



Japanese Speakers' Perception of Syllable-final Stops and Inter-vocalic Consonant Clusters

Hyun Bok Lee and Eunji Kang

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Hyun Bok Lee* and Eunji Kang**

Japanese Speakers have been known to experience difficulty perceiving and pronouncing syllable-final stops and inter-vocalic consonant clusters. Therefore they find it difficult to correctly perceive and pronounce the syllable-final consonants and consonant clusters in languages such as Korean and English.

Examples

bap → [pabu] “boiled rice”,
kkaktugi → [kakuteki] “깍두기”
gukpab → [guppa] “soup rice”
cut → [katto]
lucky → [rakki]
,

This paper attempts to assess objectively the difficulty experienced by the Japanese speakers in perceiving the syllable-final consonants and inter-

* Professor emeritus of phonetics and linguistics, Seoul National University.

** Research professor, Institute of Linguistics and Information, Korea University.

vocalic consonant clusters in Korean words.

1. Method of Perception Test

Three sets of pre-recorded Korean words were played to the Japanese speakers who were told to write down the words that they have heard in Roman letters, Japanese Kana letters, or phonetic symbols. Each word was played twice for the informants with a short intervening pause. The test was carried out twice on the same day for the same informants.

2. Material for the Test

Words used in the perception test are as follows:

A. 1) phak(팍) 2) phat(팔) 3) phap(팍)
4) phik(픽) 5) phit(핏) 6) phip(핍)

B. 1) pap(밥) 2) pat(밭) 3) pak(박)
4) pit(빳) 5) pip(빱) 6) pik(빅)

C. 1) pakka(박가) 2) patka(밭가) 3) papka(밥가)
4) papta(밥다) 5) pakpa(박바) 6) pakta(박다)

They were written in Roman letters with Hangeul letters given in

brackets. The words in Groups A and B are all mono-syllabic words ending in a voiceless plosive whereas those in Group C are two-syllable words containing inter-vocalic consonant clusters. The test words are all actual Korean words but they can easily be taken as the words of other languages having the same syllable structure as Korean.

<ph> in the list stands for the heavily aspirated plosives, and the final <p, t, k> in section A and B represent unexploded plosives. Similarly, the initial consonants of the intervocalic consonant clusters in section C are also unexploded plosives.

3. Recording

Test words were recorded by the author at the Recording Studio of the Institute of Logopaedics and Phoneiatrics, University of Tokyo with the help of Professors Sawsashima, Hirose and Mr. Nagai. Recording instruments used were as follows.

Recorder: Teak R-740 Professional Tape Deck

Microphone: Sony ECM-54 Electric Condenser Microphone

Tape: Sony SLH 275 BL

4. Informants for the Perception Test

The informants for the perception test were all Japanese who were either

born and lived in Tokyo for more than ten years and received higher education. Of 7 informants one was fifty years of age, three were in the 40s and three in the 30s. 6 informants were male and the only female informant was a professional linguist educated in the United States. They all had good background in English and had experience of travel and residence abroad. Therefore they were better educated and more conversant with speech sounds of foreign languages than ordinary Japanese speakers.

The highly striking background of the informants is bound to have significant relevance to the interpretation of the results of the test. One of the informants took part only in the first session.

5. Results of Perception Test of Syllable-final Stops

The results of the perception test are as follows:

The table I shows the perception test results of individual informants. In the table the capital letters such as H, R, etc. in the middle column represent the informants who took part in the test and I and II to the left and right of the middle column represent the first and second session of the perception test.

The blank space represents correct response and the letter 0 stands for no response for the relevant sounds. Small letters like <p, t> represent perceptual errors for the relevant stops. And the numeral following the letter as in p2 stands for the number of errors made. Thus <p2> means that the informant misheard the relevant sound as [p] twice.

Table I. Individual Perception Errors of Syllable-final stops

Session I				Session II		
p	t	k	Informants	p	t	k
		p1/ t1	H			t2
		p1/ t1	R		p1	t2
	ø1	p1/ ø1	W	X	X	X
			U			
ø3	p1/ø3	ø4	I	ø2	p1/ø3	p2/ø2
	?3	?2	K	?1	?1	?2
ø1	ø2	t2	N			

Table 2. Comprehensive Perceptual Errors of Syllable-final Plosives

Session	p	t	k	Total
I	ø4	ø9	ø7	28
II	ø3	p1	p3/t4	
		ø4	ø4	
		p2	p2/t4	19
	7	16	24	47

The table II shows the comprehensive perceptual results of syllable final plosives based on the individual perception errors of Table I.

One can see that the table II summarily shows the perceptual errors for the relevant plosive sounds and the number of times that the errors were made. For instance <ø4> in the upper left should read: /p/ was not heard four times in the first test, and <ø4/p2> in the lower column of <t> should read ㅍ was not heard 4 times, and /t/ was misheard as /p/ twice. It should be noted here that the glottal stop that was marked in the test I was treated in the test II as silence (not heard). Phonetically, glottal stop should be

treated as different from silence. However in this test, the purpose is to find out whether the listener 1) is capable of hearing a sound, and if so, which of the three sounds p,t,k stops he actually hears. Therefore, glottal stop written by the informants is here interpreted as “incapable of hearing p, t, k”.

6. Results of perception test of intervocalic consonant clusters

The individual perception test results of intervocalic consonant clusters (Part C) is as follows (Table 3) where /tt/ in the column /kt/ is to be interpreted that /kt/ was misheard as /tt/ by the informants.

The table 4 shows a comprehensive test results of consonant clusters based on the individual results.

Table 3. Individual Perception Errors of Intervocalic Consonant Clusters

Session I						Informants	Session II					
kk	tk	pk	pt	kp	kt		kk	tk	pk	pt	kp	kt
	kk	kk	tt	pp	tt	H	tk			tt	pp	tk
				pp		R						
				pp	tt	W	X	X	X	X	X	X
	kk		tt		pt	U						
	kk			pp	tt	I					pp	tt
			tt		tt	K					pp	tt
				pp	tt	N				tt	pk	tt

Table 4. Comprehensive Perception Errors of Intervocalic Ploisves

Session	kk	tk	pk	pt	kp	kt	Total
I	-	kk3	kk1	tt3	pp5	tt5/pt1	18
II	tk1	-	-	tt2	pp3/pk1	tt3/tk1	11
	1	3	1	5	9	10	29

7. Analysis of the syllable-final /p, t, k/ and intervocalic consonant clusters

A. Syllable-final Stops

7.1 Relative Perception Error Rate

As can be seen in the Table 1 and 2, the perception error rate of /k/ was highest, followed by /t/ and /p/. This reveals an interesting fact that the backer a point of articulation. the higher the error rate. Thus the error rate of bi-labial stop is lowest whereas that of the velar stop /k/ with the blackest articulation is highest.

In the perception test one and the same plosive sound occurs 4 times and the total number of hearing of a particular plosive for the 7 informants is 28. Thus the sound /k/ marks 50% error rate (14 errors out of 28 perception test).

7.2 Decrease of Error Rate in the Second Test

Notice that the error rate has decreased in the second test. For instance /t/ marked ten errors in the first test but only 6 errors in the second test. Similarly errors of /k/ decreased to 10 errors in the second test from the 14 in the first test. And the total number of errors in the first test was 28 and it decreased to 19 in the Second.

7.3 The Nature of Perception Errors

An interesting tendency is noted in the errors. AS can be seen in the Table 2, That is, a backer sound, i.e. a plosive with the backer articulation point, is perceived as a fronter sound. Excluding the /θ/, /t/ is all perceived as /p/ and /k/ is misheard as /t/ or /p/. In particular, /t/ is never perceived as /k/ and the labial sound /p/ is never misheard as a backer sound /t/ or /k/. One might characterize this phenomena as a progressive or forward perception errors. This progressive nature of perception errors can well be linked to the point made earlier that the backer the plosives the more frequent the error rate.

7.4 Intervocalic Consonant Clusters

The cluster /kt/ marked the highest error rate, followed by /kp/, /pt, /tk/. The most striking feature here is that the first consonant of the cluster is

perceived as the second consonant. That is, /kt/ was perceived as /tt/, /kp/ as /pp/, and /pt/ as /tt/. The consonant clusters /kit/ and /kpt/, which mark the highest perception error rate, both begin with /k/ sound. Thus it can be said that /k/ shows the highest error rate in both the syllable-final position and in clusters.

As shown in Table 4, the cluster /kk/ shows only a few errors. This is self-explanatory considering the fact that Japanese speakers tend to perceive the first consonant as the second consonant of the cluster. As each of the six Intervocalic clusters occurs only once in the list, it was subject to judgment by 7 speakers. And yet /kt/ shows as many as 6 errors in the first session. Likewise /kp/ also shows as many as five errors out of 7 hearings.

As in the case of the syllable-final perception test, the second session (11 errors) shows better results than the first one (18 errors) in the intervocalic consonant perception test...

8. Conclusion

From the perception test of the syllable-final consonants and intervocalic consonant clusters for the Japanese speakers, the following conclusions may be drawn.

1. Japanese speakers find it difficult to perceive the unexploded /p, t, k/, the highest error rate being marked by velar stop /k/ followed by alveolar /t/ and labial /p/.

2. Japanese speakers show a strong tendency to make “progressive” perceptual errors. That is, /k/ is perceived as the fronter sound /t/ or /p/, and /t/ as the fronter sound /p/.

3. Japanese speakers show considerable perceptual errors of inter-vocalic consonant clusters. In particular, clusters beginning with /k/ such as /kt/ and /kp/ mark a very high perceptual errors. This error rate is just as high as the syllable-final /k/.

4. With regard to the intervocalic consonant clusters, the first consonant was identified as the second consonant and the second consonant was hardly misheard. The fact that Japanese speakers tend to identify the first consonant as the second consonant of a cluster may be accounted for by the frequent occurrence in of homorganic consonant clusters like /kk/, /tt/, /pp/ to which Japanese speakers have been well accustomed to in speaking Japanese, This phenomenon may be attributed to “Soku on “ in Japanese.

5. Out of the 47 perceptual errors of syllable final plosives 17 errors were related to misperception of “place of articulation” but as many as 31 errors were attributed to the failure to identify or to hear “silence”). This could be taken as an indication that Japanese speakers’ perceptual ability to judge the unexploded (implosive) stops is very weak.

6. It was found that the perceptual ability varies from person to person depending on individual linguistic and phonetic background. In the table 1 and 3, informant U made no errors except one in inter-vocalic consonant cluster whereas the informant I has made as many as 27 errors in all.

7. The better result noted in the second session compared to the first one could account for the importance of the perceptual training.