this set up, we check the L2ers' sensitivity to the default RC parsing in their respective L1s and L2s. We also check whether the exposure to both HA and LA through the languages the participants speak makes them more sensitivity to the prosodic effect of CS than the speakers whose both languages prefer LA only.

Adult L2ers, upper-intermediate and advanced in their L2 proficiency, participated in a self-paced reading experiment. They read sentences seeing one word on the computer screen at a time and selecting answers to the following comprehension questions. Software Linger recorded the participants' reading and response time, as well as their answer choices.

Table (4) demonstrates that there is sensitivity to the place of CS in all groups. It is significant in Russian-Norwegian and marginally significant in Norwegian-English and Portuguese-English L2ers, with the Portuguese group's preference going in the opposite direction. There is a similar slowdown at the place of CS in each condition in all groups. However, sentences with CS do not cause longer response time than unilingual sentences.

We conclude that CS most likely imposes a prosodic break that favors either HA or LA of the RC, respectively. The problematic results of the Portuguese group are being double-checked with Spanish-English and Catalan-English tasks. It is noticeable that the effect of CS is stronger in the Russian-Norwegian group, the speakers exposed to both preferences in RC resolution through their two languages. This effect is being checked with Catalan-Spanish bilinguals. In unilingual sentences, the participants do not show parsing preferences typical for L2ers, but behave like heritage speakers (see Jegerski et al., 2016; Sokolova & Slabakova, 2022). The possible effect of the type of bilingualism will also be clarified by the follow-up study with Catalan-Spanish bilinguals. Finally, the processing effect of CS disappears within the span of two words and does not increase the response time. It suggests integrated processing of two languages in one sentence.

Appendix:

(1) Bill saw [$_{DP}$ the friend of the neighbor [$_{RC}$ that was drinking coffee]]

a. [$_{DP}$ [$_{DP}$ the friend of the neighbor] [$_{RC}$ that was drinking coffee]]]
(HA, the friend was drinking coffee)

b. [$_{DP}$ the friend of [$_{DP}$ the neighbor [$_{RC}$ that was drinking coffee]]]
(LA, the neighbor was drinking coffee)

(2) Bill saw [$_{DP}$ the friend of the neighbor [$_{RC}$ that was drinking coffee]]

a. [$_{DP}$ [$_{DP}$ the friend of the neighbor] **pause** [$_{RC}$ that was drinking coffee]]] *(HA)*

b. [$_{DP}$ the friend **pause** of [$_{DP}$ the neighbor [$_{RC}$ that was drinking coffee]]] *(LA)*

(3) *italics marks a language change*

a. Bill arrested the friend of the neighbor *that was drinking coffee* (HA by CS)

b. Bill arrested the friend *of the neighbor that was drinking coffee* (LA by CS)

c. Eng: Bill arrested the friend of the neighbor that was drinking coffee (LA by Language)

d. Rus: Ivan arestoval druga soseda kotoryj pil kofe (HA by Language)
Nor: Bill arresterte vennen til naboen som drakk kaffe (LA by Language)
Port: O Guilherme prendeu o amigo do vizinho que estava a beber café (LA by Language)

(4) Results

a. RC attachment: Language and place of CS, reference category – HA; * $p < .05$; $^{(.)}$ $p < .1$

	Portuguese-English	Norwegian-English	Russian-Norwegian
RC_Nor	n/a	26%	46%
RC_Eng	24%*	23%	n/a
RC_Rus	n/a	n/a	53 $^{(.)}$
RC_Port	38%*	n/a	n/a
CS_HA	30%	22% $^{(.)}$	41%*
CS_LA	34% $^{(.)}$	18%	33%

b. There is an increase in reading time at the place of language change in each group

c. There is no effect of either Language or place of CS on response time

References:

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