

#146



Experimental Phonetic Research Interlingual Interference and Accent in the Russian Speech of Native Speakers of the Kabardino-Circassian Language. *Gurtueva I.¹*

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SUMMARY

The acoustic analysis of the formant measurements of the non-native Russian speech of Kabardino-Circassian speakers showed a systematic deviation of the acoustic patterns of vowel allophones in the F_1 - F_2 space. This study is aimed at developing methods for modeling the non-native speech for use in speech recognition systems, language identification and accents. The experimental data can also be useful for the development of the theory of contrastive acoustic analysis of vocal systems of languages with different structures, typical interfering pronunciation errors detection, and also for the development of theoretical models of foreign languages learning.

INTRODUCTION

The complexity of the non-native speech recognition problem arises as a consequence of the discrepancy between the speech of non-native speakers and materials of native language resources used in training. An obvious way to overcome the difficulties is to create non-native speech corpora. An alternative approach to solving the problem is the use of multilingual resources to adapt the speech of non-native speakers using the phenomenon of "interlingual transfer". The most efficient approach to assessing the non-native language space is the synthesis of the mentioned solutions.

METHODS

To identify universal and specific features in the interfered Russian speech of bilingual speakers of the Kabardino-Circassian and Russian languages, ten residents of the Kabardino-Balkarian Republic with different levels of proficiency in their native speech were invited to the recording (five men and five women aged, average age 33,1). The materials of the experiment include audio recordings of phonation reading of a previously prepared list of words. For each speaker, using the speech analysis program Praat the average values of F_1 and F_2 in the analyzed speech segments were calculated using the 'Get first formant' and 'Get second formant' functions (tuning parameters: Burg method, time window 25 ms, frequency range 5500 Hz, number of formants 5). The results of measurements of F_1 and F_2 in Hertz were compared with the acoustic characteristics of the same vowels of standard Russian speech known in the scientific literature. The canonical average formant values F_1 and F_2 are designated Reference1, and the reference gender-differentiated values are Reference2. The obtained measurements are shown in Figure1.

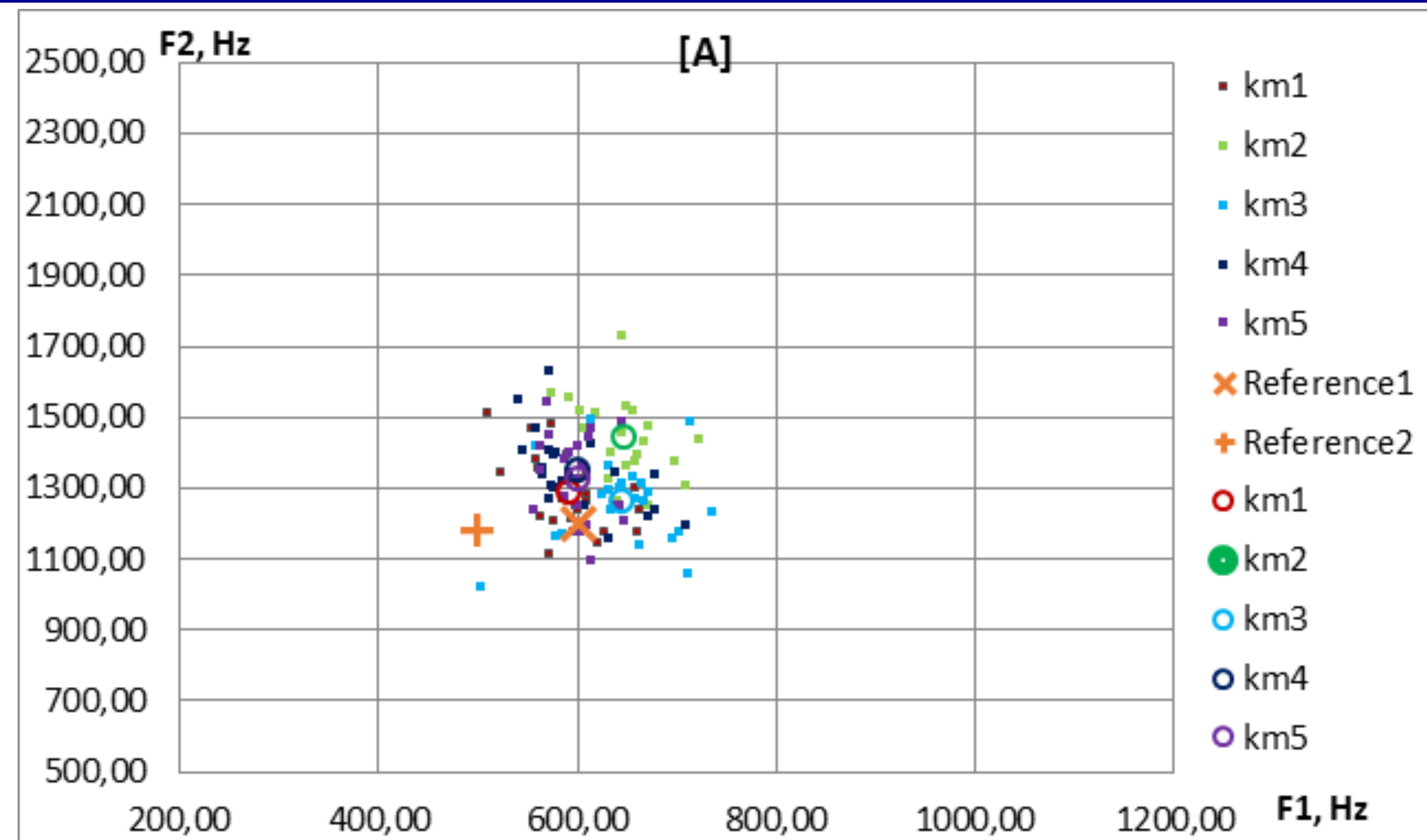


Fig. 1. Formant meanings of allophones of the vowel [A] in the speech of bilingual men (L1 - Kabardian language, L2 - Russian language). Here and below, along the X-axis are the values of F_1 , Hz.; along the Y-axis, F_2 values, Hz.

ANALYSIS

The phonetic deviations in the accented Russian speech of Kabardians in phonation reading were analyzed. 22 words represented variants of [A] in stressed positions. The measured values averaged over the speakers are shifted upwards in both formants relative to the Reference2, and all averages are above the Reference1 in F_2 . The spread of formant values for all male voices is characterized by a small standard deviation. The distance from Reference2 along F_1 is 2 times the maximum distance between the average speakers. The average values of the coordinates (F_1 , F_2) for all speakers are close.

CONCLUSIONS

- A typical speech pattern of non-native Russian speech of Kabardino-Circassian speakers at the phonetic level is a systematic deviation of the acoustic patterns of allophones of the vowel [A] in the space F_1 - F_2 to the right-up.
- When using for comparison the values of the Reference2 as standard values, the deviations F_1 , F_2 are stable and quite pronounced.
- When using the average as the base values, the deviation in F_1 is less pronounced, but in F_2 , the systematic deviation is equally pronounced. To determine the accent, it is more convenient to use the Reference2.

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