

Switching in Wh- question: intonational convergence in language mixing production

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Introduction

Code-switching (CS) is the linguistic phenomenon when more than one language is used in one utterance. In comparison to a monolingual discourse, it is reported in a line of studies that more complex processes are involved in the production, recognition and comprehension of CS utterances: in Grainger and Beauvillain's study (1987) performance costs were reported in their lexical decision task when bilingual participants are involved in switching languages when recognizing lexical items; Soares & Grosjean (1984) reported the bilingual speakers who can perform similar to monolinguals in monolingual context still showed a slower lexicon access in the bilingual speech.

Some studies reported opposite results suggesting that there's no difference between phonetic productions in monolingual versus code-switching utterances (Grosjean & Miller, 1994). Fricke, Kroll and Dussias (2016) reported subtle shifts in voice onset time (VOT) before English-to-Spanish code-switches. Piccinini and Garellek (2014) report shifts in intonation prior to code-switches in either direction. They further found that bilingual listeners use shifts in VOT and intonation as cues to anticipate code-switching components. These phonetic cues to upcoming code-switches ('code-switching pronunciation') may allow listeners to cope with switch cost. On the other hand, Shen et al. (2020) pointed out that, code-switching pronunciation (phonetic cues to upcoming code-switches) could potentially be another barrier for the listeners when recognizing and comprehending CS

utterances due to preservative coarticulation of matrix language phonetics into the code-switch, and vice versa from the switched item into the matrix language, which could be detrimental to recognition.

By looking into how can the pronunciation of matrix language and of switched items interact, we could inform ourselves with a possible explanation to the former addressed conflict between the possible role of code-switching pronunciation in CS production and comprehension. Shen et al. (2020) summed up three possible mechanisms:

...*blending mechanism* by which code-switching pronunciation might represent a blend of the phonetic features of both languages (Grosjean, 2012; Olson, 2013) ... *preparation mechanism* by which code-switching pronunciation might reflect articulatory gestures that are preparatory to the production of a specific code-switched target... A third possibility is that code-switching pronunciation might reflect *global cognitive costs* of code-switching.

Intonational alternation

As formerly mentioned, many previous studies have reported segmental properties going through alternation when produced in CS context in both matrix language and switched items (eg, VOT in Fricke, Kroll and Dussias, 2016), yet there were reported suprasegmental features involved in similar phenomenon.

According to Spaii and Hermes (1993), pitch variations are essential components not only to distinguish the speaker's intention, but also to identify non-linguistic tasks such as emotions, social status, and personalities. Non-native speakers of English (in our case, focusing specifically on Spanish speakers), show a hard time acquiring the intonational patterns in English. Since Spanish is a language with a narrow variation in intonation, English learners may tend to transfer their pitch patterns into English, resulting in a "flat" sound (Celce-Murcia et al., 1996). In Bowen's study (1956), it was suggested that Spanish speakers reading utterances in English will negatively transfer the intonation patterns of their L1, for example, a Spanish emphatic sentence, such as "he does eat pasta" (El sí come pasta) to an English speaker is perceived as annoying one. This is attributed to negative intonation transfers. The same effect occurs when English speakers speak sentences in Spanish, transferring English intonation into Spanish utterances.

Farías in her production study (2013) tested the differences and similarities in intonation when producing tag questions, wh-questions, inverted questions, and repetition questions among native English speakers and ESL Spanish speakers. Their results showed that 100% of the participants who were native English speakers ended the questions with a falling contour, while more than half (66%) of the L1 Spanish speakers can produce such English sentences with the same falling contour. Spanish wh-questions produced by the participants had the tendency to end with rising intonation, as opposed to the falling contour given by the Spanish speakers to English sentences. Another difference in producing wh-question in English and Spanish for the L1 Spanish speakers is the mean pitch, as the then mean pitch is 180Hz when they are producing English target items and 143Hz in Spanish.

In Piccinini & Garellek's (2014) study, they analyzed the code-switched sentences' intonational contour as a whole and showed that the intonation of the whole CS sentence was different from the unilingual utterances. Also, Olsen (2012) reported that insertional code-switched tokens are produced with a degree of hyper-articulation, evidenced by an increase in pitch height and duration.

The present study will be in line with Farías' (2013) study and Piccinini & Garellek's (2014) study, looking into how Mexican Spanish heritage Speakers in USA produce code-switched wh-questions that started in English and ends in Spanish in a bilingual context. A production experiments are designed to collect production data. We hypothesize that matrix language (English) will be affected by the embedded language (Spanish), resulting in a flatter F0 contour, meanwhile the switched item will show a more salient rising-falling contour as in matrix language's intonation pattern rather than the relatively flatter one in Mexican Spanish (De la Mota, Butragueño, & Prieto, 2010).

Methodology

Experiment: sentence reading

The first Experiment design will be a conceptual replication of Farías (2013) study. The participants will read out a list of wh-questions embedded in a con prepared by the researchers without any preparation. The list of wh-questions consists of 30 sentences: 10 in unilingual English, 10 in unilingual Spanish and 10 in English-Spanish CS (starts in English and terminates in Spanish). Each group of 2 sentences contains two of the following types of wh-questions: what (qué), where (dónde), who (quién), when (cuándo), how (cómo). The sentences produced by the participants will be recorded and sent to Praat for further analysis.

Participants

A total of 10 Mexican Spanish heritage speakers (5 male, 5 female) will be recruited for the present study. All participants but one completed either this Experiment 1 and Experiment 2. When recruiting, all of them self-reported as intermediate-advanced level Spanish speaker who have at least the level of B2 under DELE scheme. Each of the participants will finish an adapted language history questionnaire based on LHQ3 (Li, Zhang, Yu, Zhao, 2020), an adapted DELE exam testing their reading comprehension, grammar, listening comprehension and speaking skills, and an adapted BSWQ (Rodriguez-Fornells et al., 2012) after the two experiments. The language proficiency test result shows that all the participants are as fluent as their claim when being recruited in comprehension and speaking tests, while 2 of them had a beginner-intermediate level of proficiency for grammar test. The participants all live in the same community where the most commonly used variate of Spanish is Mexican Spanish, they are all born in Mexico and moved to the US with their entire family before age of 8, and have been living in the US for at least 15 years. All participants reported regularly code-switching with friends or family.

The participants' language dominance is evaluated by Bilingual Language Profile (Birdsong et al., 2012) integrated in the LHQ3. The qualitative questions shows that all the participants tend to speak in Spanish within their families and English is more dominant in working and studying environments. The Bilingual Language Profile result shows that, they are all English dominant. BSWQ result shows that they are frequent code switchers that equally switch in either of the directions. The family and community they live in also is reported to be an environment where CS regularly happens.

Result analysis and predictions

The mean F0 and the normalized stressed syllables F0 contour and the normalized whole sentence F0 contour will be analyzed. The contour analysis will be in line with the methodology of Piccinini & Garellek's (2014) study. More specifically, for the entire sentence, F0 values were extracted at 1% increments, starting at 0% into the sentence up to 100% into the sentence, resulting in a total of 101 measurements per sentence. For each stressed syllable, F0 values were taken at 5% increments, starting at 0% into the stressed syllable up to 100%, resulting in a total of 21 measurements per stressed syllable. Syllables were coded as being the first stressed syllable (and thus, first pitch accent) in the Intonation Phrase, an Intonation Phrase-medial stressed syllable (sometimes there were up to three medial stressed syllables for a given Intonation Phrase), or the final stressed syllable (i.e., the nuclear-pitch-accent syllable) in an intermediate phrase (and thus, also the Intonation Phrase). Once the F0 values were obtained, outliers (based on visual inspection of the F0 tracks) were manually removed.

Additionally, in order to determine the interaction between the matrix part and the embedded part of then CS utterances, each sentence will also be divided into two parts accordingly and the same F0 contour general analysis will be conducted for each part.

We predict the following results. The CS utterances will show a mean pitch that in between the English and the Spanish unilingual utterance. The F0 contour of the whole sentence will also land on the midground of English and Spanish unilingual speech. More detailed analysis on each part of the CS utterances might show that, the mean F0 and F0 contour of the matrix language and the embedded language will be drawn towards each other.

The analysis of the contours may show that, the unilingual English sentences and the unilingual Spanish sentences will show consistent result as Farías' (2013), showing that the heritages speakers are able to produce the most commonly accepted intonational patterns (in unilingual context) for each unilingual mode. And the CS contours may show that, although the final words are in Spanish, they are integrated into an English intonational context, resulting in being produced in an English wh-question falling tone pattern.

The results should suggest a consistent pattern, although due to the nature of each task, the experiment 1 will show more distinction of mean pitch as well as the F0 contour among three language modes (unilingual English, unilingual Spanish, CS mode).

The limitation if the current study is that, we only examine the Mexican heritage speakers of Spanish in the US. All the participants we recruit will be advanced speakers in both languages. However, CS doesn't only occur with advanced bilinguals. For those who might not be fluent in one of the two languages can also get involved in CS conversations. For them, the intonational pattern might have different tendency. Also, future studies can expand the scope to more intonational meanings other than simple wh-questions, as well as other language pairs. More precise tools can also help in future studies to determine which of the formerly mentioned mechanisms can offer a better explanation for the intonation convergence.

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