The Phonetic Value of Korean 'ㅓ'

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1. Introduction

Apart from /ə/, /ʌ/ and /ɔ/, Korean 'ㅓ' has been controversial in defining its phonetic value. Thus, we find the definitions of this sound like:

(1) "Back unrounded vowel. When short /ə/ or /ɔ/ are slightly lower than the corresponding cardinal vowels" (Martin, 1951, p. 524)

(2) "...the long /ʌ:/ in /bʌ:l/ (bee) is considerably different from /ʌ/ in /bʌl/ (punishment), in realizing somewhat centralization." (Lee, 1971)

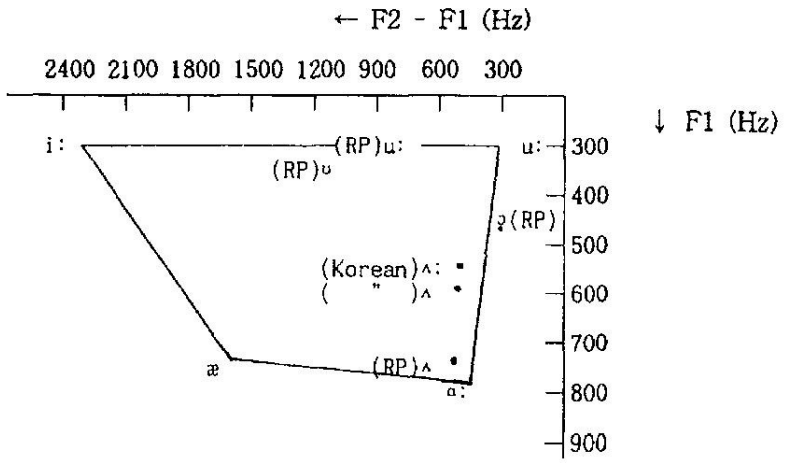
(3) "... [ə] or [ɜ:] in the word that has a long vowel, [ʌ] in that of short vowel" (Huh, 1965)

The purpose of this paper is to propose a new definition of Korean, i.e. Seoul standard 'ㅓ', and to examine several acoustic and phonetic phenomena involving Korean 'ㅓ'. It will be claimed that it is a "less-rounded half open back vowel" which has the phonetic symbol [ɔ]. This study stems from an acoustic study (Lee & Zhi, 1983), an informant study (Kim, 1982) and a lip shape examining and articulatory X-ray photograph (Skaličková, 1955) which shows the culminating phase of the Korean 'ㅓ'.

2. Acoustical value of Korean 'ㅓ'

In defining Korean 'ㅓ' as /ʌ/, Lee & Zhi (1983) show the following result from their experiment:

(4) The position of /ʌ:/ and /ʌ/ in a formant chart showing the F1 frequency on the ordinate plotted against the distance between the frequencies of F1 and F2 on the abscissa for eight Korean vowels.



In (4), the extreme /i:/, /æ/, /ɑ:/ and /u:/ stand for the Cardinal vowels. The informant pronounced /bʌ:l/ "bee", and /bʌl/ "punishment" and /se:bʌn/ "thrice".

The experimental result of my version is not so different from the result of (4). Compare the F1 and F2 position with the following result of long stressed 'ㅓ:' in /bʌ:l/ (bee), short stressed 'ㅓ' in /bʌl/ (punishment) and unstressed 'ㅓ' in /se:bʌn/ (thrice), (refer Figure 1).

(5)	duration	F1	F2
a) long/stressed	150 ms	550 Hz	1200 Hz
b) short/stressed	53 ms	700 Hz	1200 Hz
c) unstressed	80 ms	700 Hz	1150 Hz

The result shows position similar to /ɔ:/ in Received Pronunciation (Wells, 1962) in backness. When we plot it on the quadrangle. Compare the following on the quadrangle (4).

(6)	F1	F2
/ɔ:/ in 'hoard' in RP	450 Hz	740 Hz
/ʌ:/ in /bʌ:l/ in Korean	550 Hz	1200 Hz
/ʌ/ in /bʌl/ in Korean	700 Hz	1200 Hz

When we compare these three phones, we find that /ʌ/ is plotted in a more centralized position, lower than /ɔ:/. In acoustic analysis, the determinant feature of F2 is lip-rounding. For example, in the case of rounded and unrounded /u/, unrounded /ʊ/ shows higher F2 formant frequency. Below are the result of RP rounded /u:/ (Wells, 1962) and unrounded /ʊ/ in the result of another RP /ʊ/ in the phrase 'two cheese'.

(7)	F1	F2
rounded /u:/	300Hz	940Hz
unrounded /ʊ/	250Hz	1300Hz

Thus, the higher F2 of /ʌ/ suggests less lip rounding than RP /ɔ/. We get the same result for lip-rounding in the following sections. If that is the case, we need not

define Korean 'ㅓ' as /ʌ/, which is similar to Korean /a/. Plot and compare the /ʌ/ of RP (Wells, 1962) which has 720 Hz in F1, 1240 Hz in F2 in 'hub'. Gimson (1989) also points out that the quality of /ʌ/ is that of a centralized and slightly raised /a/. If the problem is in lip-rounding, we can use the appropriate diacritic '◌̜', defining this vowel as [ɐ̜].

3. Informant study

By means of work with informants, Kim (1982) shows that the variance between /ʌ/ and /ʌ:/ does not exist in the younger generation who pronounce in the standard Seoul accent. In another study, Lee (1971) had shown that /ʌ:/ has an /ə/- coloured feature, and that it is found in the older Seoul generation. However, the same phenomenon is examined for RP /ʌ/. Gimson says:

> (8) The quality of a centralized and slightly raised /a/ is that of general RP as used by younger people. Conservative RP speakers often use a more retracted vowel, i.e. an unrounded and centralized type of /ɔ/.

Thus, we find that centralizing is common to the older generation in both Korean and RP /ʌ/. It may be described in terms of the physiological laxing phenomenon. This /ə/- coloured accent can not be found in the younger generation. As a result, in the standard younger generation's pronunciation, we can not distinguish "kēri (distance): keri (street)", "būl (bee): bul (punishment)" if the context is not provided. At one time, it has been argued that the length of the two vowels differenciates the meaning. Thus, quantity (length) is no longer an important factor in defining Korean 'ㅓ'.

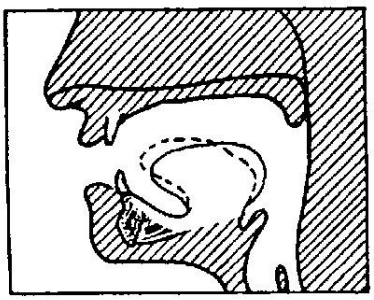
For the /ə/- coloured /ʌ:/ , the informants even responded that it was a dialect pronunciation. Thus, the transcription /ə/ for Korean 'ㅓ' is not recommendable. It is rather more similar to Korean [ㅡ] than to [ㅓ].

4. Articulatory features

In an examination based on the pronunciation of 18 people between 17 and 28 years old age, from north Korea, Skaličková (1955) shows the following results for Korean 'ㅓ'.

The X-ray screen which was proceeded to take the picture in the exposition of 0.03 second, shows the following tongue shape:

(9) Tongue positions of the Korean "ㅓ" for [ɔ], [ə].



_____ Korean ɔ

..... Korean ə (i.e. [ㅡ])

The tongue is drawn back and raised in the direction of the soft palate. Compare with the dotted line which shows Korean /ə/ of '—'in the same experiment. The tongue is farther back and consequently more arched to the soft palate than Korean /ə/.

The lip aperture of Korean 'ㅓ' is larger than Korean /ə/.

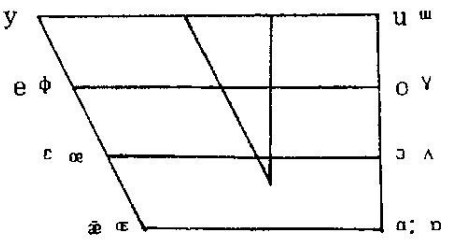
In this experiment /ə/ is transcribed for the words "up (small town), "kul (letters), ku (the)" which we transcribe as /ɯ/. Then, she defines /ə/ as more similar to /ɯ/ than /ɔ/. As we can notice in this picture, Korean 'ㅓ' is more similar to the Cardinal vowel /ɔ/ than /ə/.

The only problem is lip-rounding. In her examination, the degree of lip-rounding varies in individual pronunciation. Some of the persons examined had a slight lip rounding, but others had only a passive movement following the action of the jaw. Although it is not perceived as a complete Cardinal /ɔ/ shape in lip-rounding, it does not show a lip-spreading shape. Moreover, as we have examined the characteristics of /ʌ/, we get a sound similar to /a/ in the spread lip shape. Thus, "less-rounded half open back vowel [ɤ̞]" seems to be the most proper value of Korean 'ㅓ'.

5. The phonetic value of [ɤ̞]

I have tried to show that the term "less-rounded half open back vowel [ɤ̞]" covers Korean 'ㅓ'. The main reason that /ɔ/ has been avoided was lip-rounding, even though all other acoustic and articulatory values are most similar to the Cardinal vowel /ɔ/. Let us review Cardinal vowel /ɔ/ in the following vowel quadrangle.

(10)



Rounded vowel versus Unrounded vowel

/ɔ/ is articulated with medium lip-rounding, the back of the tongue is raised between the half-open and half-closed positions, no contact being made between the tongue and the upper molars. (Gimson, 1989)

Thus, for a broad transcription /ɔ/ would be appropriate. In a narrow transcription, the diacritic '˕ ', which shows "less-rounded" lip shape, is added. In light of all the above considerations, I suggest that [ɔ˕] would be the most proper transcription for Korean 'ㅓ'.

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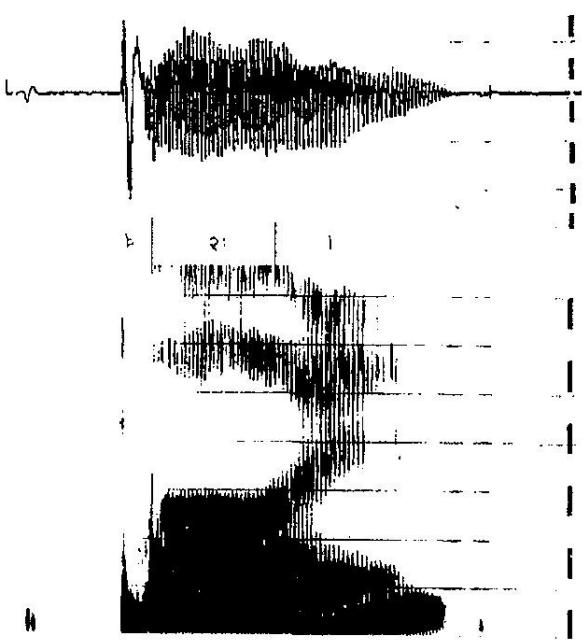
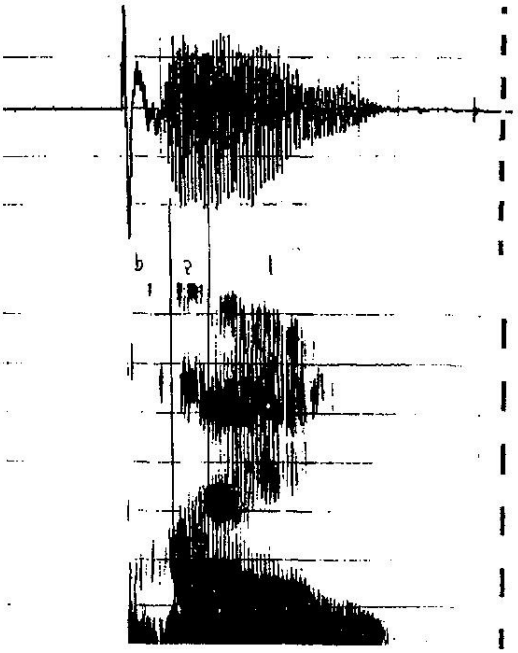
Figure 1. Speech waveforms and wide band spectrograms of (5a) [bɔl] "bee", (5b) [bɔl] "punishment" and (5c) [se:bɔn] "thrice", with less-rounded half open back vowel, adult female speaker. Divisions of vertival axis: 500 Hz. Time axis: 50ms.

(5a′) [bɔl] "bee"



(5b′) [bɔl] "punishment"



(5c′) [se:bɔn] "thrice"