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Vowel Reduction in Kermanian Accent

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Abstract

The purpose of this paper is investigating vowel reduction in Kermanian accent. Vowel reduction is a process which occurs in an unstressed syllable. It leads to change unstressed vowels and tend them to other vowels. In order to investigate vowel reduction in Kermanian accent, 6 male native speakers of Persian are participating which 3 of them are native speakers of Kerman and 3 others, speakers of standard Persian accent. The data included 12 words were recorded by a Shure microphone in the acoustic room of the linguistic department of Sharif University of Technology. Then duration, intensity, F1, F2, COG and f0 of the vowels were measured. The results show that duration, intensity and fundamental frequency of the vowels are less in Kermanian accent than in standard Persian accent. Also, the results of studying F1 and F2 of [æ, i, o] prove that these vowels in Kermanian accent are tending to center. So, this kind of vowel reduction in Kermanian accent is called centripetal.

1. Introduction

The vowel reduction is the process in which the acoustic quality of vowels changes. A well-known type of reduction is the neutralization of acoustic distinctions in unstressed syllables. Vowel reduction appears whenever a vowel tends to schwa [1]. Whereas full vowels are distinguished by their acoustic quality such as height,

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backness and roundness, the reduced vowels are unaffected by these characteristics [2]. Schwa phenomena might depend on the region where someone lives, or on his or her sex [3, 4]. In a study of controlled speech in Dutch, word stress has an impact on the spectral quality of vowels. In this way, the unstressed words were more reduced than the stressed ones [5]. Vowels have shorter duration and more centralized formants, when are reduced, than non-reduced ones [6, 5, 7]. Vowel reduction is categorized as two major types; centripetal reduction and centrifugal reduction. In centrifugal reduction, vowels are led towards the corner figures [i, u, ɑ] and in centripetal reduction, vowels on edges are centralized towards some schwa-like quality. Both centripetal and centrifugal reductions have identical effect of reducing the amount of phonetic information in the speech signal [8].

Two more examples of vowel reduction in which mid central schwa contrasts with higher vowels are standard Russian [9] and Bulgarian [10]. Dutch, also, is a language in which vowels are reduced to schwa [11]. In this language, vowel reduction is not obligatory, but vowel reduction can be applied to all vowel qualities, including high vowels like English. As different languages have different types of reductions, some languages such as Finnish, Spanish and Hindi are recognized to lack vowel reduction.

This research aims to investigate the reduction of [æ, o, i] in pronunciation of Kermanian speakers and compare Kermanian accent with standard Persian accent. Kermanian accent is currently used in Kerman, Southeast region in Iran. In Kermanian accent, vowel [æ] shifts to schwa [ə] [12], for example:
[kæ'mær] (Waist) ► [kə'mær]
[næ'mɑz] (Praying) ► [nə'mɑz]

2. Method

Data of the research included three vowel [æ, i, o] in unstressed syllables (syllables except final syllable in Persian) such as [pæ'tu] (blanket), [somæ'je] (a proper name) and [hi'tʃi] (nothing). The data including a total number of sentences 12(words) x 2(Accent) x 3(speakers) =72 were analyzed.

The data were read by 6 native speakers of Persian (Three native speakers of Kermanian accent and three native speakers of standard Persian accent) and recorded by a Shure microphone in the acoustic room of Sharif University of Technology. Using Praat, all of the words were segmented so that the boundaries of vowels were determined [13]. In making a textgrid, using sound wave and spectrogram, simultaneously, increases accuracy in measuring the data. First, the boundary of consonants, vowels and the burst of consonant were determined and specific label was used to define each phone. Then, duration, energy, F1, F2, fundamental frequency and center of gravity (COG) of [æ, i, o] were measured using a Praat script. In order to compare these vowels in Kermanian accent and standard Persian accent, Spss 16 and Repeated Measure ANOVA were used.

3. Results

We report the results of the effect of Accent (Kermanian accent and standard Persian accent) on intensity, duration, fundamental frequency and spectral measures of the vowels [æ, i, o]. The spectral information is F1, F2 and centre of gravity (COG).

3.1. Intensity

A repeated measure ANOVA was performed on the intensity of vowels in order to compare the intensity of vowels in Kermanian accent with that of the standard Persian accent. There was a main effect for Accent ($F_{[1,5]}=213.88$, $p<0.001$) on vowel reduction. A post hoc test (Bonferroni) indicated that the intensity of vowels in standard Persian accent was 23 dB higher than in Kermanian accent.