Stress Assignment in Tokyo Japanese (1)

—— Parameter Settings and Compound Words ——

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0. Introduction

In this paper we will examine the *stress* properties of Tokyo Japanese (Tokyo dialect in Japanese) and show how well its stress assignment is accounted for within the framework of Halle and Vergnaud (1987b).[1] According to them, stress is metrically represented on the stress plane. We assume that in Tokyo Japanese *tone* is assigned on a separate tonal plane by some autosegmental processes on the basis of the location of the stress previously assigned on the stress plane by stress rules discussed below. After the tone assignment, stress is wiped out.[2]

As pointed out in Tenny (1986), Tokyo Japanese is "a language that can be approached from" the two angles: stress and tone. A close relationship between them is recognized, i.e., the tone pattern is dependent on the (abstract) stress pattern. In fact, the tone distribution can be viewed as a reflection of the stress placement and its cyclicity, which reveals that some tonal mechanisms of tone languages can be as well accounted for by means of universal metrical rules originally developed for dealing with stress assignment behavior in stress languages.

We will propose parameter settings for stress rules in Tokyo Japanese, by which the position of stress, eventually determining the tone pattern of this language, is predictable by and large, except for some lexically marked words. As stated in Haraguchi (1988), the position of stress in long nouns becomes predictable, stress "normally falling on the antepenultimate mora"; while in compound nouns and loan words stress "tends to be assigned to the antepenultimate mora (Haraguchi 1988: 13)."[3] Keeping this in mind as a starting point, we will analyze the stress pattern of Tokyo Japanese, and show how the stress is properly assigned not only to long nouns, compound nouns and loan words but also to single words and compounds and suffixed strings as well by the stress rules and parameters set for them.

In section 1, after rules and parameters are set for Tokyo Japanese, stress assignment for single words will be dealt with. Stress is placed on the stem final mora in the case of verbs and abjectives, while it is generally placed on the antepenultimate mora in nominals. Stress assignment for compound words will be discussed in section 2, stress shift from non-head position and one caused by High Vowel Devoicing in section 3. In section 4, stress assignment in suffixation will be analyzed, along with its cyclicity. In section 5, conclusion will be shown.

1.0. Rules and Parameters

In 358 cases of Japanese place names listed in NHK (1985), 68 percent (244 cases) of them are *surface-stressed*; while 32 percent (114 cases) of them are *non-surface-stressed*.[4] Among the words which are surface-stressed (244 cases), for 94 percent (230 cases) of them the position of

stress is predictable, i.e., stress is assigned to the antepenultimate mora (or in some cases, to the preantepenultimate mora); while for 6 percent (14 cases) of them it is not predictable.

In the case of single words, likewise, they are divided into two classes, namely surface-stressed class and non-surface-stressed one as is shown in (1) and (2).[5]

(1) a.	mura'saki	'purple'	hototo'gisu	'cuckoo'
	mi'dori	'green'	a'rasi	'storm'
	ha'ru	'spring'	a'ki	'fall'
	ki'	'tree'	me'	'eye'
b.	otooto'	'younger brother'	koko'ro	'heart'
	atama'	'head'	komu'gi	'wheat'
	kawa'	'river'		
(2)	sakura	'cherry'	sakana	'fish'
	mizu	'water'	ame	'sweet'
	ha	'leaf'	ka	'mosquito'

The words in (1) are of surface-stressed class (we call them stressed or Type I words); i.e., a surface stress is eventually assigned to them by stress rules or lexically, which will be discussed later. On the other hand, the words in (2) are of non-surface-stressed class (non-stressed or Type II words), i.e., no surface stress is assigned to them at all by any stress rules nor lexically.

This classification of words into the two groups is not novel. All the predecessors have assumed what is called the "accented" vs. "un-

accented" distinction of Japanese words. We will not, however, use the terms "accented" and "unaccented" to label the two groups, for in Halle and Vergnaud's treatment the terms *accented* and *unaccented* imply *underlyingly accented* and *underlyingly unaccented*, respectively, which we adopt in this paper. As is shown in our analysis, moreover, the location of stress is predictable by some stress rules for the what is called "accented" words, though accompanied by some lexical exceptions. This point is supported by the evidence from the stress assignment in compound nouns, lists of meaningless syllables, and loan words. Then, it will be misleading to use the term *accented*, implying *underlyingly accented*, to label a group of words consisting of predictable words on the one hand and non-predictable ones on the other. Therefore, we employ the terms *surface-stressed* (or Type I) and *non-surface-stressed* (or Type II) to refer to the two calsses, rather than follow the convention, and leave the terms *accented* and *unaccented* being used in line whith Halle and Vergnaud (1987b).

As mentioned briefly above, the words in (1) are divided into the two groups: a group of words whose position of stress is predictable as in (1a), and those whose position of stress is not predictable and therefore has to be specified in the lexicon as in (1b). In the case of the words in (1a), for example, monomoraic words such as *ki'* and *me'* receive stress on the very mora; bi-moraic words such as *ha'ru* and *a'ki* on the penultimate mora; tri-moraic words such as *mi'dori* and *a'rasi* on the antepenultimate mora. More interestingly, in the case of the words with more than three moras such as *mura'saki* and *hototo'gisu*, strees is always assigned to the antepenultimate mora. In short, stress falls on the antepenultimate mora

of the words with three or more moras; otherwise on the first mora, in unmarked cases as in (1a). In marked cases of the words in (1b), on the other hand, we assume that the position of stress is specified in the lexicon.

Let us now assume the following stress rules and parameter settings for the stressed words or stems (i.e., for the Type I strings) of Tokyo Japanese, on the basis of the fact about the place names mentioned above, the stress assignment of the words in unmarked cases as in (1a), and the discussion about compound nouns in Haraguchi (1988), and others:[6]

(3) Assign a line 1 asterisk to the stem-final mora of verbals and adjectivals.[7]
(4) Mark the last mora of nominals extrametrical.[8]
(5) a. Stressable elements are moras.
    b. Line 0 parameter settings are [+Binary, Left-headed, Right to Left].
    c. Construct constituent boundaries on line 0.
    d. Locate the heads of line 0 constituents on line 1.
    e. Line 1 parameter settings are [−BND, Right-headed].
    f. Construct constituent boundaries on line 1.
    g. Locate the heads of line 1 constituents on line 2.
    h. Conflate lines 1 and 2.

With the rules and parameters being set in (3)-(5), they provide us with the predictability of stress placement in Tokyo Japanese. In the previous works such as McCawley (1968), Higurashi (1983), Poser (1984), Tenny

(1986), Pierrehumbert and Beckman (1988), and others, the position of stress in single nouns is specified (or marked) in the lexicon. Even in Haraguchi (1988), this point is not made clear, although he suggests the possibility. Moreover, it will be demonstrated in the ensuing sections that the stress placement of suffixed strings can be accounted for by the cyclical assignment of the stress rules.

1.1. Nouns

Taking again the nouns in (1) and (2), for example, let us examine how a set of rules in (3)-(5) is applied to them. The expmples in (1) are Type I (with surface stress) words, whereas those in (2) are Type II (with no surface stress). The expmples in (1a) are underlyingly unaccented (or unmarked); while those in (1b) are underlyingly accented (or marked).

The derivation for the word *mi'dori* in (1a), for instance, is shown as follows:

(6)

```
                                   *  .  .        *  .  .     line 2
                       *  .  .    (*  .) .       (*  .) .     line 1
                      [*  *) .    [*  *) .       [*  *) .     line 0
midori ---> mido⟨ri⟩ ---> mido⟨ri⟩ ---> mido⟨ri⟩ ---> mido⟨ri⟩
         (4)          (5a-d)        (5e-g)         (5h)
```

Rule (3) does not apply to the word *mi'dori* because it is not verbal or adjectival. Rule (4) marks the last mora of the word extrametrical.[9] Then, the rules in (5) apply to yield the correct output in (6). Likewise, stress is correctly placed on the words such as *ha'ru, ki'*.

(7)

```
            *   .         *   .     line 2
           (*)  .        (*)  .     line 1
           [*)  .        [*)  .     line 0
haru ---> ha⟨ru⟩ ---> ha⟨ru⟩
   (4),(5a-g)      (5h)

       *     *    line 2
      (*)   (*)   line 1
      [*)   [*)   line 0
ki ---> ki ---> ki
  (5a-g)  (5h)
```

Notice that, in the case of the word *ki* in (7), rule (4) does not apply because it is a monomoraic word.

In the case of the underlyingly accented words as in (1b), we assume that, on the stress plane, a line 1 asterisk is automatically assigned to the mora with the underlyingly marked accent. Therefore, the derivation for the word *otooto'* is shown as follows:

(8)

```
                                   .  .  .  *     .. ..  *    line 2
     *        (*  *  .  *)        (*  *  .  *)    ( . ..  *)   line 1
     *        [*)[* *)[*)         [*) [* *)[*)     * **  [*)   line 0
otooto ---> o to o to ---> o to o to ---> otoo to
      (5a-d)           (5e-g)        (5h)
```

The last mora of the word *otooto'* is not extrametrical, for this place is underlyingly accented (or specified). Therefore, rule (4) does not apply. Finally, the rules in (5) apply, yielding the correct output in (8).

To the Type II (non-surface-stressed) words in (2), stress is not given, since the stress rules in (3)-(5) are applied only to stressed words. There-

fore, no stress rule is applied to them, yielding an output without surface stress as in (9) which is to be an input pattern to the tonal plane.

(9) sakura ⟶ sakura (no stress is assigned)

As mentioned in footnote 2, for the Type II words, which do not bear stress, high tone is associated with the last mora on the tonal plane, and spreads to the left, with an initial high tone being lowered as in the tonal pattern of *sakura* (L-H-H).[10]

To summarize, single nouns are divided into the two types: surface-stressed nouns (Type I) as in (1) and non-surface-stressed ones (Type II) as in (2). Type I words are further divided into the two groups: words whose position of stress is predictable by the stress rules in (3)-(5) as in (1a); and those whose position of stress is not predictable, therefore, marked in the lexicon as in (1b).

1.2. Adjectives, Verbs, and Adverbs

1.2.1. Adjectives

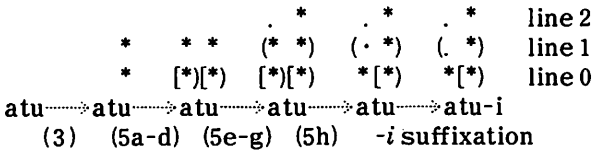
Next, let us proceed to the stress placement on adjectives. The stems in the examples in (10) are of Type I; while those in (11) are Type II.

(10)	atu'-i	'hot'
	ao'-i	'blue'
	mizika'-i	'short'

(11)	asa-i	'shallow'
	atu-i	'thick'
	yasasi-i	'easy'

In the case of adjectives such as *atu'-i* 'hot' in (10), stress is assigned as follows:

(12)



In (12), a line 1 asterisk is assigned to the final mora of the stem *atu* by rule (3), then stress is assigned by rules (5) to the same mora. Since the nonpast suffix *-i* is a Type II noncyclic suffix, which will be discussed in section 4, the suffixation of *-i* does not affect the grid previously built on the stem. Therefore, the stress remains unchanged.

On the other hand, the derivation with a Type II stem as in (11) is as follows:

(13) asa ⟶ asa ⟶ asa-i (no stress is assigned)

To the stem *asa* in *asa-i* no stress is assigned by any of the rules assumed in (3)-(5) because the stress rules are not applied to the Type II stem. Moreover, the suffixation of *-i* suffix does not allow the rules to assign any stress to the adjective *asa-i*, for the suffix *-i* is also of Type II.

As for the stress placement on the expmples in (14), in which various suffixes are added, we will look into it in detail in section 4.

(14) a. a'o-kereba   b. asa'-kereba
a'o-kute   asa'-kute
a'o-katta   asa'-katta

1.2.2. Verbs and Adverbs

The examples in (15) are verbs whose stems are also divided into the two classes: stems of Type Ⅰ as in (15a) and those of Type Ⅱ in (15b).

(15)

a. Nonpast	Stem	Gloss.	b. Nonpast	Stem	Golss.
mi'-ru	mi	see	ne-ru	ne	sleep
ke'r-u	ker	kick	kik-u	kik	hear
oki'-ru	oki	get up	hare-ru	hare	clear
nara'-u	naraw	learn	ara-u	araw	wash

Stress placement on these words is straightforward. It is dealt with in the same way as adjectives. Rule (3) is applied to the words in (15a) because they are Type Ⅰ words. For example, the derivation of the word *oki'-ru* with Type Ⅰ stem in (15a) is shown as in (16).

(16)

```
                          . *     . *     . *     line 2
         *      * *)    (* *)   (. *)   (. *)     line 1
         *     [*)[*)  [*)[*)   *[*)    *[*)      line 0
oki ----> oki ----> oki ----> oki ----> oki ----> oki-ru
    (3)     (5a-d)   (5e-g)    (5h)    -(r)u suffixation
```


Since the stem *oki* belongs to Type I, a line 1 asterisk is asigned to the last mora of the stem by rule (3), and the stress rules in (5) allocate stress to the final mora of the stem. Since the suffix *-(r)u* falls into a noncyclic Type Ⅱ suffix, no stress rule is applied after the *-(r)u* affixation. Note here that the verbs with a suffix to the right of the stem such as *oki'-nai, oki-ma'su, oki'-ta, oki'-te, oki'-reba,* etc., are treated in section 4.

Next, let us consider the following cases. The examples in (17a) are of Type Ⅰ adverbs; while those in (17b) are Type Ⅱ. To the words of Type Ⅰ in (17a), the stress rules in (5) apply to yield the correct output as in (18).

(17)

a.		b.	
go'ku	'extremely'	yagate	'in due time'
tappu'ri	'full'	mattaku	'entirely'
yukku'ri	'slowly'	arakazime	'in advance'

(18)

```
                       *  .     *  .
               *      (*  .)   (*  .)
             [* *)    [* *)    [* *)
goku ----> goku ----> goku ----> goku
      (5a-d)    (5e-g)    (5h)
```

Because adverbs are neither verbal nor adjectival, rule (3) does not apply to them. Rule (4) does not apply to them as well, for adverbs are not nominal. To the Type Ⅱ adverbs in (17b), no stress rule is applied as in (19) in the same way as (9) and (13).[11]

(19) arakazime ⟶ arakazime (no stress is assigned)

Notice here adverbs ending with *-ku* have the same endings orthographically as the one of adjectives. Therefore, we have to differentiate them from each other because they show the different stress patterns: [*monosugo'ku*]$_{ADV}$[*ookii*]$_{A}$ 'extremely large' or [*ao'ku*]$_{ADV}$[*hikaru*]$_{V}$ 'to gleam blue' vs. [*monosu'goku*]$_{A}$[*naru*]$_{V}$ 'to become gruesome' or [*a'oku*]$_{A}$[*naru*]$_{V}$ 'to become blue'.[12] The former, which is considered as a (true) adverb and is subject to rule (5), has the penultimate stress; the latter, which is to be taken as an adjective, is given an antepenultimate stress. Only the former case is treated here as an adverb, the latter as an adjective with an adjectival suffix being handled in section 4.

To sum up what has been done in this section, words in Tokyo Japanese are divided into the two classes: Type I (stressed class) where words have surface stress shown in (1) and Type II (non-stressed class) where words have no surface stress shown in (2). To the Type I words, the stress rules in (3)-(5) apply, depending on whether they are underlyingly unaccented as in (1a) or underlyingly accented as in (1b); in fact, for the underlyingly unaccented words (i.e., unmarked words) the location of stress is predictable, for the underlyingly accented words (i.e., marked words) it is not, therefore, it is to be marked in the lexicon. On the other hand, to the Type II words, no stress rule applies, i.e., there is no surface stress on the Type II words. After the stress assignment, tone is assigned to words by some autosegmental processes, which we are not concerned with in this paper, on the basis of the position of stress.

2.0. Compound Words

2.1. Compound Nouns

Let us consider compound nouns. The words in (20a-b) surface with stress on the antepenultimate mora, and those in (20c) on the penultimate or ultimate mora. On the other hand, the words in (21) surface with no stress.

(20) a. zyooki-kika'nsya (<zyo'oki+kika'nsya) 'steam locomotive'
isoppu-monoga'tari (<iso'ppu+monoga'tari) 'Aesop's Fables'
kokkai-gi'in (<kokkai+gi'in) 'a member of the Diet'
dooka-sa'yoo (<dooka+sa'yoo) 'assimilation'
yamaneko-sutora'iki (<yamaneko+sutora'iki) 'wildcat strike'
minami-yooro'ppa (<minami+yooro'ppa) 'Southern Europe'

b. oku-za'siki (<o'ku+zasiki') 'innermost Japanese-style drawing room'
onna-go'koro (<onna'+koko'ro) 'female psychology'
syoohi'-zee (<syoohi+ze'e) 'consumption tax'
kyoosoo-a'ite (<kyoosoo+aite') 'rival'
akusento-zi'ten (<a'kusento+ziten) 'accent dictionary'
gaitoo-sya'sin (<gaitoo+syasin) 'street photograph'

c. kahee-ka'ti (<ka'hee+ka'ti) 'monetary value'
ree-gi' (<ree+gi') 'courtesy'
niwaka-a'me (<ni'waka+a'me) 'shower'
Sakuma-da'mu (<Sa'kuma+da'mu) 'Sakuma dam'
kyakkan-syu'gi (<kyakkan+syu'gi) 'objectivism'

(21) zikan-hyoo (<zikan+hyoo) 'class schedule'
kuti-mane (<kuti+mane) 'mimicry'
keezi-ban (<keezi+ban) 'bulletin board'
hyoosiki-too (<hyoosiki+too) 'beacon light'
kaihee-tai (<kaihee+tai) 'Marine Corps'
gaikoku-see (<gaikoku+see) 'foreign make'
gunyoo-ken (<gunyoo+ken) 'military dog'

In the case of the compound noun *zyooki-kika'nsya* in (20a), the derivation is as follows:

(22) a.

```
** *   * ** *
[[zyooki]-[kikansya]]
```

b.

```
(* . *   . * .)   .  line 1
[* *)[*   *)[* *)  .  line 0
[[zyo oki]-[ki ka n⟨sya⟩]]
```

(4),(5a-d) (5e-g)

c.

```
  .  .  .  *  .  .
(* .  *  .  * .)  .
[* *) [*  *) [* *)  .
[[zyoo ki]-[ki ka n⟨sya⟩]]
```

d.

```
  .  .  .  .  *  .  .   line 2
(.  .  .  .  * .)  .   line 1
 * *  *  *  [* *)  .   line 0
[[zyo o ki]-[ki ka n⟨sya⟩]]
```

(5h)

In (22a), the previously assigned metrical grids of the first element *zyooki* and second element *kikansya* over line 0 are wiped out, for compounds in Tokyo Japanese are cyclic.[13] In (22b), rules (4) and (5a-b) are applied, and rules (5e-g) are applied in (22c) since the second element *kikansya* of the compound is the Type I (stressed) word. Rule (5h), then, applies to yield the correct output in (22d).[14]

Suppose that compounds in Tokyo Japanese are *not* cyclic. In which case, the compound stress will fall on the stressed mora of either the first element of the compound as exemplified in (23) or the last one as in (20a) and (20c).

(23) hayari'-uta (<hayari'+uta') 'popular song'
yo'-tuyu (<yo'+tu'yu) 'evening dew'
yama'-mizu (<yama'+mizu) 'mountain water'
hana'-miti (<hana'+miti) 'passageway in a Kabuki theater'
huru'-sato (<huru'+sato) 'hometown'

Notice here, however, that we cannot predict on which element, i.e., the first or last element, the compound stress falls, as it stands now: the examples in (24a) show the case where compound stress falls on the last element; while those in (24b) show the case where stress falls on the first.

(24) a. zyooki-kika'nsya (<zyo'oki+kika'nsya)
isoppu-monoga'tari (<iso'ppu+monoga'tari)
kahee-ka'ti (<ka'hee+ka'ti)
niwaka-a'me (<ni'waka+a'me)
Sakuma-da'mu (<Sa'kuma+da'mu)
b. hayari'-uta (<hayari'+uta') 'popular song'
yo'-tuyu (<yo'+tu'yu) 'evening dew'
abare'-uma (<abare'+uma') 'unruly horse'
deki'-goto (<deki'-koto') 'incident'
no'-bi (<no'+hi') 'burning the grass and undergrowth off a field'

Perhaps we would need some subrules to differentiate them, which we will not dwell upon here, though. Moreover, the stress pattern of the words in (20b) will not be derived correctly, as is shown in incorrect outputs in (25), if compounds are not cyclic:

(25) *o'ku-zasiki or *oku-zasiki' correct: oku-za'siki
*onna'-gokoro or *onna-goko'ro correct: onna-go'koro
*syoohi-ze'e correct: syoohi'-zee
*kyoosoo-aite' correct: kyoosoo-a'ite
*a'kusento-ziten correct: akusento-zi'ten
*gaitoo-syasin correct: gaitoo-sya'sin

Therefore, the words such as those in (20b) would have to be marked in the lexicon as receiving stress on the penultimate mora if compounds are not cyclic. In addition, for the words in (26) where compounds surface with no stress, there is no way to explain the erasure of the previously assigned stress(es) of the constituents of the compounds.

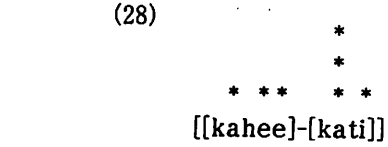
(26) a. aka-gumi (<a'ka+kumi') 'red team'
ongaku-tai (<o'ngaku+ta'i) 'musical band'
kansyaku-dama (<kansyaku+tama') 'fit of rage'
hasigo-dan (<hasigo+da'n) 'stairs'
b. nihon-ma (<niho'n+ma) 'Japanese-style room'
saru-mane (<sa'ru+mane) 'shallow imitation'
seeyoo-huu (<se'eyoo+huu) 'Western fashion'

On the other hand, if we assume that compounds in Tokyo Japanese are cyclic and that they are subjected to the stress rules in (3)-(5), we can properly handle the examples in (20a-b) and (23), with the exception of (20c). All the words in (20a-b) and (23) receive the antepenultimate stress, which entails the cyclic application of the stress rules in (3)-(5). This alternative is also motivated by the fact that all the compounds consisting of stressless first and second element receive stress on the antepenultimate mora when they are stressed as in (27), and that not only compounds but also single words and suffixed strings in Tokyo Japanese can be treated on the same basis, i.e., their stress pattern can be explained by the combination of the stress rules in (3)-(5) and their cyclicity.

(27) gaitoo-sya'sin (<gaitoo+syasin) 'street photograph'
tooyoo-ni'kki (<tooyoo+nikki) 'daily-use diary'
hasira-do'kee (<hasira+tokee) 'wall clock'
daigaku-kyo'ozyu (<daigaku+kyoozyu) 'university professor'
gyaku-hi'ree (<gyaku+hiree) 'inverse proportion'
zensin-ma'sui (<zensin+masui) 'general anesthesia'

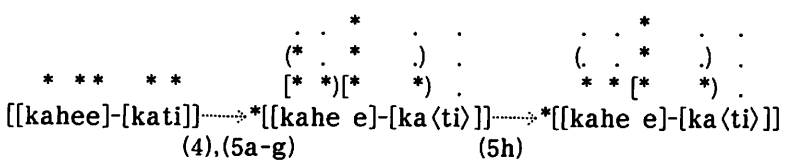
Then, the remaining problem concerning the second alternative is how we treat the exceptional case of (20c). Notice that all the second elements of the compound nouns in (20c) are underlyingly accented, and their surface stress falls on the very underlyingly accented mora as shown in the example (28).

(28)



As it stands, however, we cannot explain the examples in (20c) properly, as shown in the incorrect derivation in (29), because the previously constructed grids over line 0 on both *kahee* and *kati* are wiped out on the outermost cyclic constituent, with surface stress assigned incorrectly by rules (4) and (5).

(29)

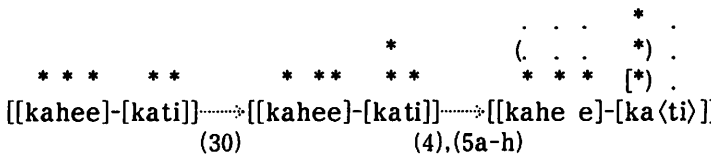


In order to handle the words in (20c), we postulate that they are subject to the following special stress copy rule.

(30) Copy the line 1 underlyingly-assigned asterisk of specific words from the metrical plane of earlier cycle in compound formation.

With this rule, we can obtain the correct derivation for the compound word *kahee-ka'ti* in (31).[15]

(31)



Notice that in McCawley (1968), Higurashi (1984) and Abe (1987) the seconds elements of words such as those in (32) are treated as pre-stressing ["pre-accenting," in their term] morphemes or words, which put stress on the immediately preceding mora:

(32) a. gedoku'-zai (⟨gedoku+zai) 'antidote' (McCawley 1968: 158)
genetu'-zai (⟨genetu+zai) 'antifebrile'
syooka'-zai (⟨syooka+zai) 'digestive'
syoodoku'-zai (⟨syoodoku+zai) 'disinfectant'

b. yasai'-iti (⟨yasai+i'ti) 'vegetable market' (Higurashi 1984: 67)
setomono'-iti (⟨setomono+i'ti) 'ceramics market'
uma'-iti (⟨uma'+i'ti) 'horse market'

c. asa'-yu (⟨a'sa+yu') 'morning bath' (Abe 1987: 35)
yuzu'-yu (⟨yu'zu+yu') 'bath scented with *yuzu*'
syoobu'-yu (⟨syo'obu+yu') 'bath with iris leaves'

As for the words in (32a, b), however, we can predict their position of stress without resorting to their pre-stressing treatment, for they receive in our treatment the normal compound stress on the antepenultimate mora by the cyclic application of the stress rules in (3)-(5). Thus, we can drastically reduce the number of the *ad hoc* pre-stressing words. In

contrast, the words really requiring the pre-stressing treatment are those in (32c). All the compounds having *yu* 'bath' in (32c) or *ki* 'period, time' in (33) as their compound-final element, for example, receive stress on the penultimate mora.

(33) kaika'-ki (<ka'ika+ki') 'flowering time'
kato'-ki (<ka'to+ki') 'transition period'
sinseezi'-ki (<sinse'ezi+ki') 'new-born infant period'
demawari'-ki (<demawari+ki') 'supply season'
nyuuzi'-ki (<nyu'uzi+ki') 'suckling period'
yoozi'-ki (<yo'ozi+ki') 'baby period'

There seems to be no way to account for their stress assignment but for the following *ad. hoc* pre-stressing treatment even in our cyclic view.

(34) Place a line 1 asterisk on the mora immediately before the compound-final element in the compound formation of a specific class of words.

Therefore, the derivation for the word *asa'-yu* in (32c) will be as follows in the second cycle:

(35)

```
                                                  *
                        *                      (.  *)
   *   *    *        *  *      *              *  [*)
[[asa]-[yu]]······>[[asa]-[yu]]······>[[asa]-[⟨yu⟩]]
                (34)            (4),(5a-h)
```

The following compound-final words or morphemes in the compounds in (36) are subjected to rule (34):

(36) geka'-i (<geka 'surgery'+i 'doctor') 'surgeon'
garasu'-ki (<garasu 'glass'+ki' 'vessel') 'glassware'
eesya'-ki (<eesya 'projection'+ki' 'device') 'film projector'
zyozi'-si (<zyozi 'scription'+si 'poetry') 'epic poetry'
Tanaka'-si (<Tanaka+si 'Mr.') 'Mr. Tanaka'
keeri'-si (<keeri 'accounting'+si' 'person') 'public accountant'
zassi'-sya (<zassi 'magazine'+sya' 'company") 'magazine company'
gaiya'-syu (<gaiya 'the outfield'+syu' 'person') 'outfielder'
tenki'-zu (<te'nki 'weather'+zu 'chart') 'weather chart'
kango'-hu (<ka'ngo 'nursing'+hu 'lady') 'nurse'
kooatu'-bu (<kooatu 'high voltage'+bu 'part') 'high voltage part'
gakuseki'-bo (<gakuseki 'school register'+bo 'book') 'school register'
Adati'-ku (<Adati+ku' 'ward') 'Adati ward'
Kussyaro'-ko (<Kussyaro+ko 'lake') 'Kussyaro lake'
Isahaya'-si (<Isahaya+si' 'city') 'Isahaya city'

In other words, those which are subjected to rule (30) and (34) are to be specified as such in the lexicon in our treatment.

Now, let us proceed to another issue. In the examples of (27), the compound stress is given by the cyclic application of the stress rules in (3)-(5), and both the first and the second element in isolation of the compounds are stressless, i.e., Type II. On the contrary, in (21) no compound stress is given to them, and both the first and second element in isolation are as well stressless, i.e., Type II. Moreover, no compound stress is given to the expmples in (26), though at least one of the constituents of the compounds is stressed, i.e., Type I, in isolation. How can we treat this discrepancy? Recall that we have assumed that whether a given single word belongs to Type I or Tpye II is a matter of lexicon. Only the lexicon gives us the information.[16]

Now, let us make one more assumption about the stresshood of words as in (37).

(37) Every word occupying a compound-final position is assigned *compound stresshood* in the lexicon.

The value of the compound stresshood is binary, i.e., [±stress]. In other words, every final compound-forming element has to choose one of the values, which is independent of the stresshood of the word itself. This assumption will be supported by all the examples discussed here. In (20a, b, c), (23), (27), (32), (33), and (36), every final compound-forming element is given [+stress] as its value. Therefore, all these words are subjected to stress rules in (3)-(5). In (21), (26), and (38), on the other hand, with final compound-forming elements being given [−stress], stress rules are not applicable, yielding stressless compound words. Namely, the compound

stresshood of the last element determines the surface stress pattern in compound formation, regardless of the stresshood of the last element itself.

(38) a. teeka-hyoo (<teeka+hyoo) 'price list'
zikoku-hyoo (<zi'koku+hyoo) 'timetable'
enpitu-ga (<enpitu+ga) 'pencil sketch'
syuukyoo-ga (<syu'ukyoo+ga) 'religious painting'
b. syooboo-gumi (<syooboo+kumi') 'fire fighting team'
aka-gumi (<a'ka+kumi') 'red team'
gakusee-ka (<gakusee+ka') 'student affairs section'
zinzi-ka (<zi'nzi+ka') 'personnel section'

2.2. Conpound Adjectives and Verbs

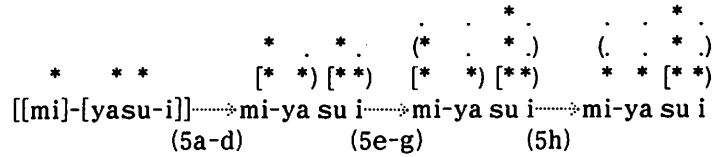
Let us turn to *non*-nominal cases of compound words. Listed in (39a) are Type I compound adjectives; while (39b) are Type II ones.[17]

(39) a. [[mi]-[yasu'-i]] 'easy to see'
[[ne]-[gurusi'-i]] 'so hot and humid that one cannot sleep well'
[[kusa]-[buka'-i]] 'overgrown with grass'
b. [[usu]-[gura-i]] 'poorly lighted'
[[asa]-[guro-i]] 'dark-skinned'
[[ao]]-[ziro-i]] 'pale'

The following is the derivation for the compound adjective [[*mi*]-[*yasu'*

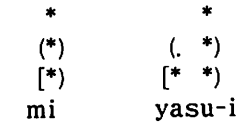
-i]] in (39a).

(40)



The first element *mi* and second element *yasu-i* in (40) have the following stress in isolation, respectively. (See the discussion in section 1.2.1. and 1.2.2.)

(41)



When they are combined to form a compound, the previously assigned stresses are wiped out on account of cyclic application of the stress rules. Then, since the last element *yasu-i* of the compound belongs to unaccented Type I,[18] and chooses [+stress] as a value of the compound stresshood, the stress rules (5) apply to yield the correct stress pattern as in (40).[19]

In the case of the compound adjective [[*usu*]-[*gura-i*]] in (39b), on the other hand, no stress is assigned to the first element *usu* and last element *gura-i* because they both lexically belong to Type II. Moreover, when they are combined to form a compound, no stress is assigned to it because the last element *gura-i* chooses [−stress], which blocks the application

of the stress rules, as a value of the compound stresshood.

Compound verbs are treated in the same fashion as adjectives; words in (42a) are unaccented Type I and those in (42b)[20] are Type II.

(42) a. hare-aga'ru 'swell up'
iki-zuma'ru 'feel suffocated'
ti-mayo'o 'be out of one's mind'

b. hare-agaru 'clear up'
de-naosu 'come again'
huri-dasu 'begin to rain'

In this section, we have seen that compound words are dealt with in the same fashion as single words. Compound words are divided into the two major types: Type I and Type II. The words in Type I in (20) have surface stress; while those in Type II in (21) have no surface stress. The words in Type I are further divided into two groups: one is underlyingly unaccented as in (20a), the other is underlyingly accented as in (20b). The stress rules (5) apply to those in (20), but not to those in (21).

(To be continued)

Notes

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written in the spring of 1989.

1. We assume that in this language an abstract *stress* is assigned to the mora immediately followed by a sharp fall of tone pattern from high pitch to low between moras. However, the stress of Tokyo Japanese is not phonetically realized as such in the sense of the term employed to describe the stress-accent in stress languages.

2. Roughly speaking, high tone is associated with a stressed mora followed by zero or more low-toned moras, with a leftward high tone spreading and an initial lowering in the case of stressed words; whereas high tone is associated with the last mora in the case of non-stressed words, with the initial high tone being lowered for each case. The tone assignment and stress erasure mechanisms will not be discussed in this paper. For a detailed discussion about them, see Tenny (1986), Haraguchi (1988).

3. McCawley (1968: 134) also calls attention to the fact that, in the case of foreign loans, stress falls on "the third-from-last mora." Moreover, Kurata (1986) argues for the antepenultimate accent (=stress, in our view) pattern in compound nouns.

4. The term *surface* implies the last derivation on the stress plane. The distinction between "surface-stressed" and "non-surface-stressed" is in accord with one between what is called "accented" and "unaccented" employed by Poser (1984), Pierrehumbert and Beckman (1988), and Haraguchi (1988), and others. We will use the terms "accented" and "unccented" differently from them in this paper; namely, they mean "underlyingly accented" and "underlyingly unaccented," respectively, which are consistent with the treatment in Halle and Vergnaud (1987b).

5. The diacritic (') indicates that the immidiately preceding mora has a surface stress assigned by some stress rules or lexically.

6. McCawley (1968), Kurata (1986), Higurashi (1984), etc.

7. See Haraguchi (1988: 14) and Tsujimura (1989). For a detailed discussion about mora, see section 3.2.

8. This rule partly follows Haraguchi (1988: 24). Note that this rule is not applicable

to the monomoraic word and the underlyingly accented mora.

9. Strictly speaking, the last element itself ⟨*ri*⟩ enclosed by angle brackets in the word *midori* in (6) is not a mora but segments. For the ease of exposition, in this paper, however, we will indicate an extrametrical mora by enclosing the segment(s) by angle brackets.

10. Despite the fact that the tone pattern of the word such as *atama'* (L-H-H) in isolation in (1b) happens to be identical to that of the word such as *sakura* (L-H-H) in isolation in (2) and (9), we differentiate between them, because they show the differential tonal patterns when they are followed by such a clitic as nominative case marker *-ga*: *atama'-ga* (L-H-H-L) vs. *sakura-ga* (L-H-H-H).

11. There are some exceptional words such as *siba'raku, oso'raku, ka'nari,* and *ka'nete* where stress is placed on the antepenultimate mora. We could assume that these words are underlyingly accented on the antepenultimate mora. For the word *ga'tagata*, we might be able to assume that this word results from the reduplication of the string *ga'ta* after the stress assignment, and the last stress is wiped out by some later rule. However, we leave these points open for further research. The words such as *ti'kaku, ha'yaku* and *ta'kaku* are treated in section 4.

12. Cf. McCawley (1968: 156).

13. If this analysis of the compound nouns in Tokyo Japanese is correct, Stress Erasure Convention suggested in Halle and Vergnaud (1987b: 83) has to be partly revised, for stress erasure is found in compound words in this language.

14. As pointed out by W. Lawrence (personal communication), the compound *zyookikika'nsya* would be parsed into [[[zyooki] [kikan]] [sya]] . In which case as well, stress is correctly placed on the penultimate mora by the stress rules (3)-(5) if we assume the compounds in Tokyo Japanese are cyclic.

15. The first element *ka'hee* of the compound *kahee-ka'ti* is not underlyingly-accented but stress-predictable in isolation; in fact, stress is properly assigned to its antepenultimate mora by stress rules. On the other hand, we assume that stress is underlyingly assigned to the second element *ka'ti* in isolation, because the word

ka'ti retains stress on the first mora when it is used to form the compound without regard to the now-assumed cyclicity of Japanese compounds: *kisyoo-ka'ti* (<*kisyoo* 'rare') 'scarcity value', *kookan-ka'ti* (<*kookan* 'exchange') 'exchange value', *kokusai -ka'ti* (<*kokusai* 'international') 'international value', *bunka-ka'ti* (<*bu'nka* 'culture') 'cultural value', *yozyoo-ka'ti* (<*yozyoo* 'surplus') 'surplus value', *riyoo-ka'ti* (<*riyoo* 'use') 'utility value'.

16. We assume that all the words in Type II are assigned the feature [−stress] in the lexicon; while those in Type I [+stress]. Which type is the basic pattern in Tokyo Japanese is open to question.

17. Examples here are taken from Akinaga (1985).

18. As we have seen in section 1.0, the term "unaccented" does not mean "non-stressed," but "underlyingly-unaccented," indicating that stress has *not* been underlying assigned in the lexicon. This point will be discussed in section 4.

19. Rule (3) is not applicable here because the internal structure of the word *mi-yasu-i* is not [[[mi]-[yasu]]-i] but [[mi]-[yasu-i]].

20. According to Akinaga (1985), there is a tendency in the younger generation that words as shown in (39b) and (42b) are pronounced with stress on the stress plane as well; that is, they are considered to be Type I words such as those in (39a) and (42a). As a result, stress patterns are *usu-gura'i* 'poorly lighted,' *asa-guro'i* 'dark -skinned,' and *ao-ziro'i* 'pale' in the case of the examples in (39b), and *hare-aga' ru* 'clear up', *de-nao'su* 'come again,' and *huri-da'su* 'begin to rain' in the case of (42b).

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