PERCEPTUAL SPACES OF THE RUSSIAN VOWELS

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ABSTRACT

The aim of this work is to analyze the perception of non-native vowels by the native speakers of Russian. The main tasks are: 1) the establishment of perceptual spaces of the Russian vowels under different conditions: when identifying non-native vowels a) isolated from the phonetic context; b) in CV and VC syllables; 2) the definition of the number of the distinguished vowels. The results allow us to maintain that untrained speakers of Russian are able to identify reliably 8 non-native vowels and to distinguish 18 vowels.

1. INTRODUCTION

It's well-known that the number of Russian vowel allophones which the native speakers of Russian are able to distinguish is much greater than the number of the Russian vowel phonemes (n=6) [1]. Numerous experimental studies of late assure us of the fact that Russian listeners possess a highly developed system of perception of phonetic features of vowels. One of the latest works in this field is that fulfilled by Tchernova and colleagues [3]. The authors investigated the perception of 20 cardinal vowels by the untrained speakers of Russian. In the first experiment the listeners were asked to identify all the cardinal vowels using only 10 symbols (the letters of the Russian alphabet) as possible answers. It was revealed that listeners were able to distinguish about 17 vowels among the 20. In the second experiment the listeners were preliminarily taught to transcription, then they listened to a vowel "sample" marked by a certain transcription sign. The listeners were able to discriminate all of the identified vowels. The number of identified vowels was increased and little (n=9-10). The problems raised in such works seem to be very actual both from the viewpoint of establishing the correlation between the perceptual and the phonological units, and from the viewpoint of elaboration of the strategy of foreign language teaching.

2. PROCEDURE

At different periods of time three groups of untrained speakers of Russian were asked to identify the vowels of English, Spanish and German. English and Spanish vowels were isolated from the words within which they were pronounced, the German vowels were presented for identification.

3. THE CHOICE OF THE LANGUAGES

The choice of the languages under study was not accidental. It was conditioned by the facts that, on the one hand, the vowel systems of English and German are more numerous than that of Russian (as far as the number of vowels), on the other hand, the vowel system of Spanish very much resembles that of Russian (as far as the number of vowel phonemes is concerned). All these facts are of great interest from the viewpoint of the study of the mechanisms of phonological hearing.

4. RESULTS

The results of the identification test are presented in Table 1. In its verbal column the table contains only the answers given by the Russian speakers, whereas the total number being 36. As it's seen from the Table, the number of correct answers is over 75% for each vowel.

FIG. 1. The distribution of the listeners' answers (by the criteria) on the vowels which give the most reliable identification. Within CV and VC syllables, the number of identified vowels and syllables was 161. In all the experiments we received from the listeners 1947 answers. The listeners knew neither of the above mentioned languages, and they also didn't know the sounds of what languages they were listening to. The aim of this work is to study the correlation between the perceptual and the phonological units, and to understand the listeners' strategy of foreign language teaching.

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estimated by means of $X^2$ criteria. The comparison of the distribution shows that the listeners are able to distinguish not 8 but at least 9 vowels. As it is seen, 4 vowels are placed higher than the critical meaning of the $X^2$ criteria is. Thus, these vowels are very well distinguished by the listeners. The vowels placed below the critical meaning of the criteria on one vertical line with the vowels marked (•) (see Fig.1), to all appear-ance, seem to be identical for the Russian listeners as far as their phonetic features are concerned.

Fig.1 gives the opportunity to represent, firstly, the width of the perceptual boundaries of the Russian vowels, and, secondly, the remoteness of non-native vowels from the centre formed by the native vowel in the perceptual consciousness of the Russian speakers.

Let’s analyse another group of vowels. While identifying these vowels the listeners do not take unanimous decisions. The vowels $\alpha\beta$, $\alpha\delta$, $\alpha\gamma$, $\alpha\beta$ (see Table 1). The task which the listeners had to fulfil was undoubtedly very difficult: to place the vowel they heard into a certain sphere of a perceptual space formed in their memory by the native sounds and to correlate the articula-tion of the unknown vowel stimuli. Let’s consider the vowels which differ only in one step of openness arti-facts of the native listeners.

The analysis of the distribution of admissible answers shows that the vowels $\gamma /$, $\alpha /$, $\beta /$, $\gamma /$, $\alpha /$, $\beta /$, $\gamma /$, $\alpha /$, $\beta /$ are placed reliably in the space of the native vowels. Their number is 18 and they form vertical spheres in Fig.1; 2) The vowels which are placed in a perceptual space, formed in a linguistic consciousness of the Russian speakers.

Table 1. Identification of English, Spanish and German vowels by the native speakers of Russian

<table>
<thead>
<tr>
<th>English</th>
<th>Spanish</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha$</td>
<td>$\alpha$</td>
<td>$\alpha$</td>
</tr>
<tr>
<td>$\beta$</td>
<td>$\beta$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>$\gamma$</td>
<td>$\gamma$</td>
</tr>
</tbody>
</table>

5. DISCUSSION

The results of the investi-gation allow us to main-tain that in the case of a non-native vowel identifi-cation the Russian listeners are able to identify reliably 8 vowels. The number of distinguished vowels is equal to 12 (Fig.1) $/\gamma /$, $/\alpha /$, $/\beta /$, $/\gamma /$, $/\alpha /$. All the vowels can be divided into 3 groups as far as their perceptual esti-mation by the native spea-kers of Russian is concer-ned: 1) the vowels which are placed reliably in a perceptual space of a definite Russian vowel. Their number is 18 and they form vertical spheres in Fig.1; 2) the vowels which are placed in a perceptual space, formed in a linguistic consciousness of the Russian speakers by several symbols: $/\alpha /$, $/\beta /$, $/\gamma /$, $/\alpha /$, $/\beta /$, $/\gamma /$, $/\alpha /$, $/\beta /$, $/\gamma /$.