

Dependence on the quantity in the perception of [i:] and [ɪ] by Japanese Learners of English

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1. Introduction The difference between English vowels [i:] and [ɪ] lies in their vowel quality as well as their quantity (i.e. duration or length). However, when it comes to English teaching in Japan, Japanese teachers of English tend to teach that the difference of the two vowel sounds is in the quantity rather than the quality. Therefore Japanese learners of English are likely to focus on the quantity in producing and perceiving [i:] and [ɪ]. This study tests to what extent they depend on the quantity in the perception of the two vowel sounds by constructing the following listening test to examine the relative importance of quantity and quality to the perception of English vowels by 1) native speakers of English (NSs) and 2) Japanese learners of English (JLEs).

2. Previous study of the perception of [i:] and [ɪ] by Japanese speakers Sugito (1996) conducted a perception test, in which the participants (NSs and JLEs) listened to the same words used in the production test. Both NSs and JLEs made no errors in perceiving *seed*, and only a few errors were found in the perception of *bead* by JLEs. This would be because the duration of [i:] is by far the longer than that of other vowels (p.312). Other perception errors caused by JLEs were found in [i:] followed by a voiceless consonant (*seat* and *beat*) and in [ɪ] followed by a voiced consonant (*Sid* and *bid*). These errors originate from the fact that [i:] preceding [t] is shorter than [ɪ] preceding [d]. Thus the perception of [i:] and [ɪ] by JLEs are very much influenced by their quantity.

As shown by Sugito (1996) above, JLEs seem to have a strong image that [i:] and [ɪ] are differentiated by the quantity rather than the quality in production and perception, and, therefore they are unlikely to be able to perceive the quality difference between the two sounds. However, as for the perception, Sugito (1996) did not investigate to what extent JLEs are dependent on the quantity and quality. Thus, this study will examine it in comparison with the participants of NSs.

3. Experiment The question we attempt to answer is 'To what extent do native speakers of English use vowel length to distinguish [i:] and [ɪ]?'. In order to test this, we have constructed a listening test in which an [i:] in a word context is shortened (to see whether a shorter version is heard as [ɪ]) and an [ɪ] is lengthened (to see whether the longer version is heard as [i:]).

3.1 Methodology

The audio samples chosen are a minimal pair of monosyllabic words, 'bead' and 'bid'. These are taken from Peter Ladefoged's website ([1]). They are pronounced with a British English accent. The advantage of using this website is that all the samples on it are produced with a level tone and with almost the same F0. This makes it easier to modify and edit the audio samples because the F0 is nearly identical in each sample, enabling us to focus mainly on the quality and quantity of vowels.

3.1 Construction of a listening test

3.1.1 Shortening of [bi:d] and lengthening of [bid]

The original duration of [bi:d] is about 424 msec. Only [i:] in [bi:d] (duration is about 328 msec) is 'shortened' by four, eight, twelve, sixteen and twenty cycles (a cycle is

each repetition of the sinusoidal pattern (Johnson 1997: 7)). The durations of [bi:d] obtained are about 291, 254, 218, 181 and 144 msec respectively. Thus six versions of [bi:d] are included in the test, including the original.

The original duration of [bɪd] is about 395 msec. Only [ɪ] in [bɪd] (duration is about 288 msec) is lengthened by four, eight, twelve, sixteen and twenty cycles of the wave forms. The duration of [bɪd] obtained are about 326, 363, 400, 438 and 476 msec respectively. Thus six versions of [bɪd] are included as stimuli, including the original.

Varieties of [bi:d] and [bɪd] created through the process above, twelve samples altogether, are arranged randomly with distractor items (bed, bad, board and booted) inserted between the experimental stimuli.

3.1.2 Participants

Participants consisted of five male and five female native speakers of English and Japanese learners of English of a range of ages and with no known hearing problems. They listened to 23 items twice and circled one of the six words on the answer sheet.

4. Comparison of the perception of [i:] and [ɪ] by NSs and JLEs

4.1 Overall result

The overall result of the perception of [i:] and [ɪ] by NSs and JLEs. The rate of correct perception of [i:] by NSs and JLEs is 50% and 28.3% respectively, which is statistically significant ($P < 0.05$, $df = 18$, $t = 2.62$). That of [ɪ] by NSs and JLEs is 61.7% and 6.7% respectively, which is also highly statistically significant ($P < 0.01$, $df = 18$, $t = 4.5$). Thus NSs had better perception of both [i:] and [ɪ] than JLEs and they are much less dependent on the *quantity* of vowels in hearing [i:] and [ɪ] than JLEs.

4.2 The choice of words by NSs and JLEs for 'bead' and 'bid'

JLEs chose much more 'bid's for 'bead' and much more 'bead's for 'bid' Both differences are statistically significant ($P < 0.01$, $df = 18$, $t = -3$; Figure 9: $P < 0.01$, $df = 18$, $t = -4.81$, respectively). This supports the idea that JLEs are more dependent on the quantity than NSs.

4.3 The duration of the target vowels which affect perception

Figures below indicate at which point NSs' and JLEs' perception changes. Figure 1 tells us that NSs' perception declines suddenly when the vowel of 'bead' is shortened by twelve cycles, whereas JLEs' perception goes down constantly as the vowel is shortened. This implies that NSs are more dependent on the *quality* of the vowels than JLEs. In other words, JLEs rely more on the *quantity* than NSs do. Figure 2 shows more stable perception of 'bid' by NSs and constantly poor perception of it by JLEs than that of 'bead' above. Thus it is difficult to identify a border line at which the perception dramatically declines. Rather, it can be said that JLEs are even not capable of perceiving the vowel [ɪ] in this word context. This could result from the fact that Japanese participants were confused with the lengthening of [ɪ] by the following voiced stop [d], which also indicates their dependence on quantity.

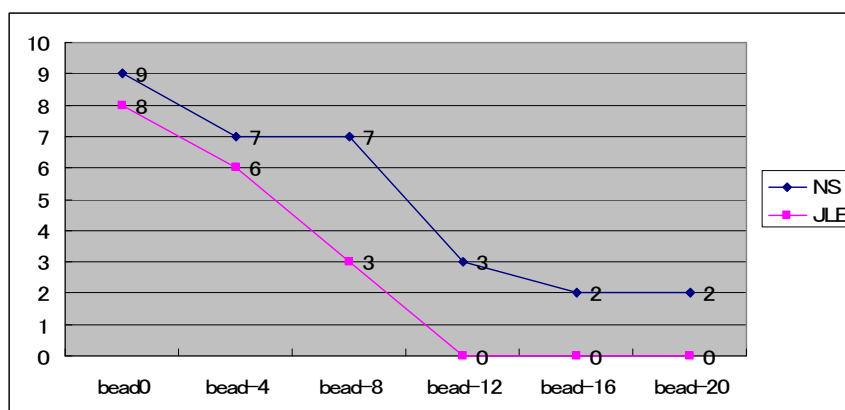


Figure 1. The number of correct answers for 'bead' shortened

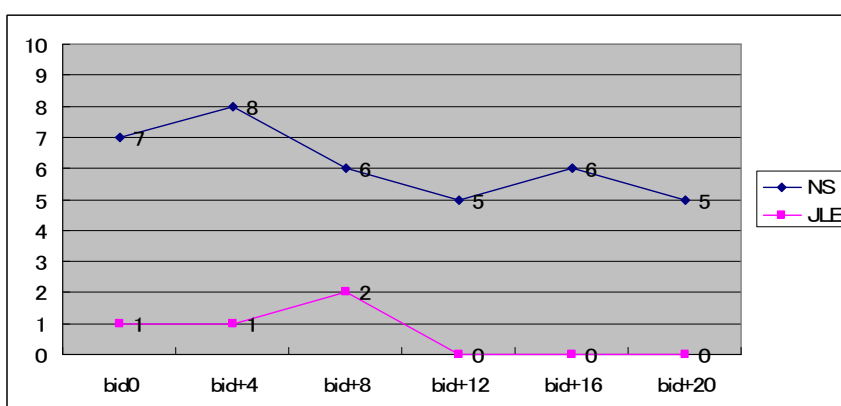


Figure 2. The number of correct answers for 'bid' lengthened

4.4 Summary

The results and discussions of the perception of NSs and JLEs above have shown that NSs' perception of [i:] and [ɪ] is by far superior to JLEs' counterpart, that NSs are more sensitive to the *quality* of the two vowels than JLEs are and that JLEs are much more dependent on the *quantity* of vowels in perceiving [i:] and [ɪ].

5. Conclusion The current study has shown that JLEs tend to be too dependent on the quantity in the perception of the two vowel sounds [i:] and [ɪ]. Relating this to ELT in Japan, teachers would need to refer to the quality difference at least to some extent. In this sense, the current study will be of some help, although it will require the larger number of participants to generalise the results.

References

Johnson, K. (1997) *Acoustic and Auditory Phonetics*. Oxford: Blackwell.

Sugito, M. (1996) *Nihonjin no Eigo: Nihongo Onseino Kenkyu 2 [English by the Japanese: Studies of Sounds 2]*. Osaka: Izumishoin.

Internet Source

[1]

<http://hctv.humnet.ucla.edu/departments/linguistics/VowelsandConsonants/vowels/c hapter3/bbcenglish.html>