EFFECTS OF PHONETIC SPEECH TRAINING ON THE PRONUNCIATION OF VOWELS IN A FOREIGN LANGUAGE

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ABSTRACT

The paper presents the results of speech training exercises on a sample of American English and Spanish native speakers learning Croatian as a foreign language. The success of training was assessed by a panel of trained phoneticians, who evaluated examples of speech before and after a series of individual training sessions. Two different evaluation tests revealed significant improvement in the quality of pronunciation of the five Croatian vowels, which was also reflected in the shape of their vowel space expressed in terms of F1 and F2 frequencies.

Keywords: foreign language learning, speech training, vowel space

1. INTRODUCTION

The importance of good pronunciation is often unappreciated in foreign language learning – equally so by teachers and students. One of the reasons is the fact that language teaching is commonly conducted in groups in which it is impossible to pay sufficient attention to individual problems, or to dwell on specific pronunciation errors. Individual phonetic speech training sessions have been shown to yield very good results [3, 4]. A particular method of phonetic training, introduced by Guberina [2, 6] several decades ago within the Verbotonal method primarily intended for the rehabilitation of the hearing impaired, is based on the idea of restricted bands of frequencies characteristic of individual sounds, that are necessary and sufficient for these sounds to be recognized and distinguished from other (particularly closely related) sounds. Other factors important for successful speech training include sound context, intonation, position within the word/sentence, movement, among others [4]. The verbotonal method also proposes the notion of the system of errors, i.e characteristic and systematic errors that can be expected in the speech of students sharing a common language background when learning a foreign language.

In this study, speakers of American English and Spanish studying Croatian as a foreign language were chosen because of the difference in their vowel repertoires in relation to the vowel repertoire of Croatian: whereas Spanish and Croatian are basically 5-vowel systems (i, e, a, o, u), American English has a more elaborate vowel space. We expected that to be a major source of different errors in vowel production (in addition to the stress-timing vs. syllable-timing differences affecting vowel reduction). Studies have shown that the shape, position and the area of the vowel space (in terms of F1 and F2) are in positive correlation with foreign language proficiency [5].
The aim of this work was to study the change in the pronunciation of vowels after a period of individual speech training sessions in combination with regular language classes. We hypothesized that the speech training sessions would be beneficial to the students of Croatian as a foreign language, which would be reflected in higher listening evaluation scores and vowel space closer to that of native speakers. We also expected that, compared with American students, the vowel space of Spanish students of Croatian would correspond more closely to that of Croatian controls, due to the similarity of the two vowel systems.

2. MATERIAL AND METHOD

2.1. Speakers and languages

Ten speakers participated in the study. Four Americans (2 male, 2 female; mean age: 22.5 years) (AM), two Spaniards (1 male, 1 female; mean age: 27) (SP) and four Croats (2 male, 2 female; mean age: 23 years). The Croats were included as control (C). The AMs and SPs were native speakers of American English and Spanish, respectively, and had been learning Croatian as a foreign language in Zagreb, Croatia. They were enrolled in a Croatian language course at the

Faculty of Humanities and Social Sciences, University of Zagreb, that consisted of daily 90-minute group classes and individual speech-practice sessions. The individual sessions were tailored to suit the specific pronunciation problems of each speaker. All had college or university degrees. The Cs were undergraduate or graduate University students. The recordings of AMs and SPs were done approximately 2 months apart, with 10-15 individual sessions between recordings.

2.2. Material

Words containing the five Croatian vowels were used as test material: kip, kec, kap, kos, kup. For AMs and SPs, one token of each word recorded at the start of individual sessions (BEFORE) and one recorded after 2 months (AFTER) were used. For Cs one or two tokens of each word, depending on the test, were used. The material was recorded in studio conditions with professional equipment. The tests were run from a notebook computer and presented via loudspeakers in a classroom (ambient noise approximately 40 dB).

2.3. Listeners

Thirtysix (4 male, 32 female; mean age: 21.6; university juniors) participated in the study.

2.4. Procedure

This was a two-part study (time between the parts: one week). The listeners were not aware of Cs in either part. In the first part (P1) the listeners were presented with BEFORE and AFTER tokens (1 token per each vowel per speaker) and with one token per C (5 times each), which yielded 80 individual stimuli. The testing was done in 5 groups with 5 different randomized orders of stimuli. The listeners were instructed to imagine themselves as teachers of Croatian as a foreign language and to grade the pronunciation of each stimulus on the 1-5 scale, 5 being the best, i.e. closest to native Croatian pronunciation. The test lasted 10 minutes. In the second part (P2) the listeners were presented with pairs of stimuli, each containing one BEFORE and one AFTER token for AMs and SPs, and two different tokens of Cs words. Each pair was presented 4 times in two different within-pair orders (2 times BEFORE-AFTER, 2 times AFTER-BEFORE for each word). This yielded 200 pairs presented in two random orders to listeners split into two groups. The listeners were asked to decide which member of the pair was better, i.e. closer to native Croatian pronunciation. The test lasted 20 minutes.

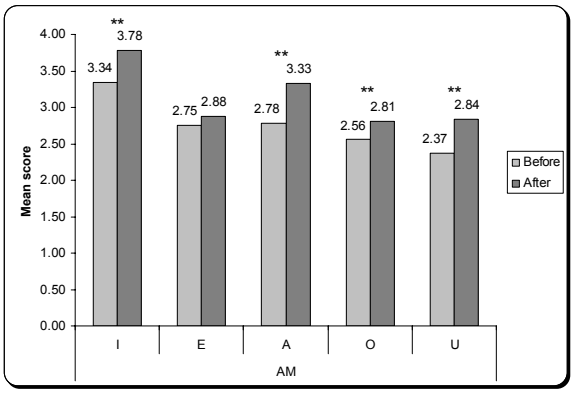
2.5. Acoustic and statistical analyses

Praat and Excel/SPSS software was used for acoustic and statistical analyses, respectively. Vowels were analyzed in terms of F1 and F2 frequencies.

3. RESULTS AND DISCUSSION

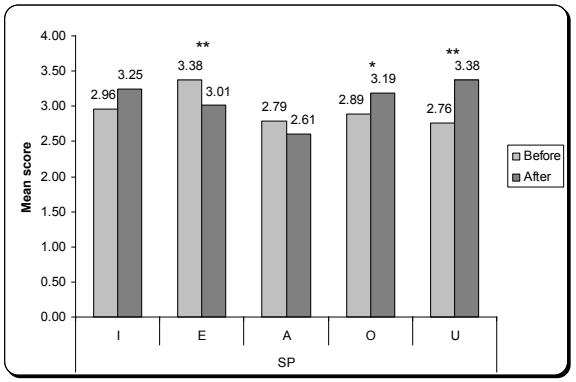
Evaluation scores provided by the listeners in P1 were averaged for each vowel BEFORE and AFTER, and are presented in Fig. 1 for AM and in Figure 2 for SP. Significance is marked with one (.05) or two (.01) asterisks. Overall, both groups were scored higher for the AFTER stimuli. For the AM speakers, mean BEFORE score was 2.76, and mean AFTER score was 3.13 (p=0.00). For the SP speakers, mean BEFORE score was 2.95 and mean AFTER score was 3.09 (p=0.05). As expected, for all five vowels, Croatian controls were, on average, scored higher than either test group. Interestingly, in the AM group the male speakers were scored significantly higher than the females (p=0.01) both on BEFORE and AFTER stimuli. No such difference was found for Croatian controls. Since there was only one male and only one female speaker in SP the gender analysis was not done.

Figure 1: Mean evaluation score for BEFORE and AFTER vowels – AM.



As it can be seen from Fig. 1, the mean score elicited by all five vowels pronounced by the AM group was higher for the AFTER stimuli. The improvement was significant for 4 vowels, and higher but insignificantly (p = 0.25) so for /e/. A possible reason for this is persistent pronunciation of /e/ in kec as /æ/ by one speaker.

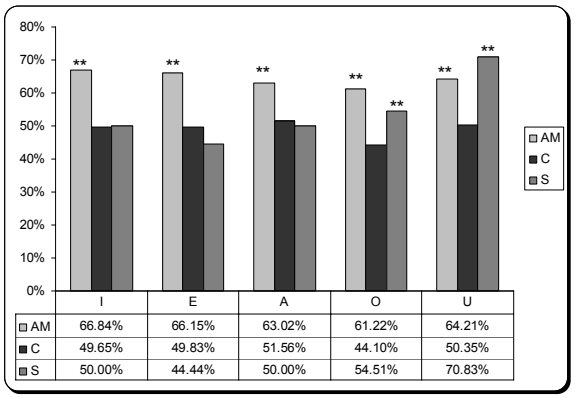
Figure 2: Mean evaluation score for BEFORE and AFTER vowels – SP.



As it can be seen from Fig. 2, the mean score elicited by 3 vowels pronounced by the SP group was higher for the AFTER stimuli. The improvement was significant for /o/ and /u/ but not for /i/ (p=0.17). The AFTER examples of /e/ and /a/ were scored lower. This is probably due to practically no improvement in the female speaker as shown by F1 and F2 values (see Figures 4 through 7).

The results of P2 are presented in Fig. 3. as percentage of listeners' responses in favor of the AFTER stimulus when presented with the stimulus pair. In this test, the pairs produced by Croatian controls were randomly chosen pairs of tokens, since, obviously in their case there is no actual BEFORE or AFTER stimulus. Double asterisks indicate .01 significance compared with responses to Cs.

Figure 3: Percentage of responses indicating that AFTER tokens are better than BEFORE.



	I	E	A	O	U
AM	66.84%	66.15%	63.02%	61.22%	64.21%
C	49.65%	49.83%	51.56%	44.10%	50.35%
S	50.00%	44.44%	50.00%	54.51%	70.83%

As it can be seen from Fig. 3, all AFTER vowels in the AM group were scored better than BEFORE. As expected, controls elicited random responses. The SP speakers also elicited random responses in 4 of the 5 vowels. Only their /u/ was judged as better AFTER than BEFORE.

Acoustic analyis of all three groups of speakers was done in terms of F1 and F2 frequencies. Figures 4 through 7 show mean F1 and F2 values across speakers for each language group. The F1 and F2 values of Cs differ somewhat from those reported in [1], but they were obtained by the same apparatus and software as the test values and we felt they would serve better for comparison.

Figure 4: Vowel space of male speakers – BEFORE (1) C (circles and bold line), (2) AM (squares and dashed lines), and (3) SP (triangles and dotted line).

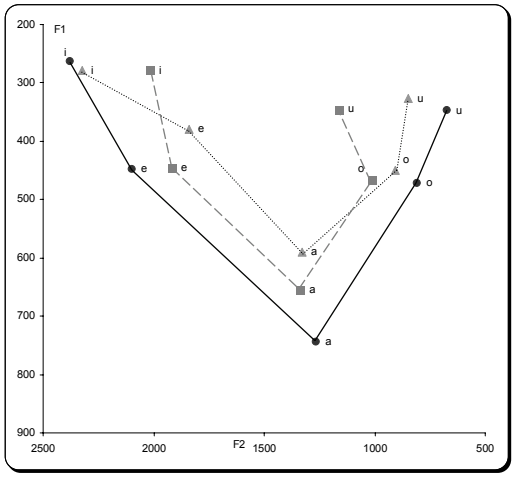
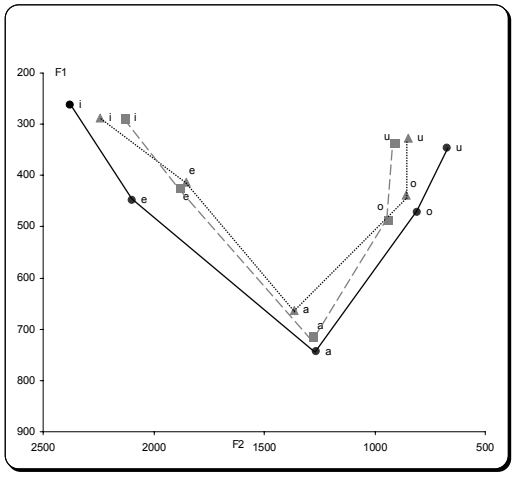


Figure 5: Vowel space of male speakers – AFTER (1) C (circles and bold line), (2) AM (squares and dashed lines), and (3) SP (triangles and dotted line).



Male and female speakers are shown in separate figures for obvious (acoustic) reasons. Besides, it has been shown in P1 that AM males are evaluated higher than females. Although no such statistics were done for SP speakers because there was only one representative of each gender, it is obvious

from these figures that the female exhibited very little improvement in the front and central vowels.

Figure 6: Vowel space of female speakers – BEFORE (1) C (circles and bold line), (2) AM (squares and dashed lines), and (3) SP (triangles and dotted line).

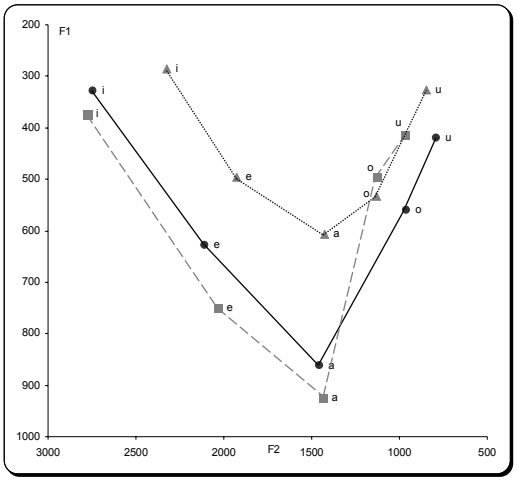
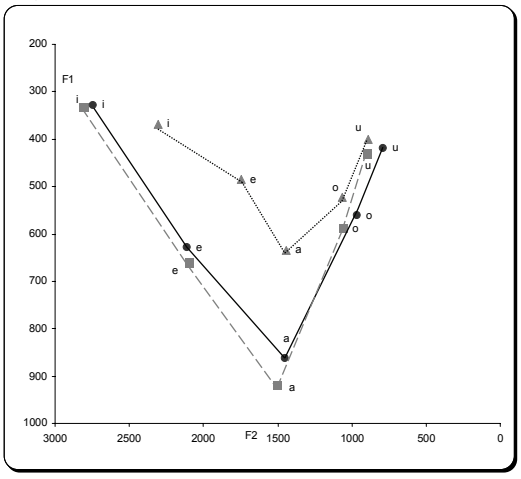


Figure 7: Vowel space of female speakers – AFTER (1) C (circles and bold line), (2) AM (squares and dashed lines), and (3) SP (triangles and dotted line).



4. CONCLUSIONS

It is obvious that the method of phonetic correction through individual speech training sessions yields very good results in the quality of foreign language pronunciation, as evidenced by evaluation scores and acoustic analysis. As expected, greater improvement was found in the language group that initially deviated more from the target language. The rate of improvement found in individual speakers seems to be correlated with extralinguistic factors, of which motivation and attitude look like the most likely candidates.

5. ACKNOWLEDGEMENTS

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