

Perceptual Evidence for the Phonological Adaptation of English Vowels in Persian Sound System

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Abstract

Loanword adaptations are transformations applied to words when they are borrowed into a foreign language. Words from a source language that are ill-formed in the borrowing language are thus transformed into well-formed words (Hyman, 1970; Yip, 1993). These adaptations are typically accounted for by philologists in terms of the same conceptual framework used for standard phonological processes in the native language. That is, loanword adaptations are treated the same as phonological facts within the borrowing language, and are thus considered to be part of the native phonology (Jacobs & Gussenhoven, 2000). However, recent research suggests that loanword adaptations are the formal reflex of perceptual assimilation, a process that applies during speech perception and maps non-native sound structures onto the phonetically closest native ones (Peperkamp 2005; Peperkamp, Vendelin, & Nakamura 2008).

In perceptual models of loanword adaptations, phonological adaptations applied to loanwords are assumed to be phonetically minimal transformations that apply during speech perception (Peperkamp, 2005). Thus, loanword adaptations are not computed by the phonological grammar of the borrowing language, but are assumed to be phonetically minimal transformations that apply during speech perception.

The present research addresses the phonological adaptation of English vowels in Persian vowel system based on the theory of perceptual assimilation Model (Peperkamp, 2005). Two perception experiments were carried out in this research to test the predictions of this theory. In these experiments, the perceptual similarity between each English vowel and its close equivalents in the Persian vowel system was tested in a number of identification tasks. We examined to what extent the perception of English vowels reflects the phonetic distances between vowels of the two languages found in a production experiment (Sadeghi & Bigdeli, 2018). In the first

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experiment, instances of English words with 9 English vowels were extracted from Oxford Bookworms corpus (three tokens for each vowel) and used as natural vowel stimuli in an identification task with two or three possible response options. Data for the second experiment included syllables containing the same 9 English vowels extracted from Oxford Bookworms corpus. Thus, the target vowels were presented to subjects at two prosodic domains, namely at the phoneme level (Experiment 1) and at the syllable level (Experiment 2). In both experiments, participants had to classify each of the auditory stimuli as “being phonetically most similar” to the auditory stimuli. Fifteen people participated in each perception experiment. The stimuli were played back through headphones. Participants were presented with two or three Persian vowels as the possible response options, and were asked which option was phonetically most similar to the auditory stimulus (English vowel) they perceived.

Results of the first perception experiment showed that listeners associate the high front tense English vowels /i/ with Persian /i/, but the high front lax vowel /ɪ/ and /ɛ/ with Persian /e/. Furthermore, it was shown that they perceive both the high back tense and lax vowels /u/ and /ʊ/ as Persian /u/. It was also observed that English /æ/ is clearly associated with Persian /a/, and that all the three vowels /ʌ/, /ɔ/ and /ɑ/ in English are associated with Persian /a/. In the second experiment, we observed similar patterns in the results. Listeners clearly associated the high front tense English vowels /i/ with Persian /i/, and the high front lax vowel /ɪ/ with Persian /e/. Moreover, they perceived both the high back tense and lax vowels /u/ and /ʊ/ as Persian /u/. It was also observed that English /æ/ is clearly associated with Persian /a/, and that both /ʌ/ and /ɑ/ in English are associated with frequent distributions with Persian /a/. However, listeners encountered a greater degree of ambiguity when processing English /ɛ/ as the vowel is associated with a very similar distribution between Persian /ɒ/ and /ɔ/. English /ɔ/ was also perceived with a high identification rate as Persian /a/.

Overall, the results of identification tests suggested that the perceptions of English vowels by Persian speakers highly correspond to the acoustic distances between the source (English) and the target (Persian) vowel segments. The perception of English vowels by Persian listeners reflects, to a large extent, the acoustic proximity between vowel categories of the two languages. Thus, listeners clearly associate each English vowel with the vowel in the Persian sound system with which it shares the maximum acoustic characteristics. Therefore, our findings provide further support for the theory of perceptual assimilation which proposes that loanword adaptations are due to the automatic process of phonetic decoding, which maps nonnative sound patterns onto the phonetically closest native ones.

Keywords: Loanwords phonology, Phonological adaptation, Theory of Perceptual Assimilation, Acoustic similarity, Vowel space