

# Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

Hideki Zamma

*Kobe City University of Foreign Studies*

## Abstract

The goal of this paper is threefold: (1) to show the various behavior of particular suffixes with regard to stress/accent assignment in English and Japanese; (2) to argue that such variety has not been adequately accounted for in the current major OT approaches; and (3) to suggest an alternative approach which properly allows for such abundance among suffixes.

While the difference in neutrality to phonological phenomena has usually been analyzed in terms of classhood, in OT it is usually reduced to different rankings of Faithfulness constraints relativized for the class. In the course of discussion, however, it becomes evident that the current OT approach is problematic, especially in capturing variety much more than simple dichotomy. An alternative approach, which can adequately accommodate this variety, should necessarily be explored.

## 1. Introduction

It is widely known that English suffixes should be divided into two “classes” according to whether or not they are stress-neutral. Classhood has been captured in the literature in various theoretical ways: e.g., by means of boundary symbols (cf. Chomsky and Halle (1968)), hierarchical strata (cf. Kiparsky (1982)), and multiple correspondence (cf. Benua (1998)). The suffixes in (1) are examples of typical English suffixes, taken from SPE and various studies.

- (1) a. Class 1 Suffixes:  
-ity, -ion, -(i)an, -al, -ous, -ant/-ent, -ory, -ary, -ic, -id, -ive, -oid, -ate
- b. Class 2 suffixes:  
-like, -able, -hood, -ness, -ly, -wise, -ing, -ed, etc.

A closer investigation, however, reveals much more than a simple dichotomy: varieties exist among suffixes belonging to the same “class.” This paper thus aims to show various behaviors of particular suffixes with regard to stress/accent assignment in English and Japanese.

As it happens, the different behavior of suffixes has been tacitly assumed in previous studies. For example, properties must be individually specified as to

whether or not a suffix undergoes syllable extrametricality (e.g. *-al* vs. *-ic*) or strong/weak retraction (e.g. *-ate* vs. *-ite*). Such lexical specifications are inevitable in any theory of stress assignment, since distribution itself is theory-neutral, and cannot be fully-captured in analyses involving simple dichotomies. In addition, several “Class 1” suffixes show an idiosyncratic behavior which is not observed in other suffixes.

The data in this paper may not be descriptively new, most of the facts having been studied in the literature. They are, however, seldom formally discussed in the context of classhood, and thus worth receiving theoretical consideration as I put forth here.

## 2. English Suffixes and Stress Assignment

### 2.1. Extrametricality

Since Hayes (1982), it is widely assumed in metrical theory that the final syllable of English words tends to be extrametrical, as summarized in (2).

- (2) a. Rhyme → [+ ex] / \_\_\_ ]<sub>N</sub>  
 b. [X]<sub>Suffix</sub> → [+ ex] / \_\_\_ ]<sub>Adj</sub>  
 c. [+cons] → [+ ex] / \_\_\_ ]<sub>word</sub>

(cf. Hayes (1982), Halle & Vergnaud (1987))

As formalized in (2a) and (2b), the final syllable of nouns and derived adjectives should be extrametrical, which is true as exemplified in (3). Words in (3a) are suffixed nouns, and those in (3b) suffixed adjectives.

- (3) a. pub(líci)<ty>    com(múni)<on>    A(méri)<can>  
 b. (nátu)<ral>    (húmo)<rous>    (dómi)<nant>    (áddi)<tive>

Since trochaic feet are constructed from right to left in English, the primary stress falls on the antepenultimate syllable. Note that the penultimate syllable is light in the words in (3) and thus should be the dependent of a foot. Suffixed verbs are considered in the next section, because they do not undergo extrametricality by definition (note that suffix extrametricality is possible in nouns (2a) and adjectives (2b)).

There are, however, several suffixes which do not conform to the prediction.

## Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

- (4) exceptions to extrametricality:
- a. -ic: alco(hóli)<c> a(tómi)<c> ti(táni)<c> sym(phóni)<c>
  - b. -id: pel(lúci)<d> in(trépi)<d> in(sípi)<d>

Adjective-forming suffixes *-ic*, *-id* do not undergo suffix extrametricality (2b), although they do undergo consonant extrametricality (2c), which vacuously applies to normal nouns and adjectives as well. Hence, words with these suffixes have primary stress on the penultimate syllable.

How should these suffixes be treated? They might be just 'exceptions,' but to treat them formally, we would have to make use of some mechanism such as diacritic marking or postulate 'classes.' In any case, we have to recognize two distinct groupings, one for suffixes which undergo extrametricality, and the other for those which do not -- whatever the nature of grouping may be.

### 2.2. Stress Retraction

In English, the rightmost stress usually becomes primary, as we saw in (3) and (4). When it is on the final syllable, however, the primary stress is 'retracted' leftward, as exemplified in (5).

- (5) oríginate, syllábify, álkanòid, mágnétique, sécrètàry, inhíbitorý

This happens particularly when the final syllable contains a long vowel or a diphthong, which do not undergo extrametricality in Halle and Vergnaud's theory.<sup>1</sup>

The words in (6), however, are exceptions to Stress Retraction, in that they have primary stress on the final syllable.

- (6) 'exceptions' to Stress Retraction
- a. Jàpanése, Chínése, Càntonése, Viètonamése, Pòrtuguése, jòurnalése
  - b. ènginéer, vòluntéer, pionéer, mòuntainéer, àuctionéer, pùppetéer
  - c. àrabésque, Ròmanésque, picàrésque, picturésque, gròtésque
  - d. sùffragétte, nòvelétte, kitchenétte, màrionétte, màisonétte, cigàrétte

As in the case of the non-extrametrical suffixes seen in the previous section, the suffixes in (6) must also be specified in some way or another to be immune from Stress Retraction. That is, they somehow constitute a group, or a 'class,'

which does not undergo the procedure.

Moreover, there is a distinction among the words which undergo Stress Retraction; that is, some undergo Strong Retraction, while others undergo Weak Retraction. In words which undergo Strong Retraction, stress occur exactly two syllables away from the suffix. That is, the weight of the intervening syllable is irrelevant. (7a) contains words which have a light syllable before the suffix *-ate*, while (7b) contains words in which the preceding syllable is heavy. In either case, primary stress is two syllables away from the suffix. The words in (8) are further examples which have a heavy penultimate syllable.

- (7) a. certíficàte, comunicàte, invéstigàte, manipulàte, assássinàte  
 b. désignàte, ìllustràte, démonstràte, cónfiscàte, législàte, cóntemplàte  
 (8) sàtisfÿ, récognize, ánecdòte, ásymptòte, Afghánistàn, Pákistàn

On the other hand, in words which undergo Weak Retraction, stress occurs one or two syllables away from the suffix, depending on the weight of the preceding syllable of the suffix. That is, if the preceding syllable of the suffix is heavy, as in (9b) and (10b), primary stress is retracted onto that syllable. If it is not, as in (9a) and (10a), primary stress is retracted two syllables away from the suffix.<sup>2</sup>

- (9) a. álkanòid, hóminòid, pyrámidòid, crýstallòid, tentáculòid, sólenòid  
 b. ellípsòid, mollúscòid, cylíndròid, salamándròid, aráchnòid  
 (10) a. mágnétite, dýnamite, sécretàry, inhíbitòry, admónitòry  
 b. stalágmite, gelígnite, eleméntàry, perfúntòry, reféctòry

These data suggest that each suffix must somehow be specified as to which retraction the word undergoes.

In sum, each suffix must be specified as to whether it is subject to retraction or not, and in case it does, which retraction it undergoes. Again, this may lead to the recognition of three distinct 'classes.'

### 2.3. Variety

In addition to the major distinctions discussed above, several suffixes show idiosyncratic behavior which is not observed in other suffixes. Let us take *-ize* and *-ant/-ent* as examples.

## Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

### 2.3.1. *-ize*

Primary stress falls on the same syllable as the base when *-ize* is attached. Observe the words in (11). These words show that *-ize* has the properties of a Class 2 suffix (i.e. stress-neutrality).

- (11) artificial/artificialize, provincial/provincialize, individual/individualize, american/américanize, cosmopolitan/cosmopolitanize

Segmentally, however, this suffix shows Class 1 behavior: it undergoes Spirantization, as shown in (12).

- (12) Catholic/catholicize, politic/politicize, fanatic/fanaticicize

Such an inconsistency cannot be observed among other suffixes. Again, this idiosyncratic behavior should somehow be treated formally.

### 2.3.2. *-ent/-ant*

Another example of idiosyncratic behavior comes from *-ant/-ent* suffixation (*-ant* and *-ent* are allomorphs). From the data in (13a) and (13b), the adjective-forming suffix is predicted to be ordinary, in that primary stress falls on the antepenultimate if the penult is light (13a) or on the penult if it is heavy (13b).

- (13) a. vígil/vígilant, différ/different, cómbat/cómbatant, suffice/sufficient  
b. ascénd/ascéndant, succúmb/succúmbent, accórd/accórdant  
c. coincide/coíncident, recúse/récusant, confide/cónfident

Problems arise when we are confronted with the data in (13c), however. Although the penultimate syllable is underlyingly heavy, the primary stress does not fall on that syllable, but on the antepenultimate one (as a result, the penultimate vowel shortens). Other suffixes do not show such behavior (e.g. *suicídal*), which suggests that this is peculiar to *-ant/-ent*.

## 2.4. Summary

In sum, five classes of suffixes can be recognized in English stress assignment. First, the well-established Classes 1 and 2 are necessary to make a distinction of stress-neutrality. Among Class 1 suffixes, there is a distinction of whether the suffix 'regularly' undergoes extrametricality or not. 'Regular' in this



## **Suffixes** and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

the latter maintain the accent of the base. The words in (15) and (16) are examples of accented suffixes. Note that the derived words always have the accent on the preceding mora of the suffix, irrespective of the accentedness of the base word: the words in (15a) and (16a) have accented bases, while those in (15b) and (16b) have unaccented bases. Note also that the accent is placed on different mora from the base in (15a) and (16a).

(15) -shi 'city'

- a. Ko'obe/Koobe'-shi, Kyo'oto/Kyooto'-shi, Na'goya/Nagoya'shi
- b. Gifu/Gifu'-shi, Oosaka/Oosaka'-shi, Hiroshima/Hiroshima'-shi

(16) -ke 'family'

- a. Koi'zumi/ Koizumi'-ke, O'buchi/Obuchi'-ke, Ta'bata/Tabata'-ke
- b. Mori/Mori'-ke, Tanaka/Tanaka'-ke, Hashimoto/Hashimoto'-ke

In the words in (17) and (18), on the other hand, this is not the case. Accent appears in the words in the a-group -- where the base has an accent -- on the same mora as the base. Recall that in (15) and (16) the place of the accent is on a different mora from the base. In words whose bases are accentless -- as in (17b) and (18b) -- accent does not appear, contrary to (15b) and (16b).

(17) -san '(honorific)'

- a. Koi'zumi/ Koi'zumi-san, O'buchi/O'buchi-san, Ta'bata/Ta'bata-san
- b. Mori/Mori-san, Tanaka/Tanaka-san, Hashimoto/Hashimoto-san

(18) -suru '(verb-forming)'

- |    |           |                |                |                      |
|----|-----------|----------------|----------------|----------------------|
| a. | ku'roo    | 'suffering'    | ku'roo-suru    | 'suffer'             |
|    | he'nka    | 'change(n)'    | he'nka-suru    | 'change(v)'          |
|    | do'kidoki | '(mimetic)'    | do'kidoki-suru | 'beat fast'          |
| b. | dokuritsu | 'independence' | dokuritsu-suru | 'become independent' |
|    | hirune    | 'nap'          | hirune-suru    | 'take a nap'         |
|    | renraku   | 'contact'      | renraku-suru   | 'make contact'       |

The difference between (15) and (16), on the one hand, and (17) and (18), on the other, should be attributed to a property of the suffix; otherwise, there is no way to know whether a word is accented or not. The suffixes in (15) and (16) are accented, and thus accent appears on a particular mora. The suffixes in (17) and (18), on the other hand, are unaccented -- that is, they do not have their own accent. Thus, only the accent of the base appears on a particular mora, if there is one.

This is clearly a case of lexical specification for each suffix. That is, each suffix must be specified as to whether it is accented or not in the first place.

### 3.2. Dominant vs. Recessive

As we saw in the previous section, the suffixes in (15) and (16) always put the accent on a particular mora, sometimes different from the base. Accent of this type is thus called *dominant*, in the sense that all the requirements of the suffix are always respected (cf. Poser (1984)). The honorific suffix *-shi*, however, shows a different behavior from these. Derived words are always accented, but the placement is not consistent.

(19) *-shi* '(honorific (formal))'

- a. Koi'zumi/Koi'zumi-shi, O'buchi/O'buchi-shi, Ta'bata/Ta'bata-shi
- b. Mori/Mori'-shi, Tanaka/Tanaka'-shi, Hashimoto/Hashimoto'-shi

In the words in (19a), the accent appears on the same mora as the base. In those in (19b), on the other hand, accent appears on the immediately preceding mora of the suffix. The difference between (19a) and (19b) is that the latter contains unaccented words as the base.

In other words, the suffix puts the accent on the preceding mora only when the base is accentless. Otherwise, the accent on the base is preserved. Accent of this type is called *recessive*. Each accented suffix must thus be specified as to whether it is dominant or recessive.

### 3.3. Accenting vs. Deaccenting

The suffixes in (15) and (16) are dominant, and thus consistently place the accent on a particular mora. There is, however, another type of consistent accentuation. Observe the following:

(20) *-shiki* 'style'

- a. Koi'zumi/Koizumi-shiki, O'buchi/Obuchi-shiki, Ta'bata/Tabata-shiki
- b. Mori/Mori-shiki, Tanaka/Tanaka-shiki, Hashimoto/Hashimoto-shiki

(21) *-iro* 'color'

- |    |            |               |           |
|----|------------|---------------|-----------|
| a. | ore'nji    | orenji-iro    | 'orange'  |
|    | mura'saki  | murasaki-iro  | 'purple'  |
|    | emera'rudo | emerarudo-iro | 'emerald' |

## Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

b.	nezumi	'mouse'	nezumi-iro	'gray'
	kusa	'grass'	kusa-iro	'green'
	zooge	'ivory'	zooge-iro	'ivory'

These words are always accentless irrespective of whether the base has an accent. In other words, the accent of the base is always deleted when the suffixes are attached. Suffixes of this type are called deaccenting.

Again, there is no way to know whether a suffix is deaccenting or not. Thus, each dominant suffix must be specified as to whether it is deaccenting or accenting.

### 3.4. Two-mora Deaccenting

Among the dominant accenting suffixes, there is a further distinction. Take *-shi* 'part of speech' as an example. This suffix usually puts the accent on the preceding mora, as shown in (22b).<sup>3</sup> When the length of the base is short, however, the word tends to be accentless, as can be seen in (22a).

#### (22) *-shi* 'part of speech'

a.	jo-shi	'particle'	mee-shi	'noun'
	doo-shi	'verb'	fuku-shi	'adverb'
	suu-shi	'numeral'	kan-shi	'article'
b.	zenchi'-shi	'preposition'	keeyo'o-shi	'adjective'
	renta'i-shi	'attributive'	setsuzo'ku-shi	'conjunction'
	kakobu'n-shi	'past participle'	jodo'o-shi	'auxiliary'

This deaccenting seems to happen when the base consists of two morae or less -- a phenomenon referred to here as two-mora deaccenting. Another example comes from *-bin* 'bottle.'

#### (23) *-bin* 'bottle'

a.	ka-bin	'vase'	do-bin	'earthenware'
	shi-bin	'chamber pot'	aki-bin	'empty bottle'
b.	biiru'-bin	'beer bottle'	kae'n-bin	'petrol bomb'
	issho'o-bin	'sake bottle'	garasu'-bin	'glass bottle'
	maho'o-bin	'thermos bottle'		

Nevertheless, the suffixes observed above do not show such behavior. A

word can be accented even when the base is short.

(24) -shi 'city'

Tsu'-shi, Gifu'-shi, Nago'-shi, Naha'-shi, Chiba'-shi, Uji'-shi

(25) -ke 'family'<sup>4</sup>

Ri'-ke, Go'-ke, Wada'-ke, Doi'-ke, Miki'-ke, Uno'-ke

Clearly this means that each accented suffix must be individually specified as to whether it undergoes a deaccenting rule or not. It is a purely lexical property and cannot be predicted from any possible source.

### 3.5. Variety

As in English, some suffixes show an idiosyncratic behavior which others do not show. We will take *-jin* 'person' and *-ji* 'temple' as examples.

#### 3.5.1. *-jin* 'person'

As McCawley (1968) points out, the accent is placed on the suffix itself only when the base is accented on the final syllable. Thus, the words in (26a) have a final accent, while in (26b) usual pre-accentuation takes place. Even an accentless base (e.g. *Amerika*) and a heavy-final base (e.g. *Iran*) show the general pattern, as the base does not have the accent on the final syllable.

(26) a.	Niho'n	'Japan'	Nihon-ji'n	'Japanese'
	Choose'n	'Korea'	Choosen-ji'n	'Korean'
	Taiwa'n	'Taiwan'	Taiwan-ji'n	'Taiwanese'
b.	Amerika	'America'	Amerika'-jin	'American'
	Do'itsu	'Germany'	Doitsu'-jin	'German'
	I'ran	'Iran'	Ira'n-jin	'Iranian'

Again, it is necessary to formally treat this suffix differently from others.

#### 3.5.2. *-ji* 'temple'

Accentuation of the suffix *-ji* 'temple' is also very unique. As Sato (1989) points out, it exhibits three patterns according to the length of the base. First, when the base consists of four morae and the initial syllable is heavy, as in (27a), the initial syllable has the accent. Second, when the base consists of more than four morae, the pre-suffixal syllable is accented (see (27b)). Otherwise -- that is, either when the word consists of less than four morae or when the word

## Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

consists of four morae with an initial light syllable -- the word becomes accentless, as in (27c).

- (27) a. 4 morae with the form  $\sigma_{\mu\mu\mu\mu}$ : initial accent  
 Ki'nkaku-ji, Ho'oryuu-ji, To'odai-ji, Da'itoku-ji, Chu'uson-ji  
 b. more than 5 morae: accent on the preceding syllable  
 Tooshooda'i-ji, Shitenno'o-ji, Rokuharamitsu'-ji, Kongoobu'-ji  
 c. otherwise (i.e., either less than 4 morae or 4 morae but not the form  $\sigma_{\mu\mu\mu\mu}$ ): accentless  
 Too-ji, Yakushi-ji, Gioo-ji, Ninna-ji, Daigo-ji, Kokubun-ji

Again, this is only observed in words with this suffix, a fact which must formally be accounted for.

### 3.6. Summary

As in the case of English, Japanese also has various distinctions among suffixes in accentuation. Suffixes can either be accented or unaccented; accented suffixes can either be dominant or recessive; dominant suffixes can either be accenting or deaccenting; and accenting suffixes can either be sensitive or non-sensitive to two-mora deaccenting. Aside from the more idiosyncratic variations seen in Section 3.5, five classes can be recognized in Japanese.

- (28) { unaccented ... a  
 { recessive ... b  
 { accented { deaccenting ... c  
 { dominant { 2-mora deaccenting ... d  
 { accenting {  
 { non-deaccenting ... e

There might be more distinctions as yet undiscovered. If there are, it is highly likely that more 'classes' should be established in Japanese accentuation.

## 4. The Multiplying Analysis in OT and Its Problems

In order to accommodate 'classhood,' two approaches have been proposed in Optimality Theory; namely, the reranking approach and the multiplying approach. The former assumes that constraint ranking can be different among groups that show different behavior (29a). The latter, on the other hand, as-

sumes that constraint ranking is consistent, but that a constraint can be ranked in different positions by relativizing it to the grouping (29b).

- (29) a. Reranking approach: Class A:  $X \gg Y$  Class B:  $Y \gg X$   
 b. Multiplying approach:  $X_A \gg Y \gg X_B$

A recent trend in Optimality Theory seems to be that the multiplying approach is preferred to the reranking approach, as it is believed that the grammar of a given language should consist of a single constraint ranking. In this next section, I will try to give an analysis which can be understood in both approaches, by presenting distinct tableaux for different groupings and at the same time putting an index on a relevant constraint. In the following section it will become evident that the reranking approach is appropriate for explaining the lexical variations we are considering. Note that the main goal of this paper is to show this, but not to make a minute formulation of constraints. I will thus omit everything irrelevant to the main goal from the discussion.

#### 4.1. English

We will first consider the well-known stress-neutrality case, the discussion of which served as the basis of classhood. The following constraints are necessary in the first place.

- (30) a. **Faith-OO**: Preserve the stress of the base.  
 b. **Troch**: Construct trochaic feet (i.e. (LL), (HL) or (H)).  
 c. **Align-R**: Primary stress is right-aligned.

Constraint (30b) can be decomposed into several others, but the formulation above suffices for our purpose.<sup>5</sup> Let us assume that the constraint in (30a) is indexed and they are ranked as in (31).

- (31) neutral/non-neutral  
**Faith-OO<sub>a</sub>** » **Troch** » **Align-R** » **Faith-OO**

Because 'class 2' words preserve the stress of the base, one of the multiplied constraints is ranked higher. (The index is employed in accordance with the labeling in (14); e.g. subscript 'a' is for a Class 2 suffix.) This kind of analysis is given in many studies, so I will skip the details.

Next, consider the extrametricality case. In (32) I simply set a simplified

**Suffixes** and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

constraint which stands for extrametricality, and set the ranking in (33).<sup>6</sup>

(32) **Extrametricality (EM)**: The final syllable is extrametrical (cf. (2)).

(33) extrametrical/non-extrametrical

**EM<sub>c, d, e</sub> Troch** » **Align-R** » **EM<sub>b</sub>**

(34) a.

nature + -al	<b>EM<sub>c, d, e</sub></b>	<b>Troch</b>	<b>Align-R</b>
na(túra)l	*!		*
☞ (nátu)ral			**
(natú)ral		*!	*
na(tú)ral		*!	*

b.

atom + -ic	<b>Troch</b>	<b>Align-R</b>	<b>EM<sub>b</sub></b>
☞ a(tómi)c		*	*
(áto)mic		**!	
(ató)mic	*!	*	
a(tó)mic	*!	*	

For words which undergo extrametricality (i.e. those indexed as c, d, or e), the **Extrametricality** constraint is ranked higher -- whereas it is lower in the hierarchy for words which do not undergo it (i.e. those indexed as b). As in the case of stress-neutrality, a constraint responsible to a phonological phenomenon is ranked in different positions in the hierarchy. (Note that I omit irrelevant constraints from the tableaux.)

Third, let us consider sensitivity and insensitivity to Stress Retraction. Stress Retraction is regarded as occurring due to the **Nonfinality** constraint (35). In English, if this constraint is ranked higher than **Align-R**, primary stress is avoided on the final heavy syllable and is placed on the second nearest stressed syllable instead (37a). If the ranking is reversed, a final-stress is produced (37b).

(35) **Nonfinality**: Primary stress does not fall on the final syllable.

(36) retraction-sensitive/insensitive

**Nonfinality<sub>d, e</sub>** » **Align-R** » **Nonfinality<sub>c</sub>**

(37) a.

design + -ate	NonFin <sub>d,e</sub>	Align-R
(dèsig)(ná)te	*!	
☞ (désig)(nà)te		***

b.

Japan + -ese	Align-R	NonFin <sub>c</sub>
☞ (Jàpa)(né)se		*
(Jápa)(nè)se	*! **	

Finally, suffixes which undergo Stress Retraction can be divided into two groups, according to whether they are subject to strong or weak retraction. This distinction arises depending on the sensitivity to the constraint **\*Clash** (38):

(38) **\*Clash**: Stress should not be on adjacent syllables.

If these constraints are ranked with respect to **Troch** as in (39), the distinction can be predicted as in the tableaux in (40):

(39) strong/weak retraction

**\*Clash<sub>d</sub>** » **Troch** » **\*Clash<sub>e</sub>**

(40) a.

design + -ate	*Clash <sub>d</sub>	NonFin <sub>d,e</sub>	Troch	Align-R
(dèsig)(ná)te		*!		
de(síg)(nà)te	*!			
☞ (désig)(nà)te			*(LH)	***

b.

ellips- + -oid	NonFin <sub>d,e</sub>	Troch	*Clash <sub>e</sub>	Align-R
(èllip)(sói)de	*!			
☞ el(líp)(sòi)d			*	**
(éllip)(sòi)d		*!(LH)		***

In a ranking where **\*Clash** predominates **Troch**, avoiding a stress clash is more optimal than constructing an illegal trochaic foot. Words with this ranking therefore put primary stress exactly two syllables away from the suffix. If the relevant constraints are in the reverse order, on the other hand, constructing a legal trochaic foot is more important than avoiding a stress clash: hence, when

## Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

the preceding syllable of the suffix is heavy, that syllable is stressed.

### 4.2. Japanese

Varieties among Japanese suffixes can also be analyzed in a similar fashion. For the accentedness of a word, however, we need recourse to such diacritic marking as <+A> in (41a), as it is an absolute lexical property of a word as to whether it is accented or not and there is no way to predict it. Thus, for the distinction accented/unaccented, I assume that each suffix is specified or not with a diacritic marking, as in (41).

- (41) accented/unaccented  
a. accented: <+A>  
b. unaccented:  $\emptyset$

-*ke* is marked as <+A>, while -*san* is unmarked. Observe the cases in (42) where these are attached to accented and unaccented bases.

- (42) a. Obuchi<+A> +      -ke<+A> →      Obuchi'-ke<+A>  
b. Mori            +      -ke<+A> →      Mori'-ke<+A>  
c. Obuchi<+A> +      -san      →      O'buchi-san<+A>  
d. Mori            +      -san      →      Mori-san

When there is more than one marking, the outermost marking is respected. Thus in (42a) and (42b), the accentedness of -*ke* determines word accentuation even when the base does not have its own accent, as in (42b). When the suffix does not have an accentedness diacritic, on the other hand, that of the base determines the accentedness of the word. In (42d), none of the morphemes are specified with <+A>, and thus the whole word is accentless, while the base of (42c) is accented and thus its accent emerges.

Next, consider the distinction between dominant and recessive suffixes. Most dominant suffixes place accent on the preceding syllable, so I temporarily posit the constraint in (43b), which may be replaced by a more general constraint(s).<sup>7</sup> Its ranking with respect to **Max-OO** determines the dominance or recessiveness of the accentuation of the suffix: when **Preaccent (PA)** is ranked higher, the accentuation of the suffix becomes dominant, as shown in (45b).

- (43) a. **Max-OO**: Preserve the accent on the base.  
 b. **Preaccent**: Accent falls on the preceding syllable of the suffix.

(44) dominant/recessive

**Max-OO<sub>b</sub>** » **Preaccent** » **Max-OO<sub>c,d,e</sub>**

(45) a.

O'buchi + -shi	<b>Max-OO<sub>b</sub></b>	<b>PA</b>
Obuchi'-shi	*!	
☞ O'buchi-shi		*

b.

Mori + -shi	<b>Max-OO<sub>b</sub></b>	<b>PA</b>
☞ Mori'-shi		
Mori-shi		*!

c.

O'buchi + -ke	<b>PA</b>	<b>Max-OO<sub>c,d,e</sub></b>
☞ Obuchi'-ke		*
O'buchi-ke	*!	

(Both of the suffixes are accented and thus specified with <+A>, but I will omit the specification due to page restrictions.) In words with dominant suffixes, the accent of the base is not respected in the face of **PA** (45c), violating lower-ranked **Max-OO** -- even though the base has its own accent. In recessive suffixed-words, on the other hand, **Max-OO** is ranked higher and the accent of the base is respected (45a). When the base is accentless (45b), there is no correspondent accent of the derived word to be compared, and thus this constraint is irrelevant. As a result, the recessive accent appears on the pre-suffixal syllable due to **PA**.

Third, consider the distinction between accenting and deaccenting suffixes. Again, this is a matter of lexical marking. Deaccenting suffixes can be regarded as specified with <-A>, which obligatorily makes the word accentless.

(46) accenting/deaccenting

a. accenting: <+A>

b. deaccenting: <-A>

As in English and other languages, the outermost suffix becomes the head of the word, and its marking decides the accentedness of the whole as defined in (47). Thus, when the markings of the base and the suffix contradict each other,

## Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

that of the suffix is respected, as in (48b).

(47) The accentedness of the head-morpheme (i.e. the rightmost one) is respected.

(48) a. Koobe<sub><+A></sub> + -shi<sub><+A></sub> → Koobe'-shi<sub><+A></sub>  
 b. orenji<sub><+A></sub> + -iro<sub><-A></sub> → orenji-iro<sub><-A></sub>

Finally, consider the distinction as to whether or not the word undergoes two-mora deaccenting. Temporarily -- again -- I will posit the following descriptive constraint.<sup>8</sup>

(49) **\*Accent on 2 $\mu$ -base:** Accent does not fall on a base with two morae or less.

When this constraint is ranked higher than **PA**, which requires accent on derived words, the word becomes accentless if the base consists of two morae or less.

(50) sensitive/insensitive to 2-mora deaccenting

**\*Accent/2 $\mu$ -base<sub>d</sub>** » **Preaccent** » **\*Accent/2 $\mu$ -base<sub>e</sub>**

(51) a.

mee + -shi	<b>*A/2<math>\mu</math>B<sub>d</sub></b>	<b>PA</b>
me'e-shi	*!	
☞ mee-shi		*

b.

Tsu + -shi	<b>PA</b>	<b>*A/2<math>\mu</math>B<sub>e</sub></b>
☞ Tsu'-shi		*
Tsu-shi	*!	

The *-shi* in (51a) means 'part of speech,' whereas the one in (51b) means 'city.' Only the former is labeled as 'd' and sensitive to two-mora deaccenting, making the derived word accentless.

### 4.3. Problems

Although this is a rough sketch, the various behavior among suffixes in English and Japanese can be analyzed in either Optimality-theoretic approach; that is, by indexing the constraints or by reranking them. The multiplying approach,

however, raises several problems. I will discuss them in turn.

#### 4.3.1. Too many classes

Proceeding with the multiplying approach will lead to the recognition of too many 'classes' in a single language. As we saw, variation among morphemes lies beyond a simple dichotomy. At least five classes are necessary just for stress/accent assignment in English and Japanese. In order to treat idiosyncratic behavior as in Sections 2.3 and 3.5, more classes would have to be established. Moreover, if we consider phonological phenomena other than stress/accent assignment, there will be still more distinctions and idiosyncrasies among suffixes. In the long run, it is predicted that we would posit as many 'classes' as the number of root morphemes, which is enormous.

In addition, such multiplication will lead to massive explosion of constraints by indexing constraints in several ways. Moreover, the constraints which should be multiplied vary from one phenomenon to another (and are not restricted to Faithfulness constraints, as we will discuss in Section 4.3.3). Since 'classes' can also be large in number, this means that numerous constraints would be multiplied by numerous classes.

#### 4.3.2. Inconsistency

It is widely assumed that classhood is consistent among suffixes, not only in stress/accent assignment but also in segmental alternations. Some suffixes, however, may show inconsistency as to classhood.

Take Spirantization and Palatalization as examples. Class 1 suffixes *-ity*, *-ion*, *-(i)an*, *-(i)al*, *-(i)ous*, etc. undergo Spirantization and Palatalization, as well as stress shift. Class 2 suffixes *-like*, *-hood*, *-ness*, *-ly*, *-wise*, *-ing*, etc., on the other hand, never undergo any of the alternations. These suffixes thus conform to the assumption of the classhood consistency.

The suffix *-ize*, however, does not conform to this assumption. As we saw in Section 2.3.1, this suffix preserves the stress of the base, while it undergoes Spirantization. This means that *-ize* cannot be treated in a consistent way as to classhood, as other similar suffixes are. Prosodically, it is treated as a Class 2 suffix labeled 'a,' satisfying the higher-ranked **Faith-OO**. Segmentally, however, it cannot be treated as such because it violates **Faith-OO**.

## Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

- (52) a. prosodically: 'a'  
    **Faith-OO<sub>a</sub>** » **Troch** » **Align-R** » **Faith-OO**  
    b. segmentally: others  
    **Faith-OO<sub>a</sub>** » **Spirantization** » **Faith-OO**

In the multiplying approach it is therefore impossible to treat formally this kind of suffix, because it cannot belong to the same class at the same time. It may be that *-ize* constitutes a distinct class of its own, but in that case the problem of classhood explosion discussed above arises again.

### 4.3.3. Lack of theoretical motivation

The third problem with the multiplying approach is that it is sometimes necessary to multiply Markedness constraints according to the class. Multiplication of Markedness constraints, however, lacks theoretical motivation as discussed by Zamma (2001), and weakens the theory.

First, recall the definition of correspondence, to which multiplication is attributed.

- (53) Correspondence  
    Given two strings  $S_1$  and  $S_2$ , **correspondence** is a relation  $\mathcal{R}$  from the elements  $S_1$  to those of  $S_2$ . Elements  $\alpha \in S_1$  and  $\beta \in S_2$  are referred to as **correspondents** of one another when  $\alpha \mathcal{R} \beta$ .

In order to see if two strings in corresponding relation are faithful to each other, it is necessary to define what is compared to what. Thus many correspondence constraints define the correspondents in their formulation, such as I-O, B-R, B-T, etc.

Benua (1998) enlarged the notion of correspondence so that faithfulness could be evaluated between two distinct output forms. In this case, the index is employed to define the outputs being compared. Thus, O and  $O_1/O_2$  in **OO<sub>1/2</sub>-Faith** express  $S_1$  and  $S_2$  in (53).

It is important to note here that an 'index' does not refer to the constraint itself, but the type of output. This means that indexation or multiplication is theoretically motivated in evaluating correspondence, which is only possible in Faithfulness constraints. Therefore, multiplication of Markedness constraints

does not have any theoretical motivation, and weakens the reasoning for placing 'indexed' Markedness constraints in different positions in the constraint hierarchy.

## 5. An Alternative Approach

Observing the deficiencies of the multiplying approach, I now propose that the reranking approach is superior in accounting for lexical variety.

Unlike the multiplying approach, it is not strange to assume morpheme-specific rankings in the reranking approach. Orgun (1998) and Inkelas (1998) in particular argue that phonological function (i.e. constraint ranking in OT) is in a sense subcategorized for each morpheme, just as semantic and syntactic information (e.g. a given affix attaches to a given base, etc.). Phonological information should be specified for each morpheme anyway, whatever format it may be (e.g. constraint rankings, rules, or whatever). Note that it is necessary in any case to specify phonological content (i.e. sequence of segments) for each morpheme.

In Sign Based Morphology (cf. Orgun (1998), Inkelas (1998), etc.), a theory of reranking or *cophonology*, phonology in word formation is roughly expressed in the following schema:

$$(54) \text{ Sign Based Morphology} \\ f(A, B) = C$$

A word  $C$  is composed of a stem  $A$  and a suffix  $B$ , which may be modified by a phonological function  $f$ . The function  $f$  varies depending on suffix class or particular suffix, just as semantic and syntactic functions of word-formation do. In the cases we are considering, the difference among suffixes can thus be represented as follows:

$$(55) f_a(\text{Base, Class 2 suffixes}), f_b(\text{Base, non-extrametrical suffixes}) \\ \dots f_n(\text{Base, -ize})$$

Each function or cophonology has different content. If we employ OT architecture, those functions consist of different constraint rankings, which we observed in Section 4. In this approach, therefore, it is not strange for a distinct suffix to behave differently from other suffixes of, say, the same 'class.' Hence, the problem of inconsistency does not arise.

## **Suffixes and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy**

One may oppose this approach by asking: if every morpheme comes with its own constraint hierarchy, what is left of the grammar of the language as a whole? The answer is: this approach does not abandon the concept of "grammar of the language as a whole." There certainly are general properties of the language which differentiate it from other languages. From a broader view, there certainly is a ranking that identifies the language and is consistent among all the functions, but its effect is largely obscured because all the words in the language satisfy it in some way.

The alternative theory proposed here does not impose a strict single ranking on a language or a single class. Rather, it allows suffixes to be more sensitive to particular constraints. A common ranking within the language or a class can be inherited through morphological derivation. Note that Inkelas says:

"Assuming Optimality Theory ... what cophonologies with something in common would inherit would be a partial (or perhaps total) constraint ranking (Inkelas (1998:150))."

Still, clarification of the relation between 'partial' rankings and morpheme-specific constraints needs thorough investigation beyond the scope of this paper. We just wait future research to see how the issue is solved.

### **6. Concluding Remarks**

This paper has shown that there is a variety of behavior among those suffixes which show more than a simple dichotomy. Such different behavior of suffixes -- for example, whether or not they undergo syllable extrametricality or strong/weak retraction -- must be specified individually. In addition, several suffixes (e.g. English -ant/-ent and Japanese -jin 'person') show idiosyncratic behavior not observed in others. Moreover, if we consider phonological phenomena other than stress/accent assignment, there may be more distinctions and idiosyncracies among them.

To accommodate this abundance of properties, the predominating approach to classhood -- the multiplying approach -- was shown to have several problems. The reranking approach should be explored instead, allowing each morpheme to have its own distinct cophonology. Several issues remain in this approach, however, and we should wait for future studies to refine the theory and address broader issues.

## Notes

\* I am grateful to Ingo Plag for insightful comments and discussion at LP2002, as well as encouragement to my research. I also thank Mark Campana for suggesting stylistic improvements.

1. In Halle and Vergnaud's (1987) theory, extrametricality applies only to short vowels, hence the suffixes in (5) are 'regularly' immune from extrametricality and stressed. In Hayes's (1981) theory, on the other hand, retraction itself is regarded as a result of extrametricality. The suffixes in (5) have secondary stress, rather than primary, because extrametricality prohibits the suffix from having primary stress. In either theory, the suffixes in (5) are not regarded as exceptions to the generalization concerning extrametricality: their properties are correctly predicted.
2. The final *y* in *-ory* and *-ary* is considered to be a glide, as Liberman and Prince (1977) assume.
3. When the preceding mora is a part of a heavy syllable, the accent moves leftward by one mora, a general procedure in Japanese. In *setsuzo'ku-shi*, the pre-suffixal vowel is devoiced, and thus cannot retain the accent. In this case too, the accent moves leftward.
4. *Ri-ke* and *Go-ke* in these examples are not genuine Japanese names; they are Korean and Chinese, respectively. Note that *-ke* can be attached to any type of name, placing the accent on the preceding mora.
5. In fact, Pater (2001) posits **FootBinarity** and **Weight-to-Stress** to ensure that legal feet in English are (LL), (HL) and (H).
6. Although many studies reduce extrametricality to **Nonfinality** (cf. Pater (2001)), I will employ the constraint in (32) because it is necessary to recognize a distinct constraint to account for Stress Retraction phenomena.
7. Kubozono (1995a) posits the following constraint for compound accentuation, which is similar to the case at hand: **Align-CA**, which says "align the accent with the boundary between N1 and N2."
8. This constraint cannot be replaced by another well-motivated constraint in Japanese which prohibits accent on four-mora words with the final two light syllables (cf. Kubozono (1995b) and Zamma (2001)). Recall that even three-mora words are deaccented when the base consists of two morae; e.g. *mee-shi* 'noun.'

## Reference

Benua, Laura. 1998. Transderivational identity: Phonological relations between

**Suffixes** and Stress/Accent Assignment in English and Japanese: More Than a Simple Dichotomy

words. Doctoral dissertation, University of Massachusetts, Amherst.

Chomsky, Noam and Morris Halle. 1968. *Sound Pattern of English*. New York: Harper & Row.

Halle, Morris and Jean-Roger Vergnaud. 1987. *An Essay on Stress*. Cambridge, Mass.: MIT Press.

Hayes, Bruce. 1982. Extrametricality and English stress. *Linguistic Inquiry* 13:227-276.

Inkelas, Sharon. 1998 The theoretical status of morphologically conditioned phonology: a case study of dominance effects. In *Yearbook of morphology 1997*, ed. by Geert Booij and Jaap van Marle, 121-155. Dordrecht: Kluwer.

Itô, Junko and Armin Mester. 1995. The core-periphery structure of the lexicon and constraints on reranking. In *Papers in optimality theory*, ed. by Jill N. Beckman, Laura Walsh Dickey and Suzanne Urbanczyk, 181-209. UMass Occasional Papers 18. Amherst: University of Massachusetts, GLSA.

Itô, Junko and Armin Mester. 1999. The phonological lexicon, in *Handbook of Japanese linguistics*, ed. by Natsuko Tsuijijimura, 62-100. Cambridge, Mass.: Blackwell.

Kiparsky, Paul. 1982. Lexical phonology and morphology. In *Linguistics in the morning calm*, ed. by the Linguistic Society of Korea, 3-91. Seoul: Hanshin.

Kubozono, Haruo. 1995a. Constraint interaction in Japanese phonology: Evidence from compound accent. In *Phonology at Santa Cruz 4*, 21-38. Santa Cruz: University of California, Santa Cruz.

Kubozono, Haruo. 1995b. Syllable and accent in Japanese. *The Bulletin of the Phonetic Society of Japan* 211, 71-82.

Liberman, Mark and Alan Prince, 1977. On stress and linguistic rhythm. *Linguistic Inquiry* 8: 249-336.

- McCawley, James. 1968. The phonological component of a grammar of Japanese. the Hague: Mouton.
- Orgun, Cemil Orphan. 1998. Cyclic and noncyclic phonological effects in a declarative grammar. In *Yearbook of Morphology 1997*, ed. by Geert Booij and Jaap van Marle, 179-218. Dordrecht: Kluwer.
- Pater, Joe. 2000. Non-uniformity in English secondary stress: the role of ranked and lexically specific constraints, *Phonology* 17:2, 237-274.
- Poser, William. 1984. The phonetics and phonology of tone and intonation in Japanese. Doctoral dissertation, MIT, Cambridge, Mass.
- Prince, Alan and Paul Smolensky. 1993. Optimality theory: Constraints interaction in generative grammar. Ms., Rutgers University and University of Colorado.
- Sato, Hirokazu. 1989. Fukugoo-go ni-okeru akusento-kisoku-to rendaku-kisoku (Rules of accentuation and rendaku in compounds), in *Nihongo-no onsei, on'in* (Phonetics and phonology in Japanese) vol.1, ed. by Miyoko Sugito, 233-265. Tokyo: Meiji-Shoin.
- Zamma, Hideki. 2001. Accentuation of person names in Japanese and its theoretical implications. In *Tsukuba English Studies* 20, 1-18. Tsukuba: University of Tsukuba.