

## GLOBAL FOREIGN ACCENT RATING OF CODE-SWITCHED AND L2-ONLY SENTENCES

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### **Abstract**

Recent studies of short-term phonetic interference suggest that code-switching can lead to momentary increases in L1 influence on L2. In an earlier study using a single acoustic measure (VOT), we found that Czech EFL learners' pronunciation of English voiceless stops had shorter, i.e. more L1-Czech-like, VOTs in code-switched compared to L2-only sentences. The first aim of the current study was to test the prediction that native listeners would judge the code-switched English productions as more foreign-accented than the L2-only productions. The results provide only weak support for this prediction. The second aim was to test whether more native-like VOT values would correlate with improved accentedness scores. This was confirmed for sentence-initial stops.

**Keywords:** phonetic interference, bilingual mode, code-switching, voice onset time

### **1. Introduction**

The present study explores phonetic interference in speech productions of advanced learners of English as a foreign language who code-switch between languages. Specifically, it examines the effects of code-switching on the extent of short-term interference from the dominant L1 Czech into the non-dominant late-acquired L2 English.

#### **1.1. Background**

Interlanguage interference is known to shape L2 learners' phonetic representations and consequently constrain learners' perception of L2 sounds and give rise to foreign accentedness of their L2 production. The extent of L1 interference in a learner's L2 is largely predicted by the age at which L2

acquisition started (Flege, Munro & MacKay 1995; Flege, Yeni-Komshian & Liu 1999) and has been further linked to the amount of L2 experience and first-language use (for a review see Piske, MacKay & Flege 2001). It is the influence of L1 use on foreign accentedness that this study focuses on. The link between L1 use and the degree of foreign-accentedness has been reported for L2 speakers living in the L2 environment (Flege, Frieda & Nozawa 1997), or in a bilingual community (Guion, Flege & Loftin 2000), or for those who move between L1 and L2 environments (Sancier & Fowler 1997). These studies examine L1 use as having a long-term, steady effect on L2 phonological competence. Typically they measure L1 interference when learners (i.e. bilingual speakers) are speaking only in L2. The learners' L2 productions are then compared to the productions of monolingual native speakers to assess the degree of interference from L1. Grosjean (2008) describes this situation when a bilingual uses only one of their languages as performing in a 'monolingual mode' and contrasts that with the 'bilingual mode' when both languages are engaged. In order to avoid confusion of the monolingual mode with the monolingual speaker we also term this the single-language (or English-only) mode below.

Several recent phonetic studies (e.g. Antoniou, Best, Tyler & Kroos 2011; Bullock, Toribio, González & Dalola 2006; Bullock & Toribio 2009; González López 2012; Simonet 2014; Balukas & Koops 2014; Piccinini & Arvaniti 2015) examine immediate L1 use as a source of short-term performance interference, which may occur when a bilingual speaker performs in the bilingual language mode, alternating between languages as in the context of bilingual code-switching. In their experimental design such studies concentrate on within-subject comparisons of L2 productions elicited in the single-language and in the bilingual modes in order to trace dynamic changes in the degree of interference as they might take place in real time. They look for momentary short-term increases in interference occurring during code-switching, so far with somewhat disparate results.

An older, frequently cited study by Grosjean and Miller (1994) tested the effect of code-switching on Voice Onset Time of voiceless stops (VOT, the delay between the release of the stop closure and glottal pulsing) during story retelling and during sentence reading by French-English bilinguals. The speakers did not produce a significant VOT difference for English *p*, *t*, *k* when code-switching from French into English compared to performing in the single-language English mode. The authors concluded that switching "usually involves a total change, not only at the lexical but also at the phonetic level" (205).

More recently, Bullock et al. (2006) did find support for momentary increases in interference when comparing L1-English-L2-Spanish and L1-Spanish-L2-English bilinguals' VOT values of word-initial *p*, *t*, *k* elicited in each language in the single-language mode and during code-switching. Several outcomes of their study are of interest. Firstly, code-switching shortened English VOTs in the direction of Spanish VOT values but did not extend Spanish VOTs in the direction of English, regardless of the direction of the switch, for both L1-

Spanish and L1-English bilinguals. The authors ascribed the unidirectionality of the effect to the fact that the range of VOT values is wider in the English long-lag stops compared to the compressed VOT range in the Spanish short-lag stops, and hence shifts in VOT induced by code-switching are more likely in English (also Bullock & Toribio 2009). Secondly, shortening of English VOT was observed if the English voiceless stop occurred immediately after Spanish was spoken, i.e. at the site of the switch, but not if it occurred several syllables later (2 – 3 syllables in their examples), reflecting transience of the code-switching effect. English VOTs also shortened before the switch from English into Spanish, which, as Olson (2013) notes, may be the effect of planning the code-switched utterance. Unexpectedly, the L1 English bilinguals also reduced the pre-switch VOT values of Spanish *p*, *t*, *k*, possibly in the effort to enhance the VOT difference between their two languages. In Bullock and Toribio (2009) a similar pattern of results was found for English *p*, *t*, *k* while the code-switching effects on the Spanish stops varied with the language dominance of the speakers.

Supportive of short-term interference is Antoniou et al.'s (2011) study of VOT in *b*, *d*, *p*, *t* produced by Greek-English bilinguals. Focusing on the results for stops in the word-initial position, we see that, similarly to Bullock et al. (2006), inter-lingual influence induced by code-switching was observed in the long-lag language (English) but not in the short-lag language (Greek). In the bilinguals' dominant (but second) language, English, the stops became more Greek-like while in their non-dominant (but first) language, Greek, the stops seemed unaffected by switching between the languages. The question remains whether the direction of the inter-lingual influence depends on the order of acquisition of the bilinguals' languages, L1 exerting persistent influence over L2, as suggested by the authors, or on the type of VOT categories in each language, as proposed in Bullock and her colleagues.

Some indication of short-term inter-lingual interference was found by González López (2012) in VOTs of Spanish *p*, *t*, *k* elicited from English late learners of Spanish, nevertheless the effect was greatly modulated by the place of articulation. Contrary to Bullock et al.'s (2006) speculation about compressed VOT values in short-lag languages, VOT of Spanish *p* and *t* was extended by these intermediate L2 learners of Spanish after code-switching from English. Similarly to Bullock et al. (2006) though, some anticipatory interference and the transience of carry-over interference could be seen, the VOT of English *p* being extended before the switch from Spanish and the VOT of Spanish *p* being extended immediately after the switch from English to Spanish but not later in the sentence. However, the VOT of Spanish *t* showed a longer-lasting potential influence of switching from English, i.e. it was extended both at the switch site and later in the sentence. No anticipatory effect was observed for *t*. Finally, *k* showed no clear pattern of influence of L1 English on L2 Spanish. When it comes to the opposite direction of inter-lingual interactions, i.e. from L2 Spanish to L1 English, the anticipatory pre-switch interference was observed for English *p* and *k*, i.e. their VOTs were reduced. Additionally, the VOT of L1 English *k*

also became shorter when the stop appeared both right after switching from L2 Spanish and a few syllables later. Taken together the results show little systematic effect of code-switching on VOT. González López concluded that the differential behaviour of the stops in the code-switched and single-language sentences “can be partially explained in terms of different degrees of acquisition difficulty depending on the place of articulation” (2012: 257).

Another experimental study reporting short-term increases of inter-lingual phonetic interference is Simonet (2014). In this study, early Catalan-Spanish bilinguals produced Catalan mid-back vowels /o/ and /ɔ/ under two conditions: once when shadowing Catalan words and once when shadowing Catalan words randomly alternating with Spanish words containing /o/. In the latter condition, both the Catalan target vowels became more similar to Spanish /o/, as shown by their F1–F0 distances, irrespective of the bilingual speakers’ self-declared language dominance.

Šimáčková and Podlipský (2015) used VOT as a measure of short-term phonetic interference, focusing on voiceless stops in the speech of Czech learners of English as a foreign language (EFL). In Czech, like in Spanish or Greek, *p*, *t*, *k* are pronounced with a short positive VOT, i.e. they are unaspirated. The learners either performed in the single-language mode, all the time speaking in English, or they performed in the bilingual mode, once only code-switching and once also translating from L1 Czech into L2 English. The prediction was that using the L1 immediately prior to speaking in the L2 would lead to increased L1 interference in L2, and that in Czech-to-English code-switched and translated utterances VOTs would thus be shorter, more L1 Czech like, than in the utterances produced in the single-language English mode. The results confirmed this prediction, VOTs being shorter in the bilingual-mode data.

While the studies summarized above all relied on carefully controlled scripted data, other studies have analyzed spontaneous code-switching. Balukas and Koops (2014) studied code-switches in speech of early L1-Spanish – L2-English bilinguals living in a bilingual Spanish-English community. They tested the relationship between VOT of initial voiceless stops and the time that elapsed from the moment of switching. The study yielded an asymmetrical result for the long-lag English versus the short-lag Spanish stops, in line with Bullock et al. (2006) and Antoniou et al. (2011). For all three English voiceless stops VOT values increased, i.e. became more English-like, within the first few seconds after the Spanish-to-English switching point, suggesting the weakening of phonetic interference from the pre-switch Spanish. VOT values of Spanish *p*, *t*, *k*, on the other hand, remained unaffected by English-to-Spanish code-switching. Balukas and Koops (2014) argued that a universal perceptual constraint on short-VOT realizations is responsible for such unidirectionality, suggesting an upper limit of approximately 30 milliseconds for short-lag stops after Lisker and Abrahamson. At the same time, the overall English VOT values of the bilingual speakers were considerably shorter compared to the typical VOTs reported for English monolinguals, whereas the overall Spanish VOT values of these

bilinguals were comparable to those typically produced by Spanish monolinguals. The authors cautiously conclude with making a tentative link between the short-term and long-term interference from L1 Spanish to L2 English suggesting that the former may feed into the latter.

Temporary increases in phonetic interference in spontaneous code-switching were reported in another recent study with early L1-Spanish L2-English bilinguals dominant in English (Piccinini & Arvaniti 2015). VOT shortening due to code-switching was observed for both languages in this study, i.e. both for the long-lag English and for the short-lag Spanish, although the effect on English VOT was greater. The shortening of English VOT was explained as an effect of a momentary interference from Spanish while the shortening of Spanish VOT was ascribed to hyperarticulation of Spanish phonetic features under the pressure to differentiate between the two languages.

Noticeably, research of short-term phonetic interference has relied substantially on the implementation of voice onset time as a robust measure of inter-lingual influences, mostly pairing languages with different VOT of voiceless stops, i.e. long-lag versus short lag languages. Although the studies have so far produced mixed results, they seem to converge on several points: (1) the direction and magnitude of inter-language interaction depends on the pattern of L1 and L2 acquisition and use, and the resulting language proficiency and dominance of a bilingual; (2) both carry-over and anticipatory interference occurs; (3) the carry-over interference effect is temporary/transient?, lasting less than two syllables; and (4) VOT of long-lag voiceless stops such as English *p*, *t*, *k* is more likely to shift, or to shift more, as a result of interference from a short-lag language than the other way round.

The shifts in VOT observed in studies of short-term interference are small, sub-phonemic changes. For example, for English-only versus code-switched productions involving English and Spanish, Piccinni and Arvaniti (2015) report a mean difference of 6 ms, while Bullock et al.'s (2006) Figure 1 shows differences of ca 7 ms at the site of the switch and of ca 13 ms before the switch, and in Bullock and Toribio (2009) the magnitude of mean VOT changes ranges between 5 and 19 ms. It is not clear whether such small acoustic differences due to manipulation of language modes play any role in the perception of foreign-accentedness (if they exceed perceptibility thresholds in the first place). Therefore, as a follow-up to our VOT study (Šimáčková & Podlipský 2015), we test whether the utterances produced in the bilingual mode sound different than the single-language mode utterances. Our main research question is: 'When a learner uses L1 immediately prior to speaking in L2, will their speech be rated as more foreign-accented by a native listener compared to when they speak exclusively in L2?' In addition, relating this question to our previous study, we also ask whether the VOT of voiceless stops correlates with the accentedness ratings.



## 1.2. The learner population in our studies of the immediate L1 use

We focus on a specific type of L2 learners to whom the issue of short-term interference due to immediate L1 use is particularly relevant. They are adult EFL learners who chose to use English as a means of earning their livelihood and become translators and interpreters. Their first language is Czech and at the time of data collection the learners who participated in the current study were enrolled in a bachelor programme “English for translating and interpreting” at the Palacký University Olomouc in the Czech Republic. In the capacity of interpreters, these EFL learners need to alternate constantly between their two languages to say in one language what they heard in the other. The bilingual mode, when both L1 and L2 activated, is then their basic performing mode. If the degree of interference does change dynamically depending on the language mode, our learners’ L2 speech will sound more foreign-accented during interpreting.

Our university students of interpreting make good subjects for a study of momentary increases in L1 interference also because they are advanced EFL learners whose pronunciation is not completely constrained by their L1 phonology. Although native input paucity makes an accurate acquisition of phonetic categories by foreign language learners very nearly unattainable, developing phonetic awareness of L2 phonetic details by EFL learners at higher levels of proficiency has been previously documented (Mora, Rochdi, Kivistö-de Souza 2014). In contrast, speech of learners at low levels of proficiency, who fully transfer L1 phonetic categories when speaking in L2, could hardly reveal any further short-term L1-interference effects.

Our EFL learners form a homogeneous group in three important respects. Their responses to a linguistic background questionnaire confirmed that they had all had a comparable language learning experience until the end of their secondary education, with no one reporting an extended stay in an English-speaking country or daily use of English outside school. They had all achieved at least C1 level of proficiency according to CEFR (Verhelst, Van Avermaet, Takala, Figueras & North 2009) as confirmed by a standardized test. Finally and importantly for a study of effects of code-switching, all our learners had had the same amount and type of interpreting training, providing them with extensive experience with switching languages.

## 2. Method

In our previous production study outlined in 1.1 (Šimáčková & Podlipský 2015) we saw that in speech of highly proficient EFL learners VOT of English voiceless stops varied depending on the language mode. In the current study we used sentences elicited in the code-switching and the English-only conditions of that production study to test whether the language mode has an effect on foreign-

accentedness rating. Translated sentences elicited in the interpreting condition had to be excluded due to numerous discontinuities in their delivery. Since we also ask if the accent ratings obtained in the present study are correlated with VOT values observed in the previous study, we maintain the differentiation between the initial and final position of the *p*-initial target words in the stimulus sentences.

## 2.1. Participants

The bilingual talkers in the current study were 18 advanced EFL learners, all undergraduate students of the English for Translation and Interpreting programme at the Palacký University. The students are not systematically trained to acquire a British or American accent. Nevertheless, their exposure to American native speech prevails. They were all female with ages ranging from 19 to 27 years. Besides the learners, we also included 4 native talkers, three of whom recorded stimuli for the VOT study. In the present study, two native English talkers were thus speakers of Standard Southern British English and two were speakers of American English who spoke without a clear regional accent. Their ages ranged from 24 to 54 years. One speaker from each variety was female.

The native English listeners who performed the accent rating task were 12 undergraduates from the Goshen College in Northern Indiana. They all reported to come from the area and not to have any prior experience with Czech speakers of English (with the exception of a Czech university student majoring in English who was collecting the data). They also reported not to be fluent in any foreign language.

## 2.2. Eliciting sentences from the talkers

The method of eliciting speech stimuli from the talkers is described in detail in Šimáčková & Podlipský (2015). For the convenience of the reader we summarize the main points. We constructed 24 short English sentences to be presented auditorily to the EFL talkers under three conditions: in the English-only condition and in two bilingual conditions – Code-switching and Interpreting. (As explained above, the Interpreting condition was discarded in the present study.) The sentences contained 12 English monosyllabic words, 6 beginning in *p* and 6 in *t* followed by a non-high vowel. These target words occurred once sentence-initially and once sentence-finally. The sentences were recorded by 5 native speakers of English who also recorded a prompting question *What should you say* to be used in the English-only condition. Five native speakers of Czech recorded the prompt *Co jsi slyšel?* for the code-switching condition.

Concerning the elicitation procedure itself, we used a delayed repetition task to elicit the sentences from the EFL talkers. In the English-only condition, an



EFL talker heard an English stimulus (e.g. *We like the new pub.*) followed by the English prompt *What should you say?* said by a different voice. The talker responded using the quote frame *I should say,* (e.g. *I should say, “We like the new pub.”*). In the Code-Switching condition, an EFL talker heard an English stimulus sentence followed by the Czech prompt *Co jsi slyšel?* ‘What did you hear?’. The EFL talkers responded by using the Czech quote frame *Slyšel jsem* (‘I heard’) and then switching back into English to report what they had heard (e.g. *Slyšel jsem, “Pass the book around.”*). An example trial from for each condition is given in Table 1. All EFL talkers were recorded under both conditions.

The native English talkers pronounced the same sentences as the EFL learners, although not in a delayed repetition task. Instead they pronounced each sentence in the frame “I should say\_” after reading it off a computer screen. Obviously, the native English speakers did not produce any code-switched utterances.

**Table 1.** One trial in the delayed repetition task for each language mode. Glosses: <sup>a</sup>What did you hear? <sup>b</sup>I heard.

a delayed-repetition trial	Language Mode	
	English-only	Code-switching
stimulus (voice 1)	We like the new pub.	We like the new pub.
prompt (voice 2)	What should you say?	Co jsi slyšel? <sup>a</sup>
response	I should say, We like the new pub.	Slyšel jsem, <sup>b</sup> We like the new pub.

In both conditions, the 24 sentence stimuli were complemented by 64 filler sentences. Data were collected individually in a sound booth in two sessions separated by at least 48 hours. The monolingual EN session was conducted exclusively in English by a Czech experimenter with a native-like English accent. The bilingual session was conducted by one of three research assistants in Czech. The order of sessions was determined by participant availability (10 took the EN session first). The stimuli were presented in random order using a Demo window script in Praat (Boersma & Weenink 2014) over Sennheiser HD 280 pro headphones and the production was recorded using Zoom Hn4 digital audio recorder at 44.1 kHz sampling, 16 bit quantization, without compression.

2.3. Eliciting foreign accent ratings from the listeners

The preparation of the listening material involved excising all sentences elicited from the talkers out of the quote frame and scaling them for equal intensity. In the end only a small portion of these productions were used as the stimuli in the foreign accent rating task in order to keep down the number of ratings a listener had to make and thus minimize listeners’ fatigue. From each talker’s recordings we selected the same 4 sentences including a target *p*-initial word, two



pronounced in the English-only condition and two in the Code-switching condition (see Table 2). Targets with the labial rather than the alveolar stop were used because the VOT production task showed a greater variation in learners' ability to produce *p* as aspirated. We wanted to see if this variation would be reflected in the foreign accent scores. Further, we wanted all the sentences from the 22 talkers to sound continuous, without any apparent disfluencies that could contribute to the perception of foreign accentedness. The fluency of each sentence included in the listening task was judged perceptually and agreed upon by the first author and a trained research assistant. Because of the fluency requirement, we were not able to find a quartet of sentences with the same *p*-initial word. Two additional sentences were included in the accent rating as fillers; neither started nor ended with a word containing *p*. Finally, another sentence was used as a familiarization stimulus. The filler and familiarization sentences are given in Table 3.

**Table 2.** Stimulus sentences according to language mode. Target words in italics were included for comparison with the previous VOT study.

<i>p</i> -word position	Language mode	
	code-switching	English-only
initial	Pass the book around.	Pain can be a good thing.
final	He didn't feel any pain.	We like the new pub.

**Table 3.** Familiarization and filler stimuli.

Stimulus function	Sentence
Familiarization	Ten people didn't come.
Filler	I made a wrong move.
Filler	Choose your friends well.

The rating procedure was as follows: each listener first rated the familiarization sentence produced by each talker, which allowed them to get used to the talkers' accents and adjust to the 9-point Likert scale of accentedness. Subsequently they evaluated altogether 264 sentences: They heard 6 sentences from 22 talkers and they evaluated each token twice. The order of sentences was randomized.

The accent rating task was implemented as a script in Praat (Boersma & Weenink 2014). The listeners were instructed to rate how foreign-accented each stimulus sentence sounded to them on a 9-point scale from strongly foreign-accented to native-accented. The instructions explicitly stated that foreign-accented pronunciation meant pronunciation of someone whose native language was not English and native-accented pronunciation was pronunciation of someone whose native language was English. The listeners could play each sentence at most three times before rating it.

### 3. Results

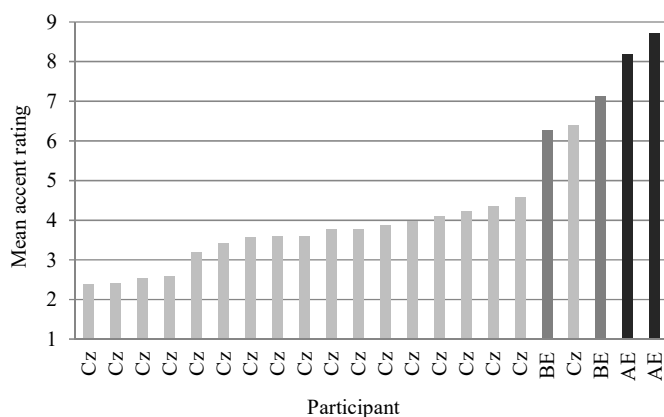
#### 3.1. Rater consistency

To estimate within-rater consistency, the two ratings of each stimulus from each listener were compared. If the pair of ratings differed by 4 or more points on the 9-point scale, both ratings were discarded. In total, 1056 pairs of ratings were compared and 67 pairs, i.e. 6.3 % were excluded. Otherwise the two ratings were averaged for subsequent analysis.

Between-rater consistency was also considered. For the 66 possible pairs of our 12 listeners, we computed Pearson correlations between their ratings of each talker. A significant correlation was found in every pair, indicating good between-rater agreement. The correlations could be described as moderate to high, with the  $r$  coefficients ranging between .72 and .94 for 62 pairs, and between .58 and .72 for 4 pairs of raters.

#### 3.2. Overall foreign-accentedness

The overall level of perceived foreign-accentedness can be gleaned from Figure 1 showing the mean ratings for the two sentences that the 22 talkers received in the English-only condition, in which both the learners' and native speaker's sentences could be compared.



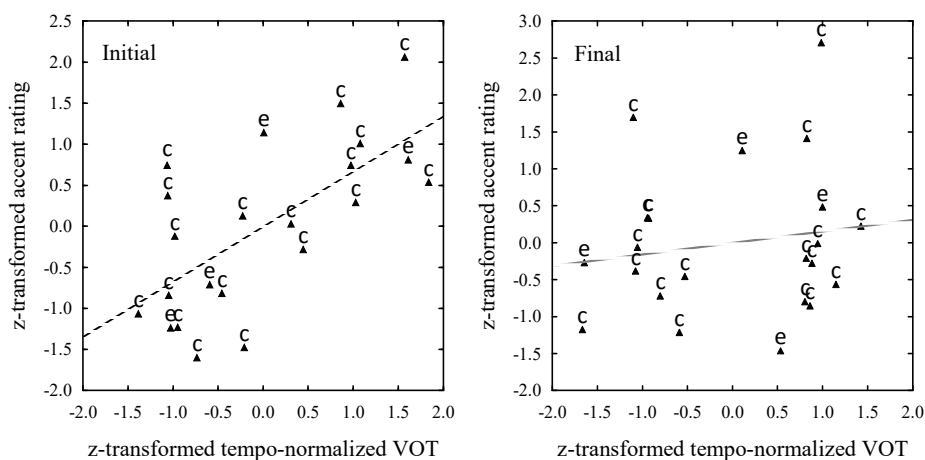
**Figure 1.** Mean accent ratings of all the 22 talkers in the English-only condition, including the Czech EFL speakers (Cz), the native speakers of British English (BE) and American English (AE).

The American college student listeners clearly favoured the accent closest to their own as is shown by the two columns representing the two American talkers. The female British talker received significantly lower scores than either of the Americans ( $t$ -test for independent samples,  $t[22] > 3.9$ ,  $p < .01$ ), the male British talker was rated as significantly more accented than the American male ( $t$

[22] = 3.34,  $p < .01$ ) and nearly significantly more accented than the American female ( $t[22] = 2.04$ ,  $p = .053$ ). Both British talkers were rated as better than most Czech learners of English. T-tests comparing mean accentedness scores of each learner with each native English talker showed that one learner did not differ significantly from either of the British talkers. All the other learners' accentedness scores were significantly worse ( $t[22] > 3.00$ ,  $p < .01$ ) than the scores of each of the four native speakers.

### 3.3. Correlating overall foreign-accentedness and VOT

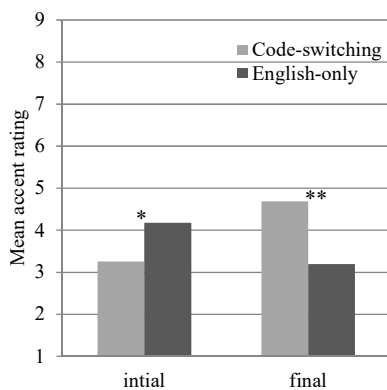
In order to explore whether the variation in the global accent ratings in the English-only condition could be linked with the varying amount of aspiration of the labial stops, correlations were computed between each speaker's z-transformed mean accentedness scores and their z-transformed mean tempo-normalized VOT of *p* (i.e. the mean ratio of the VOT of *p* to the duration of the word it occurred in; data from Šimáčková & Podlipský 2015). The correlations were computed separately for the sentence with initial (Figure 2 left) and final (Figure 2 right) *p*-words. For the initial *p*-words the positive correlation was significant and can be described as moderate:  $r = .67$ ,  $p < .001$ . For the final *p*-words the correlation was not significant. The fact that there was a correlation only when the target word was at the beginning of the sentence possibly indicates that the raters made their decision early on when hearing a sentence and thus the beginning of a sentence affected the foreign-accent rating to a greater extent.



**Figure 2.** Scatter plots of z-transformed accent rating scores from the English-only condition against z-transformed tempo-normalized VOT (data from Šimáčková & Podlipský, 2015). The left panel shows sentences with *p*-words the initial position ( $r = .67$ ,  $p < .001$ ), the right panel sentences with *p*-words the final position (correlation not significant).

### 3.4. Effect of language mode

Our main research question was about the effect of language mode on accent rating. We specifically asked whether the Czech-to-English code-switched utterances would be rated as more foreign-accented than the utterances produced in the English-only mode. Figure 3 shows the mean accent ratings of the EFL 18 learners broken down by the language mode and target word position. A Repeated Measures ANOVA on the mean accent ratings, with Language mode (English-only, Code-switching) and Position of the target *p*-word (Initial, Final) as the two within-subject factors, found neither a significant effect of Language Mode nor of Position. What was significant was their interaction ( $F(1, 17) = 31.49, p < .001$ ). When we consider the ratings of the sentences in which the target *p*-words were initial, we can observe the predicted pattern: the code-switched sentence was perceived as more accented, i.e. it had a lower mean accentedness score, 3.26, than the English-only sentence, which received the mean score of 4.18. A Tukey post-hoc test indicated the difference was significant ( $p < .05$ ). However, the ratings of the sentences with a final target word, showed the opposite pattern. The code-switched sentence was perceived as somewhat less foreign-accented than the English-only sentence (4.68 and 3.20 respectively), again a significant difference ( $p < .05$ ).

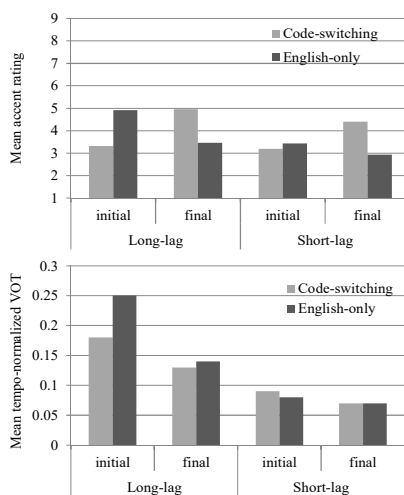


**Figure 3.** Mean foreign-accentedness scores of sentences with initial (left) and final (right) *p*-words. Dark bars represent English-only sentences, light bars represent code-switched ones.

In examining the influence of the position of the *p*-words within a sentence on the foreign-accent scores, we are assuming a link between accent rating and VOT. Let us explore that link. In the VOT study from which the sentence stimuli for accent rating were taken the 18 EFL learners split into two groups based on their ability to produce voiceless stops as aspirated. They formed a Long-lag (more target-English-like) and a Short-lag (more L1-Czech-like) speaker groups with 9 participants each. As a next step in the current analysis a new RM ANOVA was performed on the mean accent-ratings of these 18 learners with the between-subject factor Group added to the within-subject factors of Language

mode and Position. None of the factors was significant while the interaction of Position and Language mode showed a trend toward significance ( $p = .07$ ), repeating the pattern described above.

Figure 4 presents the mean accentedness ratings split by Group, Mode and Position (the interaction of these factors was not significant). The top panel showing the pattern of accentedness scores of the Long-lag and Short-lag groups is aligned with the bottom panel showing the pattern of their mean VOT values. For the Short-lag group (more L1-Czech-like) on the right we find no differences between the mean accent ratings except for the code-switched sentence with the final  $p$ -word being rated higher (less accented). In the Long-lag group on the left, the mean accentedness scores of the sentences with initial  $p$ -words show the predicted difference between the code-switched and the English-only sentences. The sentences with the final  $p$ -words show the reverse (the same pattern as the overall results). In both groups, the pattern of accentedness scores of both the code-switched and the English-only sentences with the target words in the initial position mirrors the pattern of VOT values of the labial stop. That is, there is a difference between the code-switched and the English-only condition only in the Long-lag group. When the target  $p$ -word appears sentence-finally, the mean VOTs of  $p$  do not differ between the code-switched and the English-only sentences for either speaker group but the accentedness scores do. It thus appears that this difference in accent rating was not influenced by VOT.



**Figure 4.** Mean accentedness scores of the sentences with the initial and final target words (top) and mean tempo-normalized VOT of  $p$  (proportion of word duration) in the initial and final target words (bottom) of the EFL speakers who produced extended VOT in English (Long-lag group) and of the EFL speakers who had more L1-Czech-like VOTs (Short-lag group).

#### 4. Discussion

The present study examined the degree of foreign-accentedness in short, fluently spoken English sentences produced by advanced Czech EFL learners. The sentences were pronounced by the learners once in the single-language mode when the learners spoke exclusively in their L2 English and once in the bilingual mode during code-switching from Czech into English. The pattern of our results does not allow us to determine conclusively whether or not the degree of L1 interference, and hence foreign-accentedness, was temporarily increased due to code-switching as compared to production in the L2-only mode. We did find a difference between the two modes but it interacted with the position of a *p*-initial word in which VOT had been measured in our previous study (Šimáčková & Podlipský 2015). When the *p*-word was initial, code-switched sentences were indeed perceived as more foreign-accented than the L2-only sentences, suggesting the predicted momentary increase in L1 interference. However, the opposite pattern was observed when the *p*-words were sentence final. Recall that for the current study we did not record new stimuli but used stimuli from Šimáčková and Podlipský (2015), and thus could not achieve using identical sentences across modes (the choice of the sentences was constrained by the requirement of fluency). Therefore, it is probable that, besides VOT, other aspects of the utterances contributed to the observed differences.

The resulting accentedness scores of the English-only sentences can be taken to show L1 interference in the long-term sense, reflecting the learners' L2 competence. Unsurprisingly, all the advanced EFL learners except one received lower accentedness ratings than the native speakers. What was surprising was the harshness of the listeners' judgements of the non-native speech, with scores of all but one learner ranging between 2.4 and 4.7 on a scale from 1 (strongly foreign-accented) to 9 (native-accented). This shows that even highly proficient EFL learners preparing for a career as English language professionals are perceived as having a relatively strong foreign accent. However, the American listeners' preference for the American over British native accent indicates that their unfamiliarity with the talkers' accent negatively impacted the accentedness ratings. In addition, the listeners may have been affected by the range of the EFL talkers in the sample. It is possible that including learners at lower levels of proficiency would have pushed up the scores of our more advanced learners.

As to whether VOT has any influence on accent rating, we observed in the English-only sentences a moderate correlation between VOT of *p* and accentedness scores when the target *p*-word appeared at the beginning of a sentence. No such correlation was found for sentence-final *p*-word. We propose that when listeners rate accentedness of a short utterance they make their judgement early on, perhaps even before hearing the entire stimulus. Also, at a strong prosodic boundary (the beginning of a sentence coinciding in our data with the beginning of an intonational phrase), some EFL learners produced target-English-like aspirated stops and received higher accent ratings while

others produced more or less L1-Czech-like short voice-lag *p*. VOT values of *p* in the final word were generally shorter and varied less, thus reducing the possibility of a correlation with foreign accent.

We further observed that those learners who could produce English-like long positive VOT of *p* in the sentence-initial position, and who shortened it when they code-switched, received poorer accent ratings for these code-switched sentences. This match between VOT shortening and stronger perceived foreign-accentedness provides a weak indication of the language mode influencing accent rating.

Finally, for the code-switched sentences there is another reason why VOT might have had a greater impact on accentedness scores when the target *p*-word was sentence-initial than when it was sentence-final: the first word in our sentences always appeared at the point of the switch from Czech into English and inter-lingual interference has been shown to be greater immediately after the code-switch point than later in the sentence (Balukas & Koops 2014; Bullock et al. 2006).

## 5. Conclusion

Although we cannot conclude with confidence that the global foreign accent scores of the advanced EFL learners changed as a result of manipulating the language mode, it is still possible that code-switching had a detrimental effect on the degree of perceived accentedness. Next, the results show that there was a relationship between the VOT of voiceless stops and accent rating, albeit modulated by the position of the stop in the rated sentence. VOT of *p* occurring sentence-initially correlated with the accentedness ratings while those occurring in the final word did not. This may have to do with the listeners deciding about accentedness early on in the sentence and/or with the proximity of the stop to the point of the code-switch from L1-Czech into L2-English.

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