

## Textsetting in Japanese Popular Songs\*

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### 1. Introduction

It has been a matter of controversy in linguistics and other fields how texts and music correspond to each other in songs. Many studies have been made on textsetting of Japanese songs from phonetic and phonological viewpoint. They are debating whether the relevant phonological unit is a syllable or a mora and whether pitch accents of texts are realized in melodies. The studies on textsetting of Japanese songs have contributed to our understanding of the phonological structure of Japanese. Most of the studies deal with traditional songs to make clear their basic structures.

On the other hand, since contemporary Japanese songs often violate the textsetting rules, their style tends to be regarded as *broken*. For example, almost all morae except for special morae have the one-to-one correspondence with notes in traditional Japanese songs. However, in contemporary Japanese songs, we encounter many cases where two or more morae without any special morae correspond to one note. Moreover, the exceptional correspondence causes the violation of the other basic textsetting rule on pitch accents.

However, even the *broken* lines are not freely generated. Then, what rules govern the generation of the lines? In this paper, we focus on the broken lines in contemporary Japanese songs and provide a hypothesis to explain the occurrence of the cases. Our hypothesis gives a consistent account for the cases, which are seldom referred so far.

This paper is organized as follows: section 2 surveys two basic textsetting rules of Japanese songs and broken cases which violate both of the rules. In this case, two morae correspond to one note, and pitch accents of texts is not realized. Section 3 investigates textsetting of special morae: the second vowel in diphthong, long vowel, syllabic nasal and choked sound. The further investigation of the correspondence of diphthongs to note(s) helps us to solve the problem of the cases where *two* morae, not including special morae, correspond to *one* note. Based on the observations about diphthongs, section 4 proposes a hypothesis about the correspondence of two morae without special morae to one note and examines the hypothesis. In section 5, the hypothesis is supported by the condition on the occurrence of *ji-amari* in *senryu* poems. Section 6 makes concluding remarks of this paper.

## 2. The Textsetting Rules and the Broken Lines

Phonologists and phoneticians have suggested two basic rules of textsetting in songs. First rule demands that a segmental unit should correspond to a note. This is called “one-to-one correspondence rule.” Second rule is that the accentuation of texts must be realized in tunes. The rule which requires the realization of the accent of the language is called a “matching rule.” For example, in English songs, one syllable corresponds to one note, and the stress accentuation of words and phrases is realized in tunes; stressed syllables are assigned to musical strong positions, and non-stressed syllables to musical weak positions (cf. Halle and Lerdahl (1993), Hayes and Kaun (1996), and Hayes and MacEachern (1998) among others). Since Japanese is a language whose segmentation unit is a mora, one mora usually corresponds to one note in the songs (cf. Kindaichi (1961, 1967)). Pitch accent patterns are also realized in melodic contours. The one-to-one correspondence and the matching rule are strictly kept particularly in traditional songs.

However, we can observe the violation of the basic rules in contemporary Japanese popular songs. Let us consider the example in (1). It is a passage from *Neo-Bravo!!* by Southern All Stars, which is a pop band. It is marked by hyphens /-/, which show mora boundaries, and by dots ./., which show syllable boundaries. The underlined morae are the sequential ones corresponded to the one same note.

(1)



(Joo (1994:61))

(2) A-i.no.na.tsu.ku.re.ba.mi.na.ko-o.o-n.bu.ra.bo-o

Some words in the above passage are difficult even for Japanese to catch. Joo (1994) points out that the difficulties of dictation arise from their violation of the above two textsetting rules. We can notice that the words or the part of the words consisting of two morae underlined in (2), e.g. *ai*, *natsu*, *kure*, *koo*, *on*, *bura* and *boo*, each corresponds to one note in (1). These morae violate the one-to-one correspondence rule.

Furthermore, in most of the words in (1), their pitch accent patterns are not reflected in melodies. When the pitch rises or falls in the morae corresponding to a note, the pitch change is not realized in the melody because the morae correspond to a note which keeps the same pitch. We can see the disregard of pitch accents in *ai* “love” with H(igh)L(ow) tone, *natsu* “summer” with LH tone, and so on. The violation of the matching rule is observed in other words which satisfy the one-to-one

correspondence rule. For instance, the word *mina* “everyone” is assigned to the falling tone in spite of its own LH accentual pattern. In this way, we can notice that the pitch accent pattern is not realized in the melody.

Observation of the examples in (1) and (2) tells us that special morae such as *ai*, *koo*, *on* and *boo*, are apt to be incorporated into the same notes with the previous morae, compared with the sequences without any special mora. Since it can be said that special morae form syllables with the previous morae, it is natural to predict that special morae have low independency. The plausibility of the prediction will be revealed in section 3.

The further investigation of the assignment of special morae to notes helps us to understand the sequences of morae consisting of two morae CVCV, where C is a consonant and V is a vowel. The first mora of this CVCV is called *head*, since it is usually inserted into the musical strong position and lengthened.<sup>1</sup> This CVCV should correspond to each two notes by the one-to-one correspondence rule. In fact, however, the sequences of morae as in *natsu*, *kure* and *bura* are incorporated into the same notes as seen in (2). Little attention has been given to such cases because they are seldom observed in traditional Japanese songs (cf. Kinsui 1997).<sup>2</sup> This paper focuses on the cases where a sequence of (C)VCV correspond to a note. The cases with (C)VCV form are explained by a hypothesis based on the observation of the cases with special morae. This will be dealt with in section 4.

### 3. The Correspondence of Special Morae

Before going on to the discussion of (C)VCVs, let us first consider the cases with special morae. It is useful for analysis of the correspondence of (C)VCVs. Special morae have four types: the second vowel in diphthong (J), long vowel (R), syllabic nasal (N), choked sound (Q). As mentioned above, a special mora can construct a syllable with the previous mora and they can be assigned to the same note. Let us consider the underlined syllables in the following examples.<sup>3</sup>

- |   |                                    |
|---|------------------------------------|
| (3) cho-t.to.gu. <u>ra</u> -i.no        | ( <i>Na mo Naki Uta</i> :1)        |
| (4) hi.tsu. <u>yo-o</u> .to.shi.te.ru.  | ( <i>Owari Naki Tabi</i> :12)      |
| (5) mu. <u>ge-n</u> .no.ki.bo-o.wo      | ( <i>Hallelujah</i> :20)           |
| (6) me-n.do-o.ku.sa.ku. <u>na-t</u> .te | ( <i>Hikari no Sasu Hoo e</i> :13) |

The special morae, *rai*, *yoo*, *bon* and *nat*, are assigned to the same notes with the previous CV morae. There are many similar examples in contemporary songs.

Kubozono (1999) examines the correspondences of special morae, based on 100 Japanese traditional songs. The results are shown in (7), where A in the table shows the number of the cases corresponding to the separate note, and B does the number of

the cases where special morae are inserted into the same notes with the previous morae.

(7) type of special mora	No. of instances		
	A	B	total
J	158 (94%)	10 (6%)	168
R	96 (70%)	41 (30%)	137
N	104 (51%)	101 (49%)	205
Q	28 (36%)	50 (64%)	78
total	386 (66%)	202 (34%)	588

(Kubozono (1999:247))

In (7), the ratio of the special morae corresponding to one separate note is much higher than that of the special morae inserted into the same note with the previous morae. Thus, the table shows high independency of the special morae.

Even among the special morae, the independency is different. J and R have high independency, and N and Q have lower independency. Kubozono explains that the low independency of N and Q is due to their high consonantality or high sonority. Consonants have lower sonority than vowels and cannot form syllables solely. Obstruent Q has low sonority than nasal N. Low sonority means low independency. Therefore, Q has lower independency than N. He also gives the reasons why R has lower independency than J and why Q has lower independency than N. The difference in independency between J and R is explained by the difference in quality between J or R and the vowels in the previous morae. J is different from the previous vowel, while R is the same as the previous vowel. This is why R has lower independency than J. The difference between N and Q is accounted for by the difference in sonority, as well as the difference between J and R and N and Q. Nasal N has higher sonority than obstruent Q. High sonority of N means high independency.

The examination of the contemporary popular songs reveals some differences from traditional songs. Table in (8) is based on 13 songs of Mr. Children.<sup>4</sup>

(8) type of special mora	No. of instances		
	A	B	total
J	207 (63%)	120 (37%)	327
R	75 (35%)	139 (65%)	214
N	81 (44%)	102 (56%)	183
Q	43 (35%)	81 (65%)	124
total	406 (48%)	442 (52%)	848

In comparison with the table in (7), which is concerned with traditional songs, we can

notice lower independency of the special morae in contemporary songs. In contemporary songs, half of all special morae correspond to the same note with the previous morae. The decrease of independency of special morae results from the decrease of independency of J and R. Kubozono says that the difference in independency between J and R in traditional songs results from the difference in vowel quality between J and the previous vowel and R and the previous vowel. R is the same vowel with the previous one, while J is the different vowel from the previous one. Thus, R has higher independency than J. According to Kubozono (1999), the decrease of independency of R is natural because R is the same as the previous vowel. What has to be noticed is the decrease of independency of J. 37 percent of J morae correspond to the same notes with respective previous morae. On the other hand, as can be observed in (7), the ratio is only six percent in the traditional songs. Why does the independency of J decrease?

To solve the question, we need to take notice of not only the type of J but also the type of the previous vowel to solve the question. The neighboring vowels form a diphthong. The table in (9) shows whether each type of diphthong corresponds to a note or two notes.

(9)

type of diphthong	No. of instances		total
	corresponding to two notes	corresponding to one note	
ue	2 (40%)	3 (60%)	5
ei	6 (50%)	6 (50%)	12
ai	88 (53%)	77 (47%)	165
ui	10 (54%)	8 (44%)	18
oi	18 (64%)	10 (36%)	28
ou	4 (67%)	2 (33%)	6
au	12 (67%)	6 (33%)	18
ao	3 (75%)	1 (25%)	4
ae	26 (81%)	6 (19%)	32
eo	2 (100%)	0 (0%)	2
oe	22 (100%)	0 (0%)	22
ea	2 (100%)	0 (0%)	2
ie	9 (100%)	0 (0%)	9
oa	2 (100%)	0 (0%)	2
ua	1 (100%)	0 (0%)	1
total	207 (63%)	119 (37%)	326

As observed in (9), the differences in independency between the special morae support

to analyze the results. The diphthongs *ei*, *ai*, *ui*, *oi*, *ou*, *au*, *ao*, and *æ* have the cases where the diphthongs correspond to one note. Here, let us take a look at the sonority hierarchy of vowels proposed by Selkirk (1984). I will give the only relevant phonemes for ease of explanation.

$$(10) \quad /a/ > /e, o/ > /i, u/ \quad (\text{Selkirk (1984:112)})$$

Based on the hierarchy in (10), in most of the types of diphthongs in (9), the second vowels have lower sonority than the first vowels. In the only exceptional type *ui*, the vowels have the same level of sonority. The differences in sonority between the neighboring vowels yield the *head* and *non-head* relationship just like nucleus and coda in syllable structures. That leads to the generalization in (11).

$$(11) \quad \text{In a sequence } V_1V_2, \text{ when } V_2 \text{ is less sonorous than } V_1, V_2 \text{ can be incorporated into the same note with } V_1 \text{ in contemporary Japanese songs.}$$

Under the generalization about diphthongs in (11), we consider the correspondence of (C)VCV to one note in the following section.

#### 4. The Correspondence of (C)VCVs

As we have observed in the previous sections, the one-to one correspondence rule basically holds. However, we have also observed the cases where some types of special morae tend to be incorporated into the same notes with the previous morae. When a special mora and the previous mora correspond to the same note, the morae seem to form a syllable because the vowel or consonant which forms the special mora has lower level of sonority than the vowel in the previous mora. The difference in sonority between the neighboring morae forms *head* and *non-head* relationship, and two morae are regarded as like a syllable. The observation on diphthongs tells us a growing tendency that the second vowel with less sonority has lower independency, which cannot be observed in traditional songs. In this section, based on the observed examples, we examine the correspondence of (C)VCVs with no special morae to notes.

##### 4.1. A Hypothesis about the Correspondence of (C)VCV to One Note

It appears to be a complex issue how the correspondence of (C)VCV to one note is licensed. In order to solve the problem, I will propose the following hypothesis based on the generalization in (11):

$$(12) \quad \text{In the sequence of morae } \dots(C_1)V_1C_2V_2\dots, \text{ when } V_2 \text{ has lower sonority than } V_1, (C_1)V_1 \text{ and } C_2V_2 \text{ can correspond to the same note.}$$

I will give the sonority hierarchy of vowels again.

$$(13) \quad /a/ > /e, o/ > /i, u/ \quad (= (10))$$

It is important to consider  $V_1$  and  $V_2$ , which are not adjacent to each other. If  $V_1$  and

$V_2$  have the relationship defined in (12), no matter what type of  $C_2$  is, they can correspond to one note. The difference in sonority between the *vowels* of the neighboring morae forms *head* and *non-head* relationship between the *morae*. The following subsection investigates how each type of (C)VCV corresponds to notes to prove the hypothesis in (12).

#### 4.2. Observations

Since Japanese has five vowels (i.e. /a/, /e/, /i/, /o/ and /u/), there are 25 possible (C)VCV patterns. In fact, we can find all patterns of (C)VCV in our data. First, we begin with the observation on the cases of the patterns where  $V_1$  has higher sonority than  $V_2$ . Under the sonority hierarchy in (13), there exist eight possible patterns: (C)oCu, (C)oCi, (C)eCi, (C)aCi, (C)aCu, (C)aCo, (C)aCe and (C)eCu. All the patterns have the cases where the whole of the sequence corresponds to one note. The examples are given in (14)-(21).

- (14) hu.ki.to.ba.se.so-o (Kuchibue:14)  
 (15) o.wa.ri.na.ki.ta.bi (Owari Naki Tabi:9)  
 (16) ya-t.te.ku.ru-n.da.yo (Na mo Naki Uta:20)  
 (17) ki.mi.ni.sa.sa.gu (Na mo Naki Uta:52)  
 (18) ma.mo.ru.be.ki.mo.no.ga (Everything (It's you):14)  
 (19) ku.ru.shi.mi.ni.ni.ta.o.mo-i.wo.i.da.i.te.ru.no (Everything (It's you):12)  
 (20) ji.bu-n.wo.o.shi.ko.ro.shi.ta (Alive:2)  
 (21) ro.ku.de.mo.na.ku (Mirror:7)

The underlined sequences of morae (e.g. *base*, *tabi*, *dayo*, *sagu*, *beki*, *teru*, *oshi* and *roku*) are assigned to the same notes. The table in (22) shows whether (C) $V_1CV_2$ s correspond to one note or two notes when the sonority of  $V_2$  is lower than that of  $V_1$ .

(22) type of (C) $V_1CV_2$	No. of instances		
	corresponding to two notes	corresponding to one note	total
(C)aCe	178 (97%)	5 (3%)	183
(C)aCi	265 (98%)	5 (2%)	270
(C)aCo	194 (98%)	4 (2%)	198
(C)aCu	151 (85%)	26 (15%)	177
(C)eCi	102 (96%)	4 (4%)	106
(C)eCu	112 (83%)	23 (17%)	135
(C)oCi	180 (98%)	3 (2%)	183
(C)oCu	118 (91%)	11 (9%)	129
total	1300 (94%)	81 (6%)	1383

Indeed, there are only six percent of the cases where (C)VCVs correspond to one note

of all (C)VCVs. This shows that most of the sequences of morae follow the one-to-one correspondence rule. However, it is noticeable that there are only nine exceptional cases for the hypothesis in (12), that is, the cases where the sonority of  $V_2$  is higher than that of  $V_1$ . Some of them are explained by another factor as I describe in the last of this section.

There are also many cases where the sonority of  $V_1$  and  $V_2$  has the same level. The examples of each pattern are shown in (23)-(30).<sup>5</sup>

- (23) ta.da.a.na.ta-e.to (Mirror:9)  
 (24) wa.ka.ri.a-e.ru.do-o.shi.de.mo (Na mo Naki Uta:19)  
 (25) si-n.ji.te.ru.mi.chi.wo (Nishi e Higashi e:15)  
 (26) sa-n.ko-o.sho.yo.ri.mo.ta.da.shi.ku (lalala:13)  
 (27) ki-t.to.ke.se.wa.shi.na-i (Na mo Naki Uta:22)  
 (28) cho.ki-n.ba.ko.no.na.ka.ni (Hikari no Sasu Hoo e:23)  
 (29) kyo-o.ga.yu.ki.su.gi.ru (Alive:5)  
 (30) ku.ru.shi.mi.ni.nita (Everything (It's you):12)

The table in (31) also shows whether (C)VCVs correspond to one note or two notes when the sonority of  $V_2$  is the same as that of  $V_1$ .

(31) type of (C) $V_1$ CV $_2$	No. of instances		
	corresponding to two notes	corresponding to one note	total
CaCa	408 (98%)	9 (2%)	417
CeCo	142 (98%)	3 (2%)	145
CiCi	172 (96%)	7 (4%)	179
CiCu	123 (97%)	4 (3%)	127
CoCe	44 (96%)	2 (4%)	46
CoCo	270 (98%)	6 (2%)	276
CuCi	82 (99%)	1 (1%)	83
CuCu	75 (91%)	7 (9%)	82
total	1316 (97%)	39 (3%)	1355

The one-to-one correspondence rule seems to be a firm rule because there are only three percent of the cases where (C)VCVs correspond to single notes. However, we should not ignore the cases because such cases seldom exist in traditional songs.<sup>6</sup> In order to explain both facts seen above precisely, it is necessary to revise the hypothesis in (12) as follows:

- (32) In the sequence of morae ... $(C_1)V_1C_2V_2$ ..., when  $V_2$  has lower sonority than  $V_1$  or the same level of sonority as  $V_1$ ,  $(C_1)V_1$  and  $C_2V_2$  can correspond to the same note.



As we have seen so far, there exist not a few cases where two morae are assigned to a note in contemporary songs, even though the one-to-one correspondence rule is said to be strict. This does not mean that the cases of Japanese contemporary songs are exceptional for this rule, but the cases can be explained by another rule proposed in (32). It is our hypothesis in (32) that determines whether two morae correspond to one note or two notes in contemporary songs.

As I have mentioned above, the hypothesis in (32) has a few exceptions, that is, the cases where the  $V_2$  has higher sonority than the head  $V_1$ . We have nine exceptional cases. The six cases of them are explained by the grammatical dependency of the particles. Let us consider the following passages:

(33) ma.do.gi.wa.ni.ko.shi.o.o.ro.shi.te. (Mirror:5)

(34) ko.do.ku.na.yo.ru.wa. (Na mo Naki Uta:20)

In the above cases,  $V_2$  is the postpositional particle such as objective *-o* (or *-wo*) and nominative *-wa*. The postpositional particles are not stressed in speech. It seems to be natural to suppose that such a phonological characteristic is reflected in textsetting. The low independency of postpositional particles in textsetting is explained by their syntactic and prosodic feature. The other exceptional cases are open to question.

### 5. *Ji-Amari* in *Senryu* Poems

Our hypothesis in (32) is further confirmed by Tanaka's (1999) study on *ji-amari*. He analyzes *ji-amari*, which are redundant mora(e), in modern *senryu* poems, and indicates that the sonority is a factor for the occurrence of *ji-amari* in the lines that normally consist of five morae. According to Tanaka, special morae most frequently occur at *ji-amari* in the lines. Followed by the special morae, the morae which have lower sonority than fifth morae tend to occur at the sixth morae as a *ji-amari*. This fact can be explained in the same way as the sonority of vowels in (C)VCV. That is to say, since a sixth mora has lower sonority than the fifth mora, two final morae are counted as like a syllable. This accords with our hypothesis in (32). Let us confirm this with the examples in (35)-(37). The underlined morae indicate the fifth and sixth morae. The inequality sign (>) shows that the sonority of the vowel in the left or fifth mora is greater than that of the vowel in the right mora.

(35) Sa.ra.ki-n.yo.ri ko.wa-i.wa.ga.ko.ni ka.ri.ta.ka.ne  
/o>i/

(Tanaka (1999:273))

In the first line, the sixth mora has lower sonority than the fifth mora *yo*. The number of the cases as in (35) is much greater than that of the cases as in (36) and (37), where the final two morae have the same sonority and the vowel of sixth mora has higher

sonority than that of the fifth mora.

(36) hu-t.ta.hi.to.no shu-s.se.ki.ni.na.ru ju-u.ne-n.go (ibid.)  
/o=o/

(37) o.re.yo.ri.mo ne.u.chi.a.ru.no.ka ko.no.hi.to.tu.bo (ibid.)  
/u<o/

The number of the cases as in (36) is greater than that of the cases as in (37). The difference in frequency between the instances like (35)-(37) tells us that the sixth morae in the lines are apt to be incorporated into the same note with the fifth morae when the sixth morae have lower sonority than the fifth ones and the same level of sonority as them.

In this way, the occurrence of *ji-amari* is accounted for by the hypothesis in (32), as the occurrence of *ji-amari* and the correspondence of a mora to the same note with the previous mora. This is why both a mora as a *ji-amari* and a mora incorporated into the same note with the previous mora are regarded as *extrametrical* elements.

## 6. Conclusion

Although contemporary Japanese songs tend to be regarded as broken, they are not freely generated. If all lines in a song violate the textsetting rules, we cannot dictate the texts. In this paper, I have claimed that the exceptional cases for the one-to-one correspondence rule are explained by the hypothesis in (32). The hypothesis accounts for the data observed in this paper, and is verified by *ji-amari* phenomena. The examination of how texts correspond to music will contribute to our understanding of various linguistic phenomena including syllabification.

## NOTES

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<sup>1</sup> I limit the discussion to the cases where the first mora is *head* and where two morae are corresponded to a note. There are some cases where the second mora is *head* and the shortened first mora is accompanied as in (i). The single underlined morae show the *non-head* ones, and the double underlined morae do the *head* ones.

(i) a. ka.ko.no.ji.bu-n.ni.mu.ke.ta (Not Found:13)  
/u<e/

b. a.ka-i.yu-u.hi.ga (Lalala:34)  
/a=a/

In (ia), the sonority of the vowel in the *head* mora is higher than that of the *non-head* mora. The equal sign in (ib) shows that the morae assigned to the same note have the same sonority level. Moreover, we can find a few cases where three or four morae correspond to one note as in (ii).

(ii) a. fu.ri.ka-e.ri.wa.shi.na-i.no.sa (Owari Naki Tabi:1)  
/a>e>i/

b. u.ke.u.ri.no.chi.shi.ki (Nishi e Higashi e:12)  
/i=i=i/

In (ia), the vowels of first *head* mora have the highest level of sonority among the three morae. Since the vowels in the morae assigned to the one note in (iib) are the same, their sonority is the same. The above cases might be also explained by the differences in sonority between the moras assigned to the same notes.

<sup>2</sup> Kinsui (1997) deals with the context where the phenomenon occurs. He summarizes the contexts where the correspondence occurs as in the following:

- (i) a ra-gyo mora and the previous mora (e.g. *shitteru*, *hutari*)
- (ii) the morae with a devoiced vowel and the neighboring mora (e.g. *shiteru*)
- (iii) a mora with a semi-vowel and the neighboring mora are assigned to a note (e.g. *mimi wo*)
- (iv) a word-initial mora with a devoiced u-vowel and the following mora(e) (e.g. *tsurai*).

In addition, Kinsui mentions some factors: the influence of western music, the use of English words and the spread of speech speed. Special morae are apt to be shortened in rapid speech.

<sup>3</sup> Whether a mora is assigned independently to a note or to the same note with the previous mora is not determined by the position in the line. Thus, I give the relevant phrases.

<sup>4</sup> Mr. Children is a rock band. The writer of these texts and melodies, who is also the vocalist, is from Tokyo. This shows that, basically, the texts are written in Tokyo dialect.

<sup>5</sup> The cases of the (C)eCe corresponding to a note do not exist in our data.

<sup>6</sup> There are only two cases where (C)VCVs including no special morae correspond to single notes in 100 Japanese traditional songs analyzed by Kubozono (1999).

## APPENDIX

The titles of the data are listed here. They are recorded in *Mr. Children 1996-2000* (2001, Doremi Music Publishing).

Na mo Naki Uta, Hana -Memento-Mori-, Mirror, Everything (It's you), Alive, Nishi e Higashi e, Hikari no Sasu Hoo e, Owari Naki Tabi, Tsuyogari, Kuchibue, Lalala, Not Found, Hallelujah

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