

# PROSODIC ANALYSIS OF INTENSIFICATION IN JAPANESE

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## 1. INTRODUCTION

The purpose of this paper is to define a phonological process of "intensification" in Japanese. The process has never been discussed comprehensively in the literature. It involves insertion of a consonant before a consonant, and arguments for the moraic consonants or gemination in Japanese have sometimes touched upon the phenomenon; however, those data sets presented have been far from complete. Besides, possibly due to the insufficiency of the data, one important issue has been ignored; the specification of the insertion site. This paper will show that several different types of intensification are identifiable depending on the type of the circumscription of the operation domain. The Japanese intensification process will prove to be sensitive to two circumscription principles: prosodic and morphological.

## 2. A SKETCH OF THE PROSODIC STRUCTURE OF JAPANESE

### 2.1. Syllable Structure

Japanese is known to have a relatively simple syllable structure. The majority of the syllables have the form  $/(C)V/$ . Onset is optional, and is limited to one at maximum. A heavy syllable is certainly possible, and a syllable of the shape  $/CVV/$  is not uncommon. A long vowel,  $/CVV/$  where both of the V's share one melodic element, is phonemically contrastive with a short vowel. Closed syllables are rather limited both in distribution and in phonological shape. Nasal is the only consonant that can take the syllable-final position freely. Glides, liquids, and voiced obstruents are usually not allowed to close a syllable.<sup>1</sup> The other consonants, voiceless obstruents, can occur syllable-finally, but it must constitute a geminate or a homorganic cluster with the following consonant. A superheavy syllable  $/CVVC/$  is subject to the same restriction, and is more limited in distribution. Syllabification in Japanese is not always straightforward. As onset is not obligatory, a word consisting of more than one morpheme<sup>2</sup> sometimes shows a sequence of vowels. The most complex case will be a sequence of one identical vowel,<sup>3</sup> like *sooon* ('noise') from *soo* ('noisy') + *on* ('sound'), and *hoooo* ('phoenix') from *hoo* ('male phoenix') + *oo* ('female phoenix'). The syllable structure of those words, particularly the question as to whether the syllabification should be sensitive to the morpheme boundary or not, is unclear to me.

### 2.2. Moraic Structure

Japanese is sometimes characterized as a mora-counting language (Kuroda 1965), or a mora-count syllable language (McCawley 1968). Vance (1987) provides three pieces of justification for asserting the existence of moras in Japanese. First, the default location of accent can be specified in terms of mora; i.e. it falls on the third mora from the end. This claim has been attested with nonsensical melody sequences and loan words like *pájama* ('pajamas') and *pairóttó* ('pilot'). Second, rhythmic organization seems to involve moras as timing units. That is, the coda  $C/V$  is recognized

as an independent unit, just like a light syllable /CV/. In fact, each moraic unit corresponds to one character in the Japanese Kana writing system. Third, mora is the metrical unit in all kinds of Japanese versified poetry; consisting usually of combinations of five and seven moras. Heavy syllables are always counted as two units.

Lately, Katada (1990), McCarthy and Prince (1986, 1990), Poser (1990), Suzuki (1990), Tateishi (1989) have given ample evidence for the minimal unit template consisting of two moras (foot?). The bimoraic template is observable in such diverse areas as hypocoristics, truncation (abbreviated) words, reduplicative adverbs, secret words, among others. It seems beyond doubt that the bimoraic unit plays a crucial role in the Japanese phonology (and morphology). This, in turn, gives a very strong support for moraic structure in the language.

### 2.3. Moraic Consonant

In the last section, I mentioned that a closed syllable is limited both in distribution and in phonological shape. Restrictions on a closed syllable will amount to those on a moraic consonant in Japanese. This section will give a rough picture of the phonological and distributional properties of moraic consonants.

In Japanese, a vowel is always moraic. A consonant is usually non-moraic; the exceptions are a moraic nasal and a voiceless obstruent which constitutes the first half of a geminate. Note that the second half of the geminate is not moraic, being in the onset position. Naturally, there is no word that starts with either a moraic nasal or a moraic obstruent. A non-word-final moraic nasal has also been treated as part of a homorganic cluster, because it usually assimilates with the following segment (Itô 1989). Thus, [m̥] before labials, [n̥] before dentals/alveolars, and [ŋ̥] before velars. Otherwise, a moraic nasal is pronounced relatively close to ŋ, but the point of articulation is observed to be as far back as possible, with the oral closure unreleased (Vance 1987). (Represented here as ŋ̥ for the sake of convenience.) The pronunciation of a moraic obstruent is close to that of a glottal stop. Kindaichi (1967) says that what is essential for it is sustaining an oral closure or constriction, the particular place of articulation being dependent on the following segment. Like the moraic nasal, it also lacks the release of an oral closure.

Historically speaking, Old Japanese did not use to have any moraic consonants, and the syllable structure was more regularly /(C)V/. The emergence of a moraic consonant has been attributed to the massive loan words from Chinese and a heterogeneous group of phonological changes known collectively as *onbin* that started around the ninth century (Vance 1987).

Synchronically, Kuroda (1965) describes four major morphological environments for a moraic consonant. First, verb-inflection, i.e. between the verb stem and the inflectional suffix; e.g. *mat.ta* ('waited'). Second, a certain type of adverb, to be discussed later. Third, the original morpheme boundary of Chinese compound words (registered as a simple word in Japanese); e.g. *sek.kin* from *šip+kan* ('approach'). Fourth, certain loan words: e.g. *hot.to dog.gu* (< *hot dog*), *pot.to* (< *pot*), etc. In a study of gemination in Japanese, Aoki (1981) lists some other environments where a moraic consonant (=geminate) can occur. It includes three types of denominal adjectives. An interesting point is that the adverbs that fall into Kuroda's second category and the adjectives which correspond to one of the three types listed by Aoki can be identified by a common denominator. That is, they all convey "intensified" meaning, like "very hot" as opposed to "hot". In what follows I will provide more data showing that the intensified words are not limited to those two classes, and will attempt

to define the process in a more comprehensive way.

### 3. INTENSIFIED ADVERBS AND ADJECTIVES

#### 3.1. Data and Previous Studies

The data below exemplify the type of adverbs termed "intensified adverbs" by Kuroda (1965), Aoki (1981), and Vance (1987) (henceforth, Type I Intensification). They are composed of an (onomatopoetic) morpheme, which is very rich in inventory in Japanese, followed by the suffix /-ri/. A geminate is found after the first vowel of the base:<sup>4</sup>

- (1) /gak.ku-ri/    /ga.ku-ri/    'disappointedly'  
       /pit.ta-ri/    /pi.ta-ri/    'right (to the point)'  
       /šom.bo-ri/   /šo.bo-ri/    'dejectedly'  
       /guṅ.n<sup>y</sup>a-ri/   /gu.n<sup>y</sup>a-ri/   'limply'

Given these data, Kuroda (1965) suggested that their form be represented as  $C_1V_1C_0C_2V_2$ -ri,  $C_0$  being a moraic consonant to be assimilated with  $C_2$ . McCawley (1968) says that this is a case of the infixation of a moraic consonant and /-ri/ suffixation. Reviewing previous analyses, Aoki (1981) claims that the crucial process involved in the derivation of these adverbs is gemination. They seem to suggest that intensified adverbs constitute an independent morphological class on its own; no significance is attached to the  $C_0$  (Kuroda) or the gemination (Aoki) itself outside this particular form of adverbs. Nevertheless, they all agree that the intensification of adverbs of this type is derivational.

A word is in order about this claim. Intensified adverbs are "arguably" derivational; they do not necessarily possess the non-intensified counterparts, though some actually do. The examples in (1) have the non-intensified form, while those in (2) below do not:<sup>5</sup>

- (2) /yuk.ku-ri/    \*/yu.ku-ri/    'slowly'  
       /šik.ka-ri/    \*/ši.ka-ri/    'courageously'

Nevertheless, a piece of evidence for the derivational view comes from the reduplicative adverbs and other related morphemes. Japanese is very rich in onomatopoetic-reduplicative adverbs. Often the base form of the intensified adverb is found in the base of the reduplicative adverb with almost the same meaning.<sup>6</sup> Besides, there are verbs and adjectives that seem to have supplied the base for the intensified adverbs:

- (3) \*/kir.ra-ri/    /ki.ra-ri/    /kira.kira/  
       /sap.pa-ri/    \*/sa.p(h)a-ri/    /saba.saba/  
       /koṅ.ga-ri/    \*/ko.ga-ri/    /koge-ru/ (v.) 'burn'  
       /yaṅ.wa-ri/    \*/ya.wa-ri/    /yawaraka-i/ (adj.) 'soft'

Although there are still some adverbs whose non-intensified base never surfaces now, e.g. /yuk.ku-ri/, /šik.ka-ri/, etc., diachronic study shows that most of them used to have a possible non-intensified base: /yuku-ri/, /šika-to/ it is not unreasonable to assume that the intensified adverbs are in fact derived; the intensification process inserts the moraic consonant into the base at some level.

As mentioned above, the moraic consonant insertion as an intensification process is not limited to this particular type of adverbs. It is much more prevalent than has been suggested in the literature. (4) below exemplifies such adjectives, verbs, and adverbs which do not end in /-ri/ (henceforth, Type II Intensification). In (5) are both nouns and adjectives (henceforth, Type III Intensification).

- |        |                         |                 |                   |
|--------|-------------------------|-----------------|-------------------|
| (4) a. | /toŋ.garu/              | /to.garu/       | 'be pointed'      |
|        | /oŋ.naži/               | /o.naži/        | 'same'            |
|        | /yop.podo/              | /yo.hodo/       | 'very'            |
| b.     | /čis.sai/ (> /čič.čaj/) | /čii.sai/       | 'small'           |
| c.     | /sug.goi/               | /su.goi/        | 'terrible, great' |
| (5) a. | /φukis.saraši/          | /φuki.saraši/   | 'drafty'          |
|        | /akep.panaši/           | /ake.hanaši/    | 'left open'       |
| b.     | /aoč.čiroi/             | /ao.žiroi/      | 'pale'            |
|        | /karak.kaze/            | /kara.kaze/     | 'gale'            |
|        | /kisecup.pazure/        | /kisecu.hazure/ | 'unseasonable'    |
| c.     | /maruk.kiri/            | /maru.kiri/     | 'completely'      |
|        | /aburak.koi/            | /abura.koi/     | 'greasy'          |

The examples in (4-b,c) are exceptional. In (4-b), a vowel is lost; (4-c) shows voiced moraic obstruents. The latter seems to be an innovative variation observable in a colloquial speech. An alternative /suŋ.goi/ is also observable, particularly among the older generation.

There is another type of intensified adjectives worth considering. It is the type illustrated by Aoki (1981) as a case of gemination (henceforth, Type IV Intensification). See the following examples.

- |        |              |                  |            |            |
|--------|--------------|------------------|------------|------------|
| (6) a. | /mak.kura/   | 'pitch dark'     | /kura-(i)/ | 'dark'     |
|        | /maš.širo    | 'pure white'     | /širo/     | 'white'    |
|        | /mas.saki/   | 'very first'     | /saki/     | 'first'    |
|        | /map.piruma/ | 'broad daylight' | /hiruma/   | 'daylight' |
|        | /map.padaka/ | 'stark naked'    | /hadaka/   | 'naked'    |
| b.     | /mak.ka/     | 'deep red'       | /aka/      | 'red'      |
|        | /mas.sao/    | 'deep blue'      | /ao/       | 'blue'     |
| c.     | /ma.ue/      | 'right above'    | /ue/       | 'above'    |
|        | /ma.šita/    | 'right below'    | /šita/     | 'below'    |

Here, nouns (adjectives?) get /ma/ prefixed, and the moraic consonant occurs between /ma/ and the base. (6-b) shows some irregularity that has resulted from the lack of an onset element in the base. (6-c) exemplifies the data that have failed to get the moraic consonant inserted.

Given these data, an intriguing question is the location of the moraic consonant insertion. The examples in (4) seem to pattern with the /-ri/ adverbs, but those in (5) clearly deviate from them. The data in (6) also appear to conform to the pattern. None of the previous studies has suggested anything about the insertion site, except that the formula of Kuroda (1965) necessarily puts the moraic consonant after the first CV:  $C_1V_1C_0C_2V_2$ -ri. Obviously, however, it has nothing to say about the other types of intensified words illustrated above. Even in more recent studies this

problem has been neglected. Itô and Mester (1986) simply comment in a footnote that “Intensive Infixation can be viewed autosegmentally as insertion of a skeletal slot, followed by gemination (spreading) of the adjacent consonantal melody,” giving the examples /karak.kaze/ and /toŋ.garu/. This view, “insertion of a skeletal slot”, is untenable in the view of Prosodic Theory, as will be argued in the next section. A more adequate analysis, I believe, will be found in a prosodic analysis. The discussion below will show that a morphological unit and a prosodic unit intersect in an interesting way, giving a possible solution to yet another (seemingly distinct) type of intensification process.

## 4. PROPOSAL

### 4.1. Mora Attachment

Following recent developments in Prosodic Theory, I will assume that a segmental slot should not play more than a representational role (McCarthy and Prince (1986, 1990), Hayes (1989), Itô (1989) among others). The insertion of a moraic consonant should then be restated. Let me first consider, as a point of departure, the suggestion made by Itô and Mester (1986), and its inadequacies in the light of the prosodic analysis based on the “moraic hypothesis” by Hyman (1985) and Hayes (1989).

As mentioned in the previous section, Itô and Mester (1986) suggest that a segmental C is inserted, followed by spreading of a melody element. I agree with the view that the process involves spreading rather than copying of the melody. However, the insertion of a segment C does not make a correct prediction about the prosodic structure of an intensified word. The assumption behind the suggestion seems to be that the moraic value of the consonant, or the moraic consonant that characterizes the intensified words, is purely derivational. By “derivational” I mean that the mora is assigned to the segment by virtue of its being in coda position. The problem is the “underestimation” of the moraic value; it can be added or deleted.

In recent studies on Compensatory Lengthening, for instance, more importance is attached to the moraic value. Hayes (1989) describes Lengthening (long vowel, gemination) as essentially a result of the strategy to preserve the number of moras through derivation. Itô (1989) argues that Epenthesis results from interrelated requirements of prosody. She also explores the possibility of adopting a moraic theory and presents positive consequences. The point relevant here is that Epenthesis can also be interpreted as a manipulation process to conform to the well-formedness condition of a syllable structure in a given language while maintaining the weight (i.e. the number of the moras) involved in the morpheme (word). A rough principle seems to emerge: preserve the number of moras during derivation unless some rule “adds” or “deletes” mora(s).

This principle may seem too strong, especially given the Weight by Position Rule (Hayes 1989), which assigns a moraic value to any segment by virtue of being in the coda position. However, if this rule applies in Japanese at all, it must apply at the base level of derivation. One of the relevant data that come to my mind is verb morphology in Japanese, where some consonant-final verb stems trigger either gemination or vowel epenthesis to satisfy the requirements of the syllable structure in Japanese. Compare the following examples where a consonant-final verb stem is followed by a past tense morpheme /ta/. The moraic value after the vowel /a/ in the stem seems to be assigned by the Weight by Position rule, and the value must be preserved by a principle of mora (weight) preservation. Otherwise, the replacement by a geminate consonant and the /i/-epenthesis would find no explanation:<sup>7</sup>

- (7) a. /kaw/ + /ta/ → /kat.ta/ 'bought'  
 b. /kat/ + /ta/ → /kat.ta/ 'won'  
 c. /kas/ + /ta/ → /kasi.ta/ 'lent'  
 d. /kam/ + /ta/ → /kaŋ.da/ 'bit'  
 e. /kak/ + /ta/ → /kai.ta/ 'wrote'

Thus, I will claim that the phonological process of intensification in Japanese is not the insertion of a consonant (or segment C) but the insertion of a mora. The unlinked mora invokes the spreading of the melody element over to it.

#### 4.2. Prosodic Circumscription: Type I and II

The proposal that intensification is essentially a mora insertion is not unreasonable; however, it raises another question: Why is a consonant but not a vowel spread to fill up the mora. Given the syllable structure of Japanese, a vowel is always available in this position. Besides, recall that a CVV syllable is far more common and less restricted than a CVC one. Why should the inserted mora be associated with the consonantal element rather than the adjacent vocalic element?

This is an intriguing question especially in view of the fact that Japanese has yet another type of intensive adjective/adverb formation which is featured by the lengthening of a vowel (henceforth, Type V Intensification). This process has never been discussed in the literature to my knowledge,<sup>8</sup> but it is definitely an established phonological process, and the data is abundant in all kinds of (non-academic) publications as well as in mass media like T.V. and radio. The examples below show that even some of the output of the intensification process mentioned above can undergo this process:

- (8) a. /cuyooi/            /cuyoi/            'strong'  
           /yowaai/            /yowai/            'weak'  
           /maruui/            /marui/            'round'  
 b. /šizukaana/        /šizukana/        'quiet'  
 c. /pukaari/            /pukari/            'floating'  
 d. /mam.maruui/        / (mam)marui/     'perfectly round'  
           /čis.saai/            /čis.sai/            'small'  
 e. /sootto/             /sotto/             'quietly'  
           /φuwaatto/            /φuwatto/           'softly'

I will come back to this type later; for the moment it is sufficient to remark that consonant gemination is not the only logical possibility to satisfy the prosodic requirement.

One part of the explanation to this problem relies on the idea of "Prosodic Domain Circumscription" discussed and formulated in McCarthy and Prince (1990), repeated in (9):

#### (9) Prosodic Circumscription of Domains:

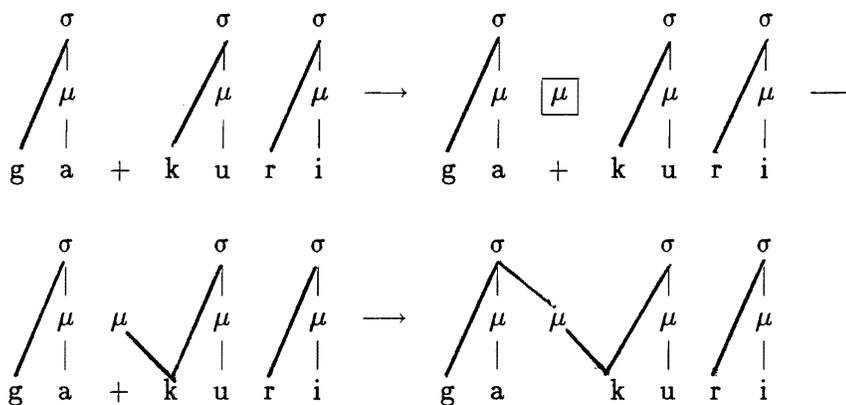
The domain to which morphological operations apply may be circumscribed by prosodic criteria as well as by the more familiar morphological ones. In particular, the minimal word within a domain may be selected as the locus of morphological transformation in lieu of the whole domain. (pp. 199-210)

My proposal is that the intensification of Type I and II (cf. (1), (2), (4) above) is an operation applying under extrametricality, formulated as follows (cf. McCarthy and Prince 1990):

$$(10) \quad O/\Phi(B) = B:\Phi * O(B/\Phi)$$

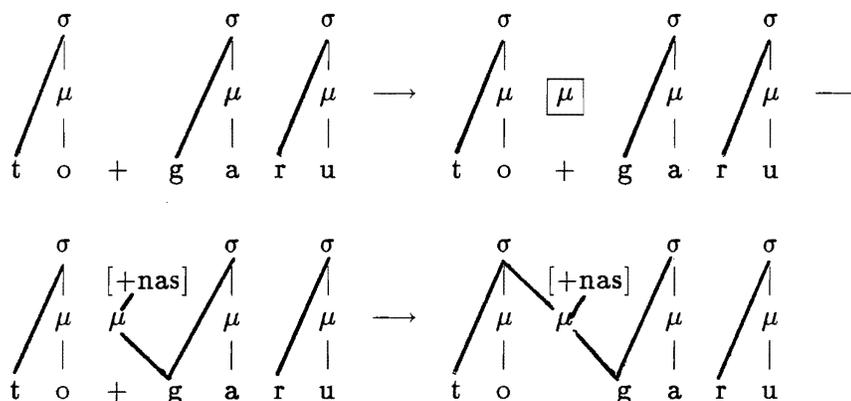
where B stands for a base, O for an operation.  $B:\Phi$  picks out the initial mora as extrametrical, with the residue, represented as  $B/\Phi$ , undergoing the operation: prefixation of a mora. It is followed by the spreading of an available melody element. As the first moraic unit is excluded from the operation domain, the vowel is no longer available, rendering the association to the consonantal element obligatory. Note also that this process cannot be the suffixation of a mora to the first moraic unit, given the extrametricality argument in McCarthy and Prince (1990); that is, a phonological process cannot operate on the extrametrical elements. Thus, spreading of a vowel is automatically blocked. The derivation proceeds as follows:

$$(11) \quad /gakuri/ \rightarrow /gak.kuri/ \text{ (Type I)}$$



The last step above is reprosodization. The moraic consonant /k/ is associated to the first syllable because it must be a coda element. The extrametrical unit (the first moraic unit) is reprosodized to constitute a syllable sharing /k/ with the adjacent syllable. This whole process is required presumably by the principle of "Prosodic Licencing" in the sense of Itô (1986).

$$(12) \quad /togaru/ \rightarrow /toŋ.garu/ \text{ (Type II)}$$



Following Itô (1986, 1989), [+nas] feature is introduced and attached to the inserted mora in the derivation of (12). Recall that the gemination of a voiced obstruent is usually not allowed. The [+nas] feature is inserted to make up for the violation.

The point is that the actual domain of operation is not the whole word but the residue left when the first moraic unit is subtracted. The motivation for defining the first moraic unit of those examples, I claim, is found in the accent system of Japanese.

The Japanese accent system is characterized by pitch, "the perceptual correlate of fundamental frequency (Vance 1987)". There is general agreement that the accent pattern of isolated Japanese words can be represented by specifying which moras carry high pitch and which moras carry low pitch (Vance 1987). For instance, see the following examples, where H represents a high pitch mora, L a low pitch mora:<sup>9</sup>

- |         |           |      |                   |                            |      |
|---------|-----------|------|-------------------|----------------------------|------|
| (13) a. | za'razara | HLLL | 'rough (surface)' |                            |      |
| b.      | tate'mono | LHLL | 'building'        |                            |      |
| c.      | širabe'ru | LHHL | 'to investigate'  |                            |      |
| d.      | takara'   | LHH  | 'treasure'        | cf. takara-ga (nominative) | LHHL |
| e.      | sakana    | LHH  | 'fish'            | cf. sakana-ga              | LHHH |

The last H syllable (usually coincides with mora) is considered the "accented syllable" and marked by a following " ' " in (13-a-d).<sup>10</sup> Note that (13-d) has the accent fall on the last syllable, while (13-e) has no accent. The distinction appears when a case marker is attached to each of them. Only in the (13-d) type does the case marker receive a lower pitch than the last syllable of the noun. It is worth noting that in Standard Japanese the initial short syllable (which has one moraic value) is always low in pitch unless it is the accented syllable itself, as illustrated in (13). This fact suggests strongly that the first mora is extrametrical by default, to be overridden only in the accent pattern of (13-a). Interestingly, there are no examples in the data of Type I and Type II where the base (when it is available) has the accented initial mora.<sup>11</sup> Thus it does not seem totally unreasonable to assume that the first moraic unit in question is indeed extrametrical.

The phonological irregularities found in some of the examples, repeated in (14), are accounted for by the segmental rules independently motivated in other domains of Japanese phonology. The major examples of the alternation are given in (15):

- |         |              |              |                        |
|---------|--------------|--------------|------------------------|
| (14) a. | /yap.pa-ri/  | /ya.ha-ri/   | 'still, nonetheless'   |
| b.      | /toŋ.garu/   | /to.garu/    | 'be pointed' (v./adj.) |
| c.      | /šom.bo-ri/  | /šo.bo-ri/   | 'dejectedly'           |
| d.      | /boŋ.ya-ri/  | /bo.ya-ri/   | 'absentminded'         |
|         | /yaŋ.wa-ri/  | /yawaraka-i/ | 'soft'                 |
| e.      | */hir.ra-ri/ | /hi.ra-ri/   | 'quickly'              |

- |         |          |   |     |
|---------|----------|---|-----|
| (15) a. | /h/      | → | /p/ |
| b.      | /g/      | → | /ŋ/ |
| c.      | /b/      | → | /m/ |
| d.      | /y/, /w/ | → | /N/ |

As for (14-a), there is agreement among Japanese linguists that /h/ is underlyingly /p/. This

“change” is historically proven, and is also widely assumed in a synchronic study as well. The correspondence is found in many different morphological classes among /h/, /p/, and /b/. As noted earlier in this paper, voiced obstruents, glides, and liquids do not allow gemination.<sup>12</sup> This possibly has forced the insertion of a moraic nasal before a voiced obstruent and a glide, which surface variably as *ŋ*, *ɲ*, and *ɱ* through assimilation. Liquids, on the other hand, seem to block the process altogether rather than inserting a moraic nasal; hence (14-e).

### 4.3. Morphological Circumscription: Type III

Now let me turn to the examples of Type III, repeated here in (16).

(16) a.	/φukis.saraši/	/φuki.saraši/	LHHHH	‘drafty’
	/akep.panaši/	/ake.hanaši/	LHHHH	‘left open’
b.	/aoč.čiroi/	/ao.žiroi/	LHHHL	‘pale’
	/karak.kaze/	/kara.kaze/	LHHL?	‘gale’
	/kiscup.pazure/	/kiscu.hazure/	LHHLL	‘unseasonable’
c.	/maruk.kiri/	/maru.kiri/	LHHL	‘completely’
	/aburak.koi/	/abura.koi/	LHHHL	‘greasy’

It is readily seen that the same type of mora attachment as proposed in the previous section features this intensification process, while the insertion site is clearly not the same. The prosodic circumscription fails to predict the correct shape of the intensified words of this class. Note that all the examples in (16) have the low pitched first mora in their base as well as in the derived (intensified) form. That is, they are exactly the same as those of Type I and II in terms of extrametricality. The prosodic circumscription proposed in the previous section would wrongly predict the intensified forms as in (17):

(17)	*/φuk.kisaraši/	/φuki.saraši/	LHHHH	‘drafty’
	*/ak.kehanaši/	/ake.hanaši/	LHHHH	‘left open’
	*/kis.secu.hazure/	/kiscu.hazure/	LHHLL	‘unseasonable’

It is not very likely that the operation domain of these examples constitutes a prosodic minimal (bimoraic foot) word, either. Hence, some other type of domain circumscription seems to be at work in this case.

Morphological circumscription of the operation domain is what I claim to be operative in Type III Intensification. Note that the examples that fall into this class are either compound words or words consisting of a base plus a morphological affix, while those of Type I and II are all “atomic” words. The following list shows how they are composed:

(18) a.	/φuki+saraši/	‘blow’ + ‘exposed’	‘drafty’
	/ake+hanaši/	‘open’ + ‘let free’	‘left open’
b.	/ao+žiroi/	‘blue’ + ‘white’	‘pale’
	/kara+kaze/	‘dry’ + ‘wind’	‘gale’
	/kiscu+hazure/	‘season’ + ‘displaced’	‘unseasonable’
c.	/maru+kiri/	‘round’ + ‘just’	‘completely’
	/abura+koi/	‘oil’ + ‘-ish’	‘greasy’

The mora is inserted at the boundary of the two component “words”. To be more precise, the domain of the mora attachment (prefixation) is circumscribed to the second component word, the first part being eliminated from the operation domain. Clearly, this is not a case of mora suffixation, because then a long vowel would result: /karakaze/ → /karak.kaze/, \*/karaa.kaze/. The derivation is essentially the same as (11) and (12) (Type I-II) except with respect to the domain of operation. The same phonological restrictions and rules mentioned in relation to Type I and II will account for the irregularities observed here (e.g. /h/ → /p/, etc.).

#### 4.4. /Ma/ Attachment?: Type IV

Now let me consider Type IV Intensification, briefly touched upon by Aoki (1981). The data is repeated in (19).

(19) a.	/mak.kura/	‘pitch dark’	/kura-(i)/	‘dark’
	/maš.širo	‘pure white’	/širo/	‘white’
	/mas.saki/	‘very first’	/saki/	‘first’
	/map.piruma/	‘broad daylight’	/hiruma/	‘daylight’
	/map.padaka/	‘stark naked’	/hadaka/	‘naked’
b.	/mak.ka/	‘deep red’	/aka/	‘red’
	/mas.sao/	‘deep blue’	/ao/	‘blue’
c.	/ma.ue/	‘right above’	/ue/	‘above’
	/ma.šita/	‘right below’	/šita/	‘below’

He assumes that /ma/ is an intensive adjective prefix. The “gemination” process takes place after the prefixation of /ma/. There are two possible ways to explain the phenomena along the line of the present argument. First, the prefixed /ma/ could be considered as the extrametrical unit. Whatever the accent pattern of the stem adjective is, the attachment of /ma/ changes it in such a way that the initial /ma/ gets low pitch and the following mora high pitch.<sup>13</sup> Differently put, the first moraic unit of the stem adjective which mostly gets low pitch in isolation gets high pitch when /ma/ is attached. This accent change is not always clear because not many of the examples of Type IV have the non-geminated counterparts, but in all cases where the non-geminated form is available, the accent change is observable. After the gemination they all conform to the pattern.<sup>14</sup>

(20)	/ma.širo-(i)/	LHHL	/širo-(i)/	LHL
	/ma.hiruma/	LHLL	/hiruma/	LHH
	/ma.hadaka/	LHLL	/hadaka/	LHH
	/ma.šita/	LHH	/šita/	LH

In other words, along this line of explanation, the prefixation of /ma/ supplies input to the intensification process of Type I and II, that is, intensification under prosodic circumscription.

That is a possible explanation, but the account of Type III Intensification will provide an equally plausible explanation. /Ma/ is not likely to be just a functional or grammatical affix, considering the Chinese character assigned to it,<sup>15</sup> which has the meaning “true”. Though it rarely stands on its own, it is not unreasonable to assume that the examples of Type IV are in fact “compound” words, like /mak.kura/ ‘pitch dark’ ← ‘truly dark’. Given that, the intensification pattern will automatically follow from the principle of the morphological circumscription of the operation domain suggested for the cases of Type III; the mora is prefixed to the stem-part of the

base, and the first consonant of the stem gets spread over to the unliked mora. At this moment, I have no further evidence to justify one analysis over the other, though intuitively I would opt for the second explanation.

Aside from the operation domain, the derivation is analogous to (11) and (12).

#### 4.5. Lengthening of a Vowel: Type V

With respect to moraic weight, lengthening of a vowel and consonant gemination are considered as essentially the same type of phenomenon (Hayes 1989). Simply put, both of them featured the spreading of a melody element over a mora in coda position. The difference resides in the selection of the type of the element to be spread: consonant (from the adjacent onset leftwards) or vowel (from the adjacent nucleus rightwards). Starting from this assumption, this section will explore the possibility of extending the analyses for Type I-IV Intensification discussed so far to Type V Intensification featuring lengthening of a vowel.

First see the examples given above, repeated here in (21):

(21) a.	/cuyooi/	/cuyoi/	LHL	'strong'
	/yowaai/	/yowai/	LHL	'weak'
	/maruui/	/marui/	LHH	'round'
b.	/šizukaana/	/šizukana/	HLLL	'quiet'
c.	/pukaari/	/pukari/	LHL/LHH	'floating'
	/soroori/	/sorori/	LHL/LHH	'slowly'
d.	/maṃmaruui/	/(maṃ)marui/	LHHHL	'perfectly round'
e.	/sootto/	/sotto/	LHH	'quietly'

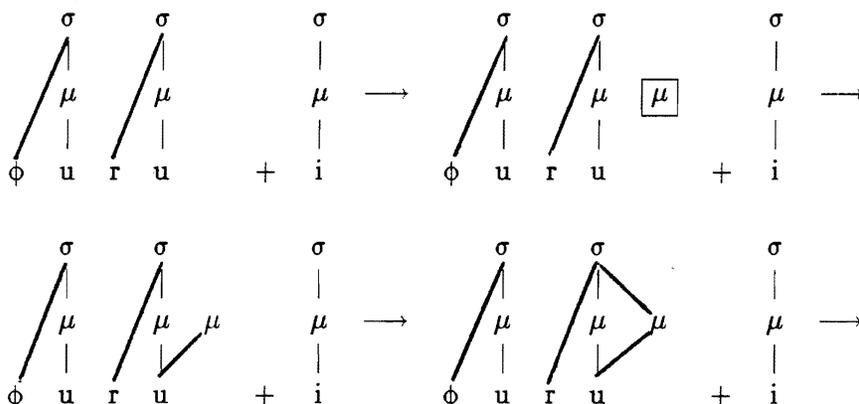
The domain of operation seems to be the word minus the last moraic unit. It cannot be the other way round; that is, the domain cannot be the last moraic unit. If the last moraic unit were the domain, then the last vowel /i/ would be lengthened in (21-a and d), a moraic nasal would be inserted in (21-b), and the process would be blocked in (21-c) (cf. (14-e), where a liquid blocks the process.) To put it another way, the difference between Type I-IV (=gemination) and Type V (=vowel lengthening) does not have to (and perhaps should not) refer to a rather fundamental distinction between a vowel and a consonant. Rather, I claim that the difference in question results from the difference in the attachment site of a mora: before the base or after the base.

Now the question is: What is the principle behind the circumscription of the operation domain in this case? Prosodic, morphological, or what? There seems to be no case where the final mora is accented with the exception of (21-c), where an accented final mora is only one of the possibilities. Though there are several cases where the final mora receives high pitch, they are in fact unaccented words. The general accent pattern of adjectives ending in /i/ (=i-adjectives) (21-a) is either unaccented or penultimate (mora) accent. (See McCawley (1968), Vance (1987).) Adjectives ending in /na/ (=na-adjectives or denominal adjectives) (21-b) show all varieties of accent pattern, though the inflective suffix /na/ never gets accented. However, this alone would not make a good argument for the extrametricality of the last moraic unit. As mentioned above in introducing the concept of mora and the default accent pattern in Japanese, low pitch moras must be counted from the end to an accented syllable. Default accent does not apply in this case, simply because these examples have a morphologically (lexically) conditioned accent pattern on their own. Default

accent thus does not provide a test for extrametricality in this case. It does show, however, that “low-pitchness” after an accented syllable or “unaccentedness” does not say anything about the extrametricality in itself. Therefore, in the absence of more dependable evidence, and given the variety of accent patterns of /na/-adjectives, I will conclude that Prosodic Circumscription is not a plausible solution.

I will claim that the circumscription in Type V is morphological. It gives a simple picture of the intensification process of this type. That is, a mora is attached to a morphological base, or a stem. Considering that /i/ and /na/ are grammatical (inflectional) suffixes, it seems (intuitively) natural that the mora is attached to the stem excluding the suffix. This situation can be contrasted with the compounding and morphological suffixation illustrated in Type III and IV Intensification, where the second morpheme provides the domain of mora insertion and a consonantal melody element is spread over the mora. The data in (21-c) and in (21-d) will be explained in the same way; /ri/ and /tto/ are both adverbializing suffixes and hence excluded from the domain of operation. The derivation is illustrated below:

(22) /φurui/ → /φuruui/ (Type V)



## 5. CONCLUSION

In this paper I have illustrated five types of intensified words, identifying mora-insertion as the common denominator. The five types are further classified into three according to the type of operation domain circumscription and the location of mora-insertion. Types I-II include non-compound words and invoke a prosodic circumscription. A mora is attached to the residue. In Types III-IV, on the other hand, there is either a compound word or a stem word with a morphological suffix. The words in these classes undergo a morphological circumscription rather than a prosodic one, and the domain is limited to the second part of the word. Type V includes both non-compound and compound words. It is subject to a morphological circumscription, presumably on a different level from Type III-IV, in the sense of lexical phonology; it parses the adjective/adverb stem off its inflectional suffix. The stem being the domain, the attached mora gets a vocalic element rather than a consonantal one spread over it. Given the classification based on the word-formation type, the surface differences like the mora attachment location and gemination vs. vowel lengthening are automatic consequences. I believe that the argument presented in this paper provides a simple, less stipulative answer to the question as to why a mora is attached to a certain site and not to the others, and why the additional mora is realized as a moraic consonant in some cases and as a lengthened vowel in others.

## NOTES

1. I am assuming that there is no  $/(C)VG/$ -syllable on the surface structure in Japanese. The sequences  $/aw/$ ,  $/ay/$ , etc. are to be analyzed as  $/au/$ ,  $/ai/$ .
2. However, the vowels within one morpheme seems to be limited to two.
3. A morpheme carries some meaning of its own, and roughly corresponds to one Chinese character. A "simple" (non-compound) word can consist of more than one morpheme. It is somewhat analogous to those English words composed of Greek/Latin morphemes like *re-turn*, *pro-ject* etc.
4. The left-hand column represents the intensified words which are assumed to be derived from the base (non-intensified) words given in the right-hand column. The glosses given in the examples translate the base words unless specified otherwise. The meaning of the intensified words will be obtained by adding "very" to each of the given gloss.
5. The last example is different from others in that the base is not onomatopoeic. There are also some adverbs ending in  $/-ri/$  that fail to undergo the intensified adverb formation like *\*hir.ra-ri/hi.ra-ri* ('fluttering') and *\*por.ro-ri/po.ro-ri* ('drop'). It is presumably due to a phonological constraint that blocks moraic liquids. They all have non-intensified meanings.
6. Reduplicative forms have often been used to justify the argument here. However, it could be a circular argument. The reduplicative adverbs in question seem to impose a bimoraic template ( $/C_1V_1C_2V_2-C_1V_1C_2V_2/$ ) anyway, and never allow a moraic consonant to intervene between  $V_1$  and  $C_2$  because it would end up with three moras. Therefore, it is possible to argue that the moraic consonant is "dropped" to conform to the template; i.e. the opposite direction of argument.
7. The verb root in (7-a) may not be taken as a counterexample to the statement in footnote 1 above. Note that the glide after a vowel surfaces as a moraic consonant, i.e. voiceless obstruent. The glide is preserved only when the verb root is followed by a vowel. In that case, however, the glide is an onset segment.
8. This is presumably because it is somewhat more colloquial than the other types illustrated above.
9. Accentuation is according to Nihon Hoosoo Kyookai (ed.), *Nihongo Hatsuton Akusento Jiten* [Japanese Pronunciation and Accentuation Dictionary].
10. Note that the accented unit is defined in terms of a syllable rather than of a mora. This distinction is crucial. In Japanese, when a long syllable is accented, the first mora is H and the second mora is L. Recall that the default accent falls on the third mora from the word-final boundary. However, if the third mora from the end is the second mora of a heavy syllable, the accent shifts leftward to the first mora of the syllable (i.e. the fourth mora from the end). This is why McCawley called Japanese a "mora-counting syllable language" (McCawley (1968), Vance (1987), Tabata (1989)).
11. Three points require comments. First, I mean by "base" of Type I an adverb ending in  $/-ri/$  without gemination. That is, the "base" should not be confused with the "quasi-base" like the related reduplicative adverbs and related verbs/adjectives mentioned above in defense of the

derivational view of Type I intensive adverbs. In particular, the reduplicative adverbs almost invariably get the first syllable accented; however, this is irrelevant to the accent pattern of the base. Second, as can be seen from the pattern of reduplicative adverbs, most of the recent prosodic template analyses show hardly any sensitivity to the accent pattern or the extrametricality. Usually the minimal base (arguably a bimoraic foot) is selected without any regard to the extrametricality argued for here (i.e. including the first mora). This problem can be got around, however, if one posits different levels of rule application. Thirdly, there is one exception to the extrametricality argument. That is, the intensified version of /i.cumo/ ('always') shows up as /ic.cumo/, but the accent pattern of the former is HLL, i.e., the first moraic unit is the accented syllable. This could be explained by "analogy", but I have no more plausible explanation to this exception.

12. Note the innovative variation in (4-c) above, which violates this constraint.
13. Here "stem" refers to the adjective form without /ma/, and "base" the form with /ma/ but without gemination.
14. The attachment of /ma/ has an overall effect on the accent pattern of a word; note the lowering of pitch in (20-b and c). The mechanism of the pitch change is beyond the scope of this paper.
15. A general tendency of Japanese is that grammatical, inflectional affixes are represented exclusively by syllabary (moraic) alphabets, while other units like nouns, adjective-stems, verb-stems, etc. have particular Chinese characters to represent their "concept".

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