

MORAICITY OF INITIAL GEMINATES IN THE TEDUMUNI DIALECT OF OKINAWA

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ABSTRACT

We have examined in our audio recordings the behavior of initial and medial geminate consonants with respect to the pitch accent patterns and word minimality of Tedumuni, a Ryukyuan dialect of Japan. This dialect has a two-way accent system. By examining the location of accents in the accented class, our study confirmed that the word initial geminate is moraic, and indicated that word medial geminate can also form an onset in some variant patterns.

Keywords: initial geminate, Taketomi, Ryukyuan, pitch accent

1. BACKGROUND

1.1. The Tedumuni dialect of Okinawa

Tedumuni is one of the Southern Ryukyuan, or Okinawan, dialects spoken on a small island, Taketomi-jima, located between the south-west of Main Okinawa Island (Japan) and Taiwan. Tedumuni means the language of Taketomi in the dialect. This dialect is endangered because among the entire population of around 300 people on Taketomi Island; it is mainly the generations over eighty years of age that speak the dialect (see [8] for dialect attrition in Southern Ryukyu).

Like many of the Ryukyuan dialects, it has word initial geminates such as /kkara/ 'strength', /ssa/ 'grass', or /mmasaN/ (N stands for a placeless nasal) 'delicious'. In this paper, we shall examine the moraic status of initial geminates of the Tedumuni mainly in terms of its pitch accent patterns (Sections 2 and 3) but also with respect to word minimality (Section 4). Based on the description by [7], we constructed a corpus designed for this purpose and recorded speakers of this dialect in 2010.

1.2. Cross linguistic perspectives

Initial geminates are typologically rare and have been the focus of phonological and phonetic

studies [1, 2, 6, 9]. Moreover, the prosodic affiliation of initial geminates is a problem in standard moraic theories since a mora is defined as a constituent of the syllable nucleus or coda only ([4]; this paper does not discuss the grouping of onset and nucleus as a mora unit). Previous studies proved that the prosodic status of initial geminates varies depending on the language. The following patterns and analyses are found in the literature:

- The first half of an initial geminate forms an independent syllable (Tashlhyit Berber, [3]).
- Depending on the language, initial geminates count as a mora or they do not [2].
- Underlying geminates bear moras wherever they occur [9].

Our study supports the moraic status of geminates in Tedumuni that Kuno's study [7] presupposed in her description of the accent.

1.3. Recording

Recordings took place twice in 2010 in each informant's house: once as a pretest, with a corpus of 39 sentences, with six speakers; and again as the main test with five speakers, four of whom took part in both recordings. At times, we resort to the pretest data for additional variant patterns. In the main test, native speakers aged between 80 and 89 years read or translated a corpus of 85 sentences. All of the speakers were bilingual in Tedumuni and Standard Japanese. They learned Standard Japanese in primary school. None of them had major problems in hearing or speaking, although one has recently had a problem with her vision. To facilitate the reading and translating tasks, some of the target phrases were orally presented by the investigators; others were read or translated from written materials. Test sentences were sometimes modified when speakers did not agree with a given form. Disagreements were partly due to inter- and ideo-dialectal variation and partly to ignorance of Tedumuni by the investigators. Not all of the

participants completed the task. Each session took about an hour.

The test sentences were recorded onto a Marantz PMD 660 through a RAMZA WM-S10 microphone at a sampling rate of 44.1kHz with 16bit resolution. The recordings were then transcribed with pitch marks by one of the authors, who is a speaker of Northern Kyushu and Tokyo Japanese with phonetic ear training. The rising point of certain items in the unaccented class was sometimes difficult to determine by listening. But since the pitch patterns of the unaccented class are not the focus of this paper, the details will not be reported. Pitch tracking and other acoustic measurements were carried out using Praat. Five of the pretest sessions and two of the main test sessions were also recorded onto a Panasonic HDC-TM35 digital high vision video camera.

2. GENERAL PITCH ACCENT PATTERNS OF TEDUMUNI

A peculiarity of Tedumuni phrases is that the pitch pattern of a word can differ depending on whether it occurs in isolation or the word is placed in a phrase with other words. Similar patterns are reported for Ikema-jima of the Miyako branch of Ryukyuan dialect [7]. In our recording, however, words uttered in isolation were realised in variable pitch patterns. By contrast, when the word was spoken in a phrase with other words, the accent patterns showed a strong regularity. We shall limit our study here to the latter situation.

The pitch accent patterns of the nouns in a phrase in Tedumuni are summarized as having only two classes:

1. Accented class: a sharp pitch-fall at a fixed location in an accentual phrase (i.e. a noun followed by a grammatical particle).
2. Unaccented class: a flat pitch with some rise after the first syllable and no fall within an accentual phrase.

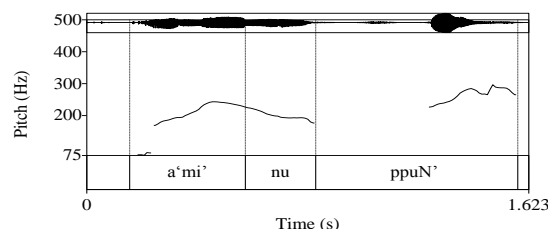
Table 1: Two accent classes (Transcription is roughly phonetic. ‘ indicates the pitch rising point; ’ indicates the beginning of the pitch fall.)

Accented word	Gloss	Unaccented word	Gloss
a‘mi’	rain	ami	candy
‘paa’	tooth	paa	leaf
‘mii’doo	woman	biidoo	man

When a noun was accented, the first mora was low-pitched unless the word consisted of only one syllable or the first syllable was heavy (cf. below).

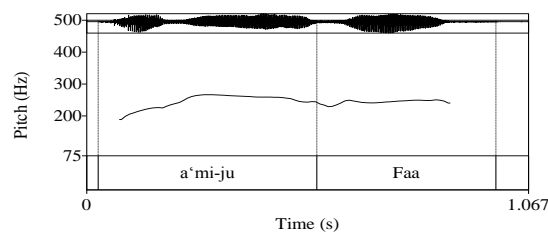
The pitch started falling from the accent location and kept falling to the end of an accentual phrase (cf. [a‘mi’-nu] in Figure 1).

Figure 1: Pitch contour of an accented phrase [a‘mi’ nu (ppuN’)] ‘The rain is (falling)’. Speaker: SU. cf. Audio file 1.



In the case of the unaccented phrases, the pitch rose more or less from the beginning and formed a plateau throughout the accentual phrase (cf. Figure 2).

Figure 2: Pitch contour of an unaccented phrase [a‘mi ju (Faa)] ‘(Eat) a candy’. Speaker: SU. cf. Audio file 2.



The location of the pitch accent is determined by the following data:

Table 2: Accent location in the accented class.

	Word	Gloss
a.	a‘mi’	rain
b.	ka’ta’na	knife
c.	mu‘ra’saki	mauve
d.	Ci‘mu’gukuru	heart
e.	‘suu’ru	head
f.	u‘jaN’tCu	mouse

The sequences of light syllables (a.-d. in Table 2) are accented on the second syllable from the beginning of the word. However, e.-f.) require rectification of the counting unit. The accent location is the syllable containing the second mora from the beginning. e.) shows that a heavy initial syllable omits the low tone at the left edge, as in the Tokyo dialect. But unlike Tokyo, where the fall within a heavy syllable occurs only after the first mora, the fall in Tedumuni occurs at the end of the heavy syllable, as in e.-f.) (with a few variant forms of, presumably, the Tokyo type: e.g., [u.‘je’N.tCu] ‘mouse’ by one speaker. A dot indicates a syllable boundary.).

3. ACCENT PATTERNS OF WORDS WITH GEMINATES

The basic accent patterns are compared with those in words starting with a geminate consonant and those with a medial geminate.

3.1. Words with initial geminates

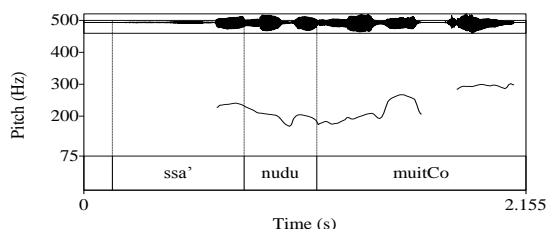
The forms below make it clear that the initial syllables starting with a geminate consonant consist of two moras: otherwise g.-j.) should carry the pitch fall at the end of the word, as in [ami^ʔ].

Table 3: Accent location in the accented class.

	Word	Gloss
g.	ssu ^ʔ ru	medicine
h.	kka ^ʔ sa	public officer
i.	tta ^ʔ ti	soy source
j.	kku ^ʔ bi	belt
k.	ssa ^ʔ	grass
l.	ppa ^ʔ	saddle
m.	ppi ^ʔ	sepia

In Table 3, each of the examples k.-m.) consists of a single heavy syllable with two moras. In these, the pitch falls after the words before a grammatical particle. The utterance below shows a pitch contour similar to that in Figure 1.

Figure 3: Pitch contour of an accented phrase starting with a geminate [ssa^ʔ nudu (muitCo)] ‘The grass is (grown)^ʔ. Speaker: SU. cf. Audio file 3.



In summary, it is clear from the pitch patterns that the initial geminates are moraic.

3.2. Words with medial geminates

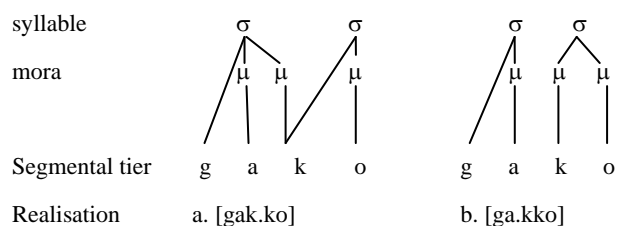
In the analysis of pitch patterns, we encountered instances where the medial geminates behave just like the initial geminates. That is, the whole geminate affiliates to the onset position instead of straddling two syllable positions, resulting in a cross-linguistically rare and thus unstable syllabification pattern ([9]). As seen below there are two accent patterns for medially geminated words.

Table 4: Accent location in medially geminated words. Variants are noted after ~. Rising points are omitted (see below).

	Word	Gloss
n.	nap ^ʔ pa	pillow
o.	mit ^ʔ tCi	thunder
p.	toC ^ʔ Ci	guava
q.	gakko ^ʔ ~gak ^ʔ ko	school
r.	Citta ^ʔ ~çitta ^ʔ (~tta ^ʔ ~çita ^ʔ)	tongue
s.	çikka ^ʔ	stick
t.	nukka ^ʔ (~nuka ^ʔ)	rice bran
u.	çippa ^ʔ sa (~ppa ^ʔ sa)	darkness

All of the above examples can be analysed as accented on the syllable containing the second mora from the left edge, conforming to the regular accentuation pattern. But this occurs only if we allow a medial geminate to affiliate with the onset. The exact location of pitch change within a geminate is not clear, however, in n.-p.) the pitch is high on the initial vowel whereas in q.-t.) it is high on the second vowel. This difference depends on the affiliation of the first half of the geminate: either with the coda on its left or with the onset on its right. If the first half of the geminate belongs to the coda of the initial syllable, which is a canonical case of mora affiliation ([4], Figure 4a.), the pitch change occurs after the first syllable as in [gak^ʔ.ko]. When the affiliation is with the onset (Figure 4b.), as in the initial geminates, the high pitch is realised on the second syllable [kko^ʔ]. This pattern does not seem completely stable, often appearing with other variants (cf. q.-u.). It remains to be investigated whether the variation is free or lexically determined for a given speaker.

Figure 4: Moraic structures of medial geminates.



4. WORD MINIMALITY

While moraic status of the initial geminate is already clear from the pitch patterns, moraicity of the word initial geminate is further supported by word minimality in this dialect.

As mentioned in [7], a monomoraic word is lengthened in accentual phrases in Tedumuni. This indicates that underlying monomoraic words are required to have at least bimoraic length in the accentual phrase. Bimoraic word minimality is a

norm in all types of phrase in Kyoto Japanese. In contrast, in Tedumuni, it does not occur in words in isolation but it does occur in accentual phrases. We heard instances of this lengthening in such items as /i'/ 'stomach', /mi'/ 'eye', /pa'/ 'tooth', /ja'/ 'house', /pa/ 'leaf'. For example, [i i: nudu jamu] 'Stomach, I have a stomach ache'. By contrast, such lengthening did not occur in initially-geminated words like /ssa'/ 'grass', /ppi'/ 'sepia', /ppa'/ 'saddle', or /tta'/ 'tongue'; they were pronounced with the same rhythmic length in isolation and in the accentual phrase. We shall provide a few pieces of evidence for the lack of lengthening.

4.1. Psychological length by native speakers

Two of our informants commented on the difference in word pairs such as /pi/ 'tide' and /ppi/ 'sepia': where the former is 'lengthened at the end', and for the latter '[pi] is preceded by some element and the vowel is short at the end'.

4.2. Vowel length measurement

We made acoustic measurements of the pair /pa'/ 'tooth' vs. /ppa'/ 'saddle' as an isolated phrase (I), and also embedded in longer phrases (Ph) such as /pa nudu jamu/ 'The tooth is aching.' and /ppa nudu aru/ 'There is a saddle'. Below is the average across speakers of five-eight tokens of each target.

Table 5: Interval between release of [p] and offset of the following vowel /a/ in milliseconds in /pa'/ [pa:] vs. /ppa'/ [p:a].

pa (I)	pa: (Ph)	ppa (I)	ppa (Ph)
194.8	246.3	109	104.8

For the effect of phrasal rhythmic compensation [5], it is expected that the same portion will be shorter when embedded in a longer sequence than when uttered in isolation. However, /pa/ is longer when embedded in an accentual phrase. This indicates that it is lengthened even more than the ratio [pa]:[pa:] shown in Table 5. The initially-geminated /ppa/, on the other hand, does not show such a difference. This preliminary acoustic comparison indicates that the vowel portion of /ppa/ is not subject to bimoraic lengthening, because the word is underlyingly bimoraic.

The total length in Table 5 is shorter for /ppa/ than for /pa/. The reason is that the longer geminate portion is in the closure duration which was not included in the measurement. The duration of geminate consonants would be clearer if an

initial fricative pair was compared, but we have not yet found such a minimal pair.

4.3. Lip closure timing on video

Closure duration of an initial plosive was examined by looking at lip movement of an informant on the video. Precise measurement of closure duration of [p] and [p:] is not available on this video due to a slow frame sequence (30 frames/s). Nevertheless, a longer duration is observable for [p:] than for [p] in the slow motion version (*0.125) (video file 1).

5. CONCLUSION

We have shown the moraic status of initial geminates by our analysis of pitch accent patterns in Tedumuni. By examining the location of accents in the accented class, the syllable affiliation of geminates was determined. Onset affiliation of medial geminates was also found in one of the variant patterns. We have also investigated word minimality and articulatory timing and thus confirmed the moraicity of the initial geminates.

6. ACKNOWLEDGEMENTS

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