Regional Dialect Influence on L2 English Production: BATH-STRUT-LOT Triangle for L1 Turkish Speakers

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ABSTRACT

Studies examining the role of regional dialects on L2 speech production are scarce. This study examines the role of Turkish regional dialects on L2 English /ɑː/ - /ʌ/ - /ɒ/ production. Acoustic realization of the /ʌ/ phoneme varies between İstanbul and Trabzon Turkish. I test the hypothesis that the regional dialect difference in L1 will influence the L2 English production of /ʌ/ vowel as well as the non-native phonemes (/ɑː/ - /ɒ/) in L2 English among these regional dialect speakers. Fourteen speakers from each region (Trabzon, İstanbul, and Southern England) aged 18-35 were recorded reading a text. Vowels were acoustically analysed in word-medial position and mixed-effect modelling was used to test the regional dialect influence on L2 speech. The findings show that the existing regional dialect variation in /ʌ/ does not transfer to L2 English, while regional dialect speakers significantly differ in /ɑː/ - ɒ/ English production. The results also reveal crosslinguistic variation between SSBE and L1 Turkish speakers.

Keywords: L2 speech production, regional dialects, vowels, Turkish

1. INTRODUCTION

Second Language (L2) speech models acknowledge the influence of L1 phonology on the perception and production of non-native sounds [2,9]. While there is a solid theoretical foundation for how L1 phonology affects L2 speech production and perception, less is known about how inter-speaker variance in the L1 affects the L2. These models do pose the hypothesis that within-L1 variation that can affect the L2 speech learning [6,9] and one way of examining within-L1 variation is to look at L1 regional dialect variation on L2 speech. Recent studies on L2 speech perception found that L1 regional dialect variation can lead to variation in L2 perception. For example, Escudero et al. [7] found that Dutch speakers of different regional dialects varied in their perception of L2 English vowel contrasts. Research on the influence of L1 regional dialects on L2 speech production, however, has only found L1 dialect partial effects on the L2 [11,13]. Therefore, further research into the specific dynamics of how structured L1 variation affects the results of L2 speech production is clearly necessary.

Another scarcity in studies on regional dialect and L2 speech processing is typological variation between the target L1 and L2. Turkish, a member of the Altaic language family, is more typologically from English than many other Indo-European languages, such as Spanish or Dutch, which are common examples in L1-L2 English speech studies. Turkish has eight phonologically contrastive (front-back, high-low, rounded-unrounded) vowels. Among these, /ʌ/ is phonologically classified as a low back vowel [10], while some research describes it as low central phoneme [14]. While phonetic documentation of regional dialects in Turkish is another neglected subfield, a recent study showed that Trabzon and İstanbul dialects differ in the production of /ʌ/ in L1 due to the influence of neighbouring languages in the regions [1].

This study aims to examine how regional dialect variation of /ʌ/ in Turkish influences the L2 English speech production of /ʌ/ - /ɑː/ - /ɒ/ vowels in an EFL setting. In order to test this, I examine the acoustic realization of these vowels produced by İstanbul and Trabzon Turkish dialect speakers in L2 English. As the acoustic realization of /ʌ/ is different between İstanbul and Trabzon dialect in Turkish, I predict that this difference can lead to variation in L2 English between these groups. It is worth noting that /ɑː/ – /ɒ/ is not a native contrast for L1 Turkish speakers. Since there is not any available acoustic data on the allophonic variation of these sounds in L1 Turkish, I hypothesise the production of these non-native vowels in L2 English will behave according to the *similar sound* scenario of SLM-r [9]. While I do not predict any regional dialect influence on the production of /ɑː/ – /ɒ/ non-native vowels, I hypothetically claim that the acoustic realization of these non-native sounds may merge with /ʌ/ for L1 Turkish speakers due the equivalence classifications as framed by SLM-r. I do make the clear prediction that L2 English production of /ʌ/ will be different between the regional dialect speakers.

2. METHODS

2.1. Participants

Twenty-eight participants aged 18-35 from Trabzon and İstanbul regions were recruited for the speech production experiment. In addition, 14 Standard Southern of British English speakers were recruited to compare L2 English production of Turkish speakers with native speakers. All Turkish participants received English as a Foreign Language in classroom from year 2 to the end of high school, however the proficiency level varies between speakers, and it is not controlled between groups and speakers. Participants had not spent longer than 6 months in any English-speaking country and SSBE speakers also reported that they did not spend more than one year in a different country.

2.2. Speech Materials

The text "The Boy Who Cried Wolf" was selected for speech data collection [4]. This text presents all English monophthongs in word-medial position. Two repetitions for each vowel were obtained from the text in word-medial position except for /ɑ:/, which was observed only once in word-medial position.

2.3. Procedure

Participants were given a consent form explaining the experimental procedure and data protection policy prior to data collection. Participants were recorded in quiet rooms in the related regional dialect locations, namely Trabzon, Istanbul, and England. The text was presented to the participants on a computer in a PowerPoint presentation. The session was audio recorded using a Zoom H1 at 44,100 Hz and a 16-bit quantization, which files saved as WAV files. Participants were requested to read aloud the text on the screen at their normal pace.

2.4. Acoustic Analysis

The audio files were annotated in ELAN [5] and divided into tokens and then each token was tagged for participant, phoneme, word, and dialect. This was followed by the acoustic coding of phonemes in Praat. The onset and offset of the vowels were determined based on periodicity on the waveform and onset/offset of the formants on the wideband spectrogram. All tokens were downsampled to 11,025 kHz and static formant values at midpoint of vowels were obtained through custom scripts in Praat.

Acoustic results were then transferred to R [12] for statistical analysis. First, all vowels were normalized using within-speaker Lobanov z-scoring. Mixed-Effect modelling with a restricted maximum likelihood ratio were fitted to the data. Models were fitted separately to each lexical set to simplify the model. 'Dialect' was set as a fixed effect, and 'word' and 'speaker' were set as random intercepts. The random variable 'word' was removed from the model for lexical set /ɑ:/, as to the observation of the vowel only in one word for each speaker. Due to small sample size of the dataset, random slopes were not included as they caused convergence issues in the models.

3. RESULTS

The results showed that both İstanbul and Trabzon regional dialect speakers produce English /ʌ/ in similar acoustic values to SSBE speakers, also showing that the L1 regional dialect difference of this phoneme is not observed in L2 English. However, both regional dialect speakers exhibit different production patterns for the non-native /ɑ:/ – /ɒ/ contrast in L2 English (See Figure 1). Trabzon dialect speakers produce a front-back contrast for /ɑ:/ – /ɒ/, whereas the two are nearly merged with /ʌ/ for İstanbul speakers.

**Figure 1:** F1~F2 plot of STRUT-BATH-LOT vowels across dialect groups
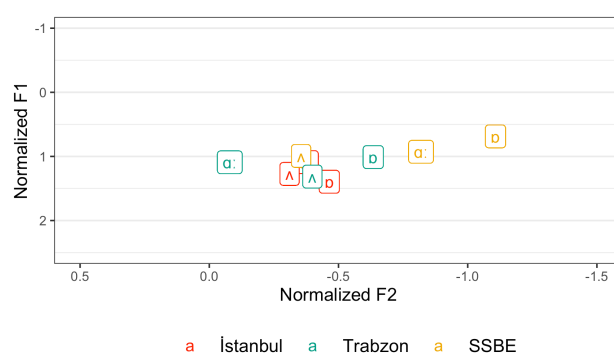
Statistical results revealed that there was no regional dialect effect on F1 ($\chi2$ (2) = 5.539, p =.062), F2 ($\chi2$ (2) =1.461, p = .481), F3 ($\chi2$ (2) =0.716, p = .698), or duration ($\chi2$ (4) = 4.496, p = .105) for /ʌ/. In addition, there was not any cross linguistic difference in the production of /ʌ/ as L1 Turkish and SSBE speakers produced this vowel very similarly. With regard to /ɑ:/, a non-native phoneme for L1 Turkish speakers, the results showed that there was a significant regional dialect influence on F2 ($\chi2$ (2) =-3.887, p = .0001), and duration ($\chi2$ (2) =-7.472, p = .0001). However, there was no significant effect of dialect on F1 ($\chi2$ (2) =-0.246, p = .537) and F3 ($\chi2$ (2) = - 1.772,

$p = .309$). SSBE speakers produced the longest and the least fronted /ɑ:/ compared to L1 Turkish speakers of İstanbul and Trabzon dialects.

Lastly, LRT model comparison showed that there was a significant effect of dialect on F1 ($\chi 2$ (2) =-18.80, $p = .0001$) and F2 ($\chi 2$ (2) =-38.26, $p = .0001$) in the production of /ɒ/, while there was no significant effect of dialect on F3 ($\chi 2$ (2) =1.582, $p = .453$), and duration ($\chi 2$ (2) = 0.690, $p = .708$). Figure 2 demonstrates that Trabzon and İstanbul speakers produced /ɒ/ differently in terms of F1, while Trabzon and SSBE speakers showed similarity. In terms of F2, SSBE speakers significantly differed from L1 Turkish speakers of both dialects by producing it as a back vowel.

Figure 2: F1 and F2 values of /ɒ/ among regional dialect speakers
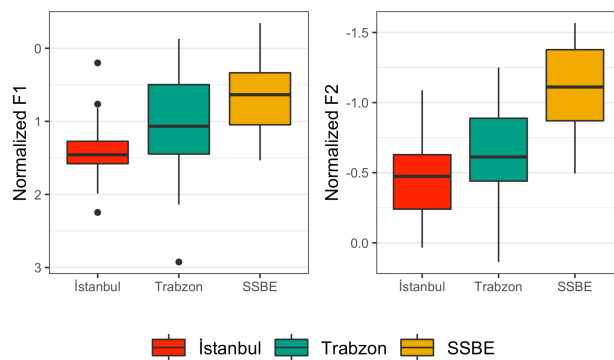
In summary, these results revealed an influence of regional dialect on the production of non-native phonemes /ɑ:/ and /ɒ/, while the existing regional dialect difference in /ʌ/ is observed to diminish in L2 English production of L1 Turkish speakers. In terms of duration, it is found that there is an L1 difference on the production of /ɑ:/, while the other vowels produced similarly between the regional dialect and SSBE speakers (See Figure 3).

Figure 3: Duration Boxplot of /ɑ:/ - /ɒ/ - /ʌ/ across dialect groups
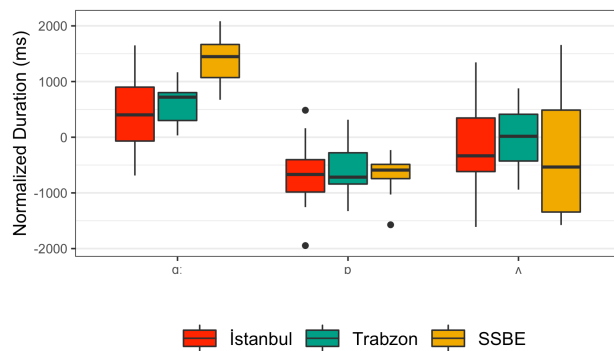
4. DISCUSSION AND CONCLUSION

This paper aimed to examine the regional dialect influence on L2 English speech production among L1 Turkish speakers. The focus was on low vowels due to existing regional dialect variation of /ʌ/ in L1, and its relation to the acquisition of non-native /ɑ:/ – /ɒ/ contrast in English. Although the acoustic realization of /ʌ/ is different between Trabzon and Istanbul regional dialects, statistical analysis revealed that neither regional dialect nor L1 affected the production of /ʌ/ in L2 English. /ʌ/ is found to be the most fronted among SSBE and İstanbul speakers, whereas it is /ɑ:/ that is most fronted for Trabzon Turkish speakers. In addition, we observed that F2 and duration of /ʌ/ are similar across all dialect groups. It is somewhat surprising that L1 Turkish speakers produce /ʌ/ similarly in L2 English, despite the regional dialect difference. One potential reason for this could be the change in the phoneme inventory size of the L1 and L2. According to the SLM-r, L2 English learners of L1 Turkish may be able to easily recalibrate the phonemic category of /ʌ/ since it represents an '*identical sound*' scenario in which L2 speakers can produce the target sound with a high accuracy due to direct transfer from L1.

On the other hand, both /ɑ:/ and /ɒ/ create '*similar sound*' scenarios of SLM-r. That is, L2 leaners may not be able to discriminate the phonetic differences of non-native sounds if they are categorically very similar to one another. /ɑ:/ – /ɒ/ do not form a phonemic contrast in Turkish. According to SLM-r, producing non-native L2 sounds as a separate category depends on the distance of these sounds from its nearest category in L1. The results in this study revealed that L1 regional dialects lead to variation in L2 English production of /ɑ:/ and /ɒ/ among Turkish speakers, despite the fact that these phonemes do not exist in L1 Turkish. /ɑ:/ is produced the most fronted by Trabzon dialect speakers while its production is nearly similar to /ʌ/ among İstanbul speakers. In addition, as can be seen in Figure 3, SSBE speakers produce /ɑ:/ significantly longer than L1 Turkish speakers of both dialects. These results overall showed that F2 and duration are the key discriminators between İstanbul and Trabzon dialect speakers for the production of /ɑ:/ in L2 English.

With regard to /ɒ/, İstanbul speakers produced a fronted /ɒ/ while Trabzon and SSBE speakers produced this vowel similarly (less fronted). The regional dialect difference is also observed in F1 that /ɒ/ is produced the highest among İstanbul speakers and the lowest among Trabzon speakers, which caused İstanbul speakers' production to be significantly different than SSBE speakers.

Overall, the findings of this study demonstrate that L1 Turkish regional dialect speakers of L2 English rely on different acoustic correlates for each novel L2 sound. Trabzon dialect speakers produce an open-

mid, back /ɒ/ and a significantly fronted /ɑ:/, while İstanbul dialect speakers tend to merge /ɑ:/ – /ɒ/ with /ʌ/. According to the 'category precision' hypothesis of SLM-r, it may be argued that İstanbul speakers were not able to form new phonetic categories for these new L2 sounds due to their phonetic closeness to their equivalent in the L1 (i.e., /ʌ/). However, Trabzon speakers formed a moderate front-back contrast for /ɑ:/ – /ɒ/ in L2 English. İstanbul and Trabzon speakers produce /ʌ/, which is categorically different across dialects in L1, similarly in L2 English while they differ in the acoustic mapping of /ɑ:/ and /ɒ/, which are both allophones of the /ʌ/ vowel in Turkish. These findings, taken together, suggest that learning non-native contrasts in L2 can benefit from both phonemic and acoustic realizations of allophonic diversity found in regional dialects of L1. That is, L1 regional dialects may not only results in one-to-one phonemic change in L2 speech variation, but also can affect the phonetic re-mapping of non-native sounds. What caused this regional dialect influence on the production of /ɑ:/ and /ɒ/ in L2 English remains unclear as the allophonic variation of /ʌ/ in Turkish is not well-documented.

Aside from the regional dialect influence, it is worth mentioning that these results showed a crosslinguistic difference that L1 Turkish speakers produced /ɑ:/ shorter than SSBE speakers. Although the duration of /ɑ:/ is significantly longer than other L2 sounds, L1 Turkish speakers produce this non-native phoneme shorter than SSBE speakers. Duration is not a phonemic contrast in Turkish, but these results suggest that Turkish learners are able to employ duration as an acoustic cue in L2 English, though the degree of the duration is not fully in line with the production patterns of SSBE speakers.

In conclusion, these findings suggest that the acquisition of non-native contrasts in the L2 is sensitive to regional dialect variation in the L1. In addition, it demonstrates that the regional dialect may not directly lead to one-to-one L2 speech variation. Instead, it may play a role in the phonetic re-mapping of non-native sounds. Further research is needed to elucidate the role of regional dialects on L2 perception and production as well as taking L1 allophonic variation into consideration.

5. ACKNOWLEDGEMENTS

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