Visualization of vowel spaces in language learning

This paper examines the articulatory properties of six vowels in English produced by twenty-two Japanese learners of English with acoustic analyses of spoken words measured by sound analysis software (Praat). Formant 1 and 2 of these vowels are compared with the ones produced by native speakers of English. Feedback from learners about methods of pinpointing each vowel in a vowel space and comparing them with the ones by a native speaker is collected and estimated.

There are two aims for the experiment. One is to present an arrangement of vowels in vowel space produced by Japanese learners of English. The other is to collect learners' feedbacks of a learning method in which visualization of vowel space is used for training their pronunciation. Twelve female Japanese learners of English (mean age 19 years) and ten male Japanese learners of English (mean age 19 years) take part in the research. All are university students who major in linguistics. They are brought up as monolinguals and have been learning English as a second language at school for over six years. They are intermediate-level speakers of English, which are reflected in their self-reported English skills. Six words, *heed, hid, had, hod, heed* and *hoodoo*, each of which include different vowels are selected. Learners are asked to read these listed words. They are recorded and whose formant 1 and 2 are measured with Praat. Results are given to learners respectively. They put dots for each vowel in a vowel space drawn on a sheet of paper. After that they write their comments for their own pronunciation.

Formant 1 and 2 values of six vowels produced by Japanese learners of English are presented in Table 1. The result presents that six vowels produced by Japanese learners of English are not discriminated clearly compared to ones by native speakers of English.

Feedbacks from the subjects are collected. Among 22 feedbacks, only one just complains that this method is too difficult for her/him. All the rest of the feedbacks show their positive attitudes, such as she/he will pay an attention to opening or closing of mouth and shapes of tongues. The author is pleased to find that some of them like this method and say that they are interested in training their own pronunciation. There are also several feedbacks that show their analytical minds. Some of these samples are listed in Table 2. Visualization of vowel space for language learning is sure to be made use of for learners to let them to have a special interest to their pronunciation.

Table 1 Mean formant 1 and 2 values of six vowels

word	formant 1	formant 2
Heed	399.64	2370.05
hid	491.32	2430.50
had	786.05	1513.55
hod	619.00	1094.82
hood	462.45	1399.86
hoodoo	445.09	1379.50
mean	533.92	1701.99
F-value	16.95	56.91
p-value	<0.01	<0.01
comparison	heed, hoodoo, hood, hid, hod<had	hod<hoodoo, hood, had<heed, hid

Table 2 Samples of feedbacks

1. I could not clarify differences of vowels in *hod, hood* and *hoodoo.* I thought that was because I was nervous and could not stabilize my own pronunciation. I thought that pronouncing English very well was difficult for us, Japanese.
2. Position of six vowels did not scatter as much as I expected. I think I do not discriminate two vowels that are arranged close in a vowel space. I think my pronunciation is not clear as I usually think about myself.
3. I thought I usually closed or opened my mouth when I was speaking in English. With looking at the figures, however, I found I could not do that as I expected. I thought those who spoke good English would open or close mouth and moved tongue in better ways than I thought they were doing.
4. This is the first time for me to analyze my own vowel pronunciation. I felt a little nervous. The result showed that vowels in *heed* and *hid* were discriminated very well. I felt happy. Vowels in *hood* and *hoodoo,* however did not show much difference. I felt sorry for that. I thought vowel pronunciation presented individuals' characteristics of pronunciation.

References

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