

AN ACOUSTIC ACCOUNT OF TURKISH VOWELS

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1. INTRODUCTION

The Turkish language is mainly spoken in Azerbaijan and Iran (Johanson 2010). After Farsi as the official language, Turkish, with approximately 15–20 million speakers, has the most speakers in Iran (Crystal 2010). Most of the speakers inhabit in the four provinces of the northwestern part of Iran. In the literature two striking features of Turkic morphology were presented: first, its agglutinative nature (low level of fusion, in Sapir's terminology), i.e. the fact that there is basically one-one correspondence between grammatical categories and their exponents, and second, its highly synthetic nature (high level of synthesis, again using Sapir's terminology), i.e. the fact that a given word can contain a large number of morphemes. Turkish morphemes have allomorphs with clear-cut boundaries. Among the few problematic morpheme boundaries are the following: bek-le 'wait', get-ir 'bring', yar-ıf 'race'. The bound base forms bek-, get-, yar- are considered morphemes on account of further suffixation. Their meaning may be said to be determinable by subtracting the meaning of the suffixes -le, -ir, and -ıf from the meaning of the total form.

Furthermore, the syllable structure of Turkish is consonant-vowel-consonant (consonant). That is, tautosyllabic consonant clusters with the sonority drop are acceptable. In Turkic languages stress falls into final syllables of all parts of speech (noun, adjectives, adverbs, verbs), most of the derivational and inflectional suffixes carry stress. However, some of the derivational suffixes and clitics are unstressable, when roots combine with an unstressable suffix, stress falls on the immediately preceding syllable, and stress shift may not take place. In other cases, however, the primary stress is shifted to another syllable of the same word. This appear to the idiolectal variations of stress-placement rules and the change in the rhythm pattern also influences word stress. There are only a few forms where stress change affects the subclass (adjectival or adverbial) membership of substantives. Within the subclass of nominals, place names are set apart from other nominals by stress

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change: yildiz 'star', Yildiz 'a place name'. In suffixed forms where the place of stress is determined by morphophonemic rules, the stress of place names falls on the syllable that precedes the regularly stressed one: armutlu 'having pears', Armutlu 'a place name' (Nash, 1973). According to these stress-placement rules, we used target vowels in simple words with the cvc.cvc syllables.

2. MATERIALS AND METHODS

Generally, the first three formants of the vowels are the most important indicators providing information for distinguishing vowels from each other (Hagino et al. 2008). There is a close relation between first formant frequency (F1) and articulatory and/or perceptual dimension of vowel height. The second formant frequency (F2) corresponds with the place of maximal constriction during the production of the vowels (Wang and Van Heuven 2006). Distribution of the vowels in a F1 by F2 plane is given in two Figures that provide the overviews of the acoustic vowel space for Turkish formants. In the study on formant measurements of vowels, analysis revealed no significant effect of gender on the variables (stress pattern and syllable position); hence, the formant values of the male and female participants were pooled and reported one average value of F1 and F2 for each vowel. Formant frequency analysis was performed using the Formant Pro (Xu, 2018) available in Praat with its default standard settings (range of 5,000 Hz for five formants). Descriptive statistics were performed to describe mean and standard deviation values for output measures (F1, F2, F3, duration). In this research, participants were recruited from among Turkish speakers aged 20-45 years old. There were 10 participants, including 5 male and 5 female. We had 144 target words for analysis. Participants were asked to read the list of carrier phrases two times. A total of 2880 vowel tokens were recorded. Describing the acoustic properties of the Turkish vowels, and developing the vowel space plot based on F1 and F2 values of vowels can be utilized in analyzing the Phonetic system of Turkish language.

3. RESULTS AND DISCUSSION

An attempt was made to investigate the acoustic characteristic of target vowels in the different syllabic positions (open and close syllables, stressed and unstressed syllables). Results showed that these different positions have no significant effect on the distribution of the vowels in the vowel space presented by the combination of two spectral parameters F1, F2. Vowel reduction was examined in unstressed syllables using duration and F1 and F2 spectral values across different consonantal contexts.

4. CONCLUSION

Results of the phonetic aspects of vowel reduction showed that vowel formant changes in unstressed condition as compared to stressed condition had not non-significant effect. That is the vowels had no significant spatial reduction in the direction of the center of the vowel space.

Keywords: Formant; Vowel space; Vowel quality; Stress; Syllable