The Duration of Sequences of Two Identical Consonants in Indonesian in Comparison with Geminates in Japanese

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1. Introduction

Japanese is an agglutinative language and also a polysyllabic language. Although it is sometimes claimed that, phonetically, Japanese has closed syllables (CVC, CV) as well as open syllables (CV,V), it is generally accepted that Japanese has only open syllables (CV,V) and mora phonemes as phonemic units[1].

As mora phonemes have their respective allophones, their manifestations are not simple. In some cases, the mora phonemes /N/ and /Q/ are manifested as part of a geminate consonant. These geminate consonants appear not only within a stem but also at the position of a morpheme boundary in one word. Therefore, it is not so difficult to find minimal pairs of words with single and geminate consonants.

To understand the relation between phonetic characteristics and the native language of second-language learners, it is necessary to examine both the phonetic manifestations of the learned language and those of the learners' native language. The important point is whether there are similar sounds in the native language, and how they appear in different conditions. Mora sounds are often pointed out as being one of the major phonetic problems for learners of Japanese as a second language.

We have studied the problem of mora sounds with Indonesian learners of Japanese. Our first results showed that they had difficulty in discriminating single from geminate consonants concerning mora sounds in Japanese. We examined whether there are similar sounds in Indonesian. In Indonesian there is no geminate without being intervened by a word-boundary or a morpheme-boundary, but there are sequences of two same consonantal sounds laid across a word-boundary or a morpheme-boundary. We call such sequences "geminates" in the following. We took up geminate consonants, measured the durations, and reported the results in the preceding number of RILP. In that study[2], we hypothesized that the durations of geminate consonants are shorter than those in Japanese, and they are not so different from those of paired single consonants in Indonesian. But, as we were working with meaningful words in isolation and not minimal pairs, we could not control all conditions, and therefore could not obtain conclusive evidence.

In this paper, we examined geminate consonants in Indonesian in more controlled

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conditions.

2. Method

2.1. Indonesian language

Indonesian is an agglutinative language. It is also a polysyllabic language, and its basic words have mostly two syllables and three syllables. Both open syllables and closed syllables can appear.

Vowel phonemes are the following six: /i//e//a//ə//o//u/
Diphthongs are the following three: /ai//au//oi/
Consonant phonemes are the following 22:

/p//b//t//d//k//g/
/f//s//z//ʃ//x//h/
/tʃ//dʒ/
/m//n//ɲ//ŋ/
/l//r//j//w/

Though these consonant phonemes can all occur in syllable-initial position, some of them cannot occur in syllable-final position. The consonant phonemes which can occur in syllable-final position are the following 14:

/p//b//t//d//k//g/
/f//s//h/
/m//n//ŋ/
/l//r/

Consonant clusters appear in words of foreign origin and onomatopoeic words, but these are peripheral.

As there are syllables which begin with a vowel, two vowels can come together in one word, but these are different from diphthongs. Two consonants, a syllable-final consonant and a syllable-initial one, can come together in one word. But, as no geminate consonant can appear in a stem, there are no minimal pairs of stems with an opposition of geminate and single consonants.

Geminate consonants can appear at the morpheme boundary of a word, but there is no minimal pair of words with a geminate consonant at the morpheme boundary. Moreover, consonants can be geminated when a word with the same consonant in initial position follows another with the consonant in final position.

2.2. Procedure

Though there were no minimal pairs, the same consonants geminated within a word, or between two words. In our previous paper, in which we used meaningful words, we outlined several factors to be considered.

1.Morpheme boundary vs. word boundary.

2.The syntactic relation of words, such as subject+predicate, verb+object, or noun+modifier.

3.The total number of syllables in an utterance.

4.Position in an utterance, such as initial or final position.

5.Speed of utterance.

It is necessary to examine the duration of geminate consonants using minimal pairs with the above conditions controlled.

We are now planning a further experiment under the conditions listed below.

Condition 1. We will syntactically restrict the combination of constituents to the following three types:

<1> stem+suffix

<2> noun+adjective (as a modifier of the preceding noun)

<3> verb+noun (as an object of the preceding verb)

Condition 2. We will phonetically restrict the combination of constituents as shown in Table 1.

Table 1. Combination of constituents

group	consonant	geminate	1st constituent		2nd constituent
(1)	p	geminate	-Vp	+	pV-
	p	single	-Vp	+	V-
	p	single	-V	+	pV-
(2)	t	geminate	-Vt	+	tV-
	t	single	-Vt	+	V-
	t	single	-V	+	tV-
(3)	k	geminate	-Vk	+	kV-
	k	single	-Vk	+	V-
	k	single	-V	+	kV-
(4)	s	geminate	-Vs	+	sV-
	s	single	-Vs	+	V-
	s	single	-V	+	sV-

Condition 3. The phonetic construction of the first constituent will be the same except for their final consonants; the same will be true for the second constituent except for their initial consonants.

It is impossible to meet all the above conditions if only meaningful words are used, so we have decided to use nonsense words. However, if we adopt nonsense words both for the first constituent and for the second, Condition 1 will be hard to meet. So, either the first or the second must be a real word. We decided to choose word pairs whose structures (underlined in Table 2) were phonetically the same.

Table 2. Phonetic restrictions of the paired words

group	first word	second word
(1)	---Vp	pV---
	---V	V---
(2)	---Vt	tV---
	---V	V---
(3)	---Vk	kV---
	---V	V---
(4)	---Vs	sV---
	---V	V---

By embedding the half-nonsense phrases in meaningful phrases in the list, we will endeavor not to break Condition 1.

2.3. Choosing the meaningful words

Within the phonetic restrictions shown in Table 2 above, we chose as first constituents verbs which a noun could follow (cf. Condition 1 <3>), and nouns which an adjective could modify in the following position (cf. Condition 1 <2>). As to the second constituents, we chose nouns which could follow verbs (cf. Condition 1 <3>) and adjectives which could modify the preceding noun (cf. Condition 1 <2>).

We used the "Kamus Standar Bahasa Indonesia-Jepang"[3], a middle-sized Indonesian-Japanese dictionary containing about 20,000 words, examining every word to see whether it agreed with our three conditions. We asked a Japanese graduate student whose major was Indonesian language and an Indonesian student in Japan to check whether the words agreed with Condition 1.

For the first constituent, suitable verbs were rare; for example, only two pairs were found for group (4). Suitable nouns were not so rare; at least 18 pairs were found for every group. As for the second constituent, suitable adjectives were rare; only two pairs were found for group (4), while suitable nouns were relatively numerous; no fewer than 40 were found for each group.

3. Results of preliminary recording and measuring

We made combinations of meaningful word and nonsense words. In order to see whether an Indonesian speaker can pronounce these half-nonsense phrases with the same fluency as meaningful phrases, we made a preliminary recording of the list of meaningful verbs accompanied with an object of nonsense word, which is only a part of our lists. We asked an Indonesian speaker to pronounce the phrases in the list, and she reported that she felt little difficulty in pronouncing half-nonsense phrases.

We made an acoustic analysis of the recorded materials and measured the durations of geminate and single consonants. The ratios of the durations of geminates to those of singles are shown in Fig. 1. The average of the ratios is 1.4, and the ratios are between 1 and 2. This result shows that geminate consonants are not always longer than single consonants, and that ratios on the average are not so large as those in Japanese. This preliminary result in this study is consistent with our previous result. We are now making recordings of our entire lists with Indonesian speakers, and analyzing materials.

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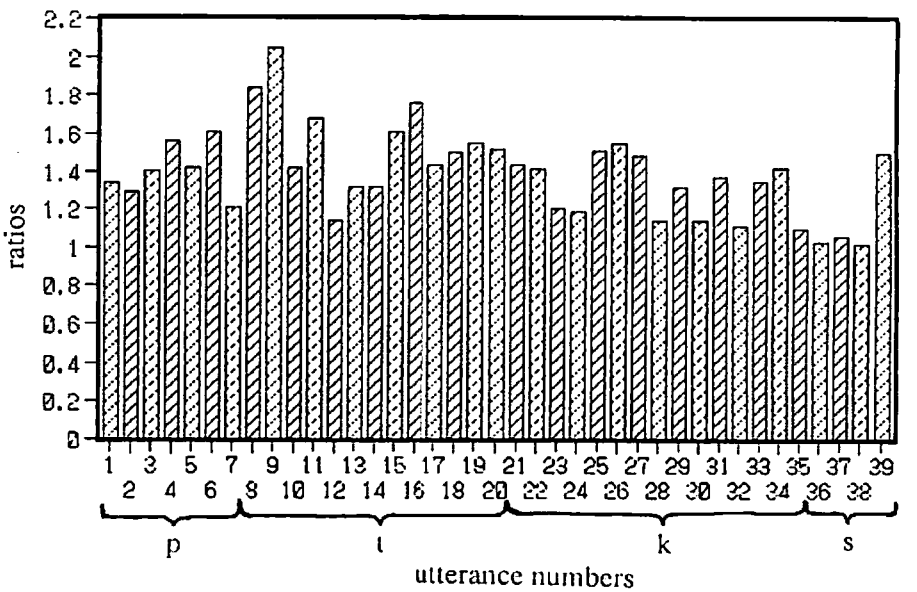

Fig.1. Ratios of durations of geminate consonants to single consonants in Indonesian. Ratios are between 1 and 2, and the average is 1.4. This result shows that geminate consonants are not always longer than single consonants, and that ratios on the average are not so large as those in Japanese.