Japanese loanword accentuation: epenthesis and foot form interacting through edge-interior alignment[*]

Eric Rosen
University of British Columbia
errosen@interchange.ubc.ca

1. Default and exceptional loanword accent patterns

Japanese words are either *accented* (HL tonal melody: $\overset{\text{H}}{\text{a}}\,\text{m}\,\overset{\text{L}}{\text{e}}$ 'rain') or *unaccented* (H tonal melody: $\text{a}\,\text{m}\,\overset{\text{H}}{\text{e}}$ 'candy'). Whereas the *locus* of accent (i.e. mora that bears H tone before a L tone, represented henceforth by acute accent) is lexically determined in native and Sino-Japanese nouns (e.g. *híru* 'leech'; *hirú* 'noon'), in loanwords it is predictable enough to suggest a grammatical explanation as shown below.

McCawley (1968) observes an antepenultimate default loanword accent pattern, illustrated in (1).

1) *púrasu* 'plus' (3μ), *sutóresu* 'stress' (4μ), *kurisúmasu* 'Christmas' (5μ), *badomínton*[1] 'badminton' (6μ)

Kubozono (2006) identifies a notable sub-pattern (2) that occurs when three conditions coincide: (a) a final heavy syllable (which receives accent), (b) an epenthetic vowel on the antepenultimate mora and (c) a degenerate penultimate foot:

2) *p⟨u⟩rée* 'play' (*púree), *b⟨u⟩rúu* 'blue', *s⟨u⟩ríi* 'three', *t⟨u⟩ríi* 'tree', *d⟨o⟩róo* 'draw', *d⟨o⟩rái* 'dry', *s⟨u⟩kái* 'sky', *t⟨u⟩ín* 'twin'

This pattern might suggest, in the framework of Optimality Theory (Prince and Smolensky 1993), conjunction of three constraints when we have (a) an epenthetic antepenultimate mora (violation of "don't accent epenthetic vowel"), (b) a monomoraic penultimate foot (violation of "don't accent monomoraic foot") and (c) a heavy final syllable (violation of "accent heavy syllable")

When even one of these conditions fails to apply, default antepenultimate accent occurs and final foot is not accented, as shown in (3):

3) a. **antepenultimate mora not epenthetic:** *(pú)(rin)* 'pudding', *(há)(wai)* 'Hawaii', *(sé)(dan)* 'sedan', *(í)(ran)* 'Iran', *(rí)(ree)* 'relay'

b. **no degenerate foot:** *(s⟨u⟩p⟨ú⟩)(ree)* 'spray', *(s⟨u⟩t⟨ó⟩)(roo)* 'straw' *(s⟨u⟩k⟨ú⟩)(ryuu)* 'screw'

c. **no heavy final syllable:** *(p⟨ú⟩)(ras⟨u⟩)* 'plus', *(g⟨ú⟩)(ras⟨u⟩)* 'glass', *(t⟨ó⟩)(rio)* 'trio'

Because triple constraint conjunction arguably compromises the strict domination nature of Optimality Theory, I shall not pursue such an analysis here, but instead propose an account that avoids constraint conjunction. What follows will deal with six main issues presented by the observed data: (a) (§2) restriction of accent to the final two feet of the loanword (b) (§3) avoidance of accent on the final foot in the default pattern (c) (§4) a violable avoidance of accenting an epenthetic vowel (d) (§5) apparent iambicity of the head foot (e) (§6) mora nonfinality, and (f) (§7) weight-to-accent.

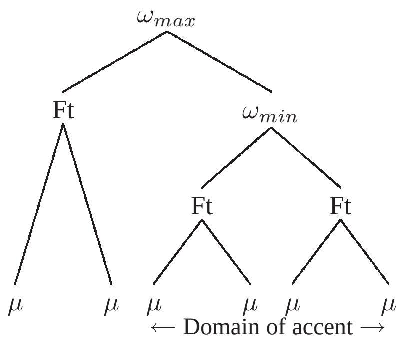
[*]Thanks to Douglas Pulleyblank and Shin-ichi Tanaka for helpful comments and suggestions. All errors are my own.

[1]When two moras form a heavy syllable, the leftmost mora always receives the accent.

2. Domain of accent

With the exception of heavy-light-heavy syllable words (discussed §11.1 below), loanword accent never occurs more than four moras from the right edge of the word. This fact can be captured by adopting Ito and Mester's (2006) proposal of prosodic adjunction, which yields minimal and maximal prosodic categories. Here, the minimal prosodic word, the apparent domain of accent, consists of no more than two bimoraic feet as shown below in (4).

4)



I adopt Akinlabi and Liberman's (2001) proposal of a *tonal complex*, where pitch accent in Japanese is the H tone head of a tonal complex that consists of a HL sequence and which has a *path of association* (in the sense of Archangeli and Pulleyblank 1994) to a minimal prosodic word. Restriction of accent to the minimal prosodic word can be explained by an undominated constraint ACCENT-MINIMAL-PROSODIC-WORD.

5) ACCENT-MINIMAL-PWD: "The head of a tonal complex has a path of association to a minimal Pwd."

3. Foot nonfinality

Default antepenultimate accent suggests either trochaic feet with final mora extrametricality or iambic feet with foot nonfinality. I pursue the latter possibility because extrametricality in Japanese is inconsistent with independent evidence for bimoraic feet that include the final mora: for example, truncations to pairs of bimoraic feet (Mester 1990), or the bimoraic template that occurs in language games such as the jazz language *zuzya-go* (Itô, Kitagawa, and Mester 1992). In addition, foot nonfinality is independently motivated for analyses of compound accent by Kubozono (1995).

Assuming that foot construction keeps bimoraic feet at the right edge of the word when there is an odd number of moras (i.e. $\mu\mu\mu\mu\mu$ surfaces as $(\mu)(\mu\mu)(\mu\mu)$), the informal tableau Table 1 on page 2 shows how iambic feet and nonfinality of the head foot derive antepenultimate accent. Further on, I shall formulate constraints IAMBIC and HEAD-FT-NONFINAL-PWD more rigorously.

Table 1: *Derivation of antepenult accent*

/krismas/	ACCENT MINIMAL PWD	IAMBIC	HEAD-FT-NONFINAL-PWD
a. $[_\omega$(kú)$[_\omega$(risu)(masu)$_\omega]_\omega]$	*!	?	
b. $[_\omega$(ku)$[_\omega$(rísu)(masu)$_\omega]_\omega]$		*!	
c. ☞ $[_\omega$(ku)$[_\omega$(risú)(masu)$_\omega]_\omega]$			
d. $[_\omega$(ku)$[_\omega$(risu)(másu)$_\omega]_\omega]$		*!	*
e. $[_\omega$(ku)$[_\omega$(risu)(masú)$_\omega]_\omega]$			*!

4. Epenthetic segments as non-morphemic: an alternative to HEAD-DEP

Some past analyses of resistance of accent or stress by epenthetic vowels rest on a "HEAD-DEP" constraint that requires a prosodic head to have an input correspondent. (See, for example, Alderete (1995).) In the present case, a HEAD-DEP analysis requires constraint conjunction, because, as shown above, such a constraint only appears to activate when other constraints are violated at the same time. Accordingly, I shall take a different view of epenthetic vowels: namely, their non-morphemic status.

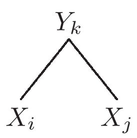
Consider, for example, the morphological and prosodic structure of *s*$\langle$*u*$\rangle$*t*$\langle$*ó*$\rangle$*res*$\langle$*u*$\rangle$ 'stress', with three epenthetic vowels.

```
6)      (μ        μ)      (μ        μ)
          u        o                 u
    s         t        r   e    s          (Morphemic tier)
```

Although all the consonants, including the first two, are part of the morpheme, the first foot is not part of the morphological word here since a foot requires moras in our analysis, and the first two moras are not part of the morpheme.

Under such a view, consider now the idea of nonfinality within the *morphological* word. In order to rigorously define the idea of nonfinality I adopt a constraint schema proposed by Eisner 1997, who seeks to constrain possible constraint types in O.T. by limiting them to two types: *implication* (x and y coincide temporally) and *clash* (x and y do not coincide temporally). Focusing on the first type, both the interior and the edge of a phonological or morphological domain can coincide with the interior or edge of some other domain. In the case of *edge-interior implication*, the edge of domain x must coincide with the interior of domain y. We can formally define such a relation as shown in (7), where instances of phonological or morphological categories coincide based on (a) paths of association between them (in the sense of Archangeli and Pulleyblank 1994) and (b) precedence relations between relevant instances. A specific example of this, nonfinality of a head foot in morphological word, is formulated in (8). A head foot is non-final in morphological word M if and only if it (a) has a path of association to the morphological word and (b) precedes another foot that also has a path of association to the same morphological word. As shown in (9), the head foot in initially accented *dórama* 'drama' fails to be nonfinal because crucially, the head foot has no path of association to the Morphological word, since all its moras are epenthetic. The relevance of this constraint to an analysis of loanword accent will be shown in §9.

7) "Given two phonological or morphological categories X and Y, the right edge of X_i aligns with the interior of Y_k iff $\exists$ a path of association from X_i to Y_k and $\exists$ a X_j with a path of association to Y_k such that $X_i \prec X_j$."

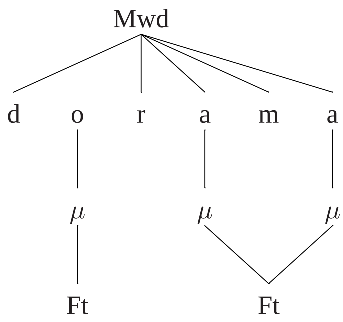


8) HEAD-FT-NONFINAL-MWD "$\forall$ F_i, F_i a head foot, $\exists$ M, M a Mwd with a path of association to F_i such that $\exists$ a foot F_j distinct from F_i and with a path of association to M such that $F_i \prec F_j$."[2]

Under this definition, if all the moras of a foot are epenthetic, that foot will fail to be nonfinal in the morphological word, since it has no path of association with the Mwd. This is shown for *d*$\langle$*ó*$\rangle$*rama* 'drama':

[2]In the case of Japanese, we consider a head foot to be a foot that has a path of association with the head of a tonal complex, in the sense of Akinlabi and Liberman (2000).

9)



HEAD-FT-NONFINAL-MWD is violated when (a) the head foot is the final foot of the Mwd e.g. in *p⟨u⟩rée* ‘play’ and/or (b) all of the moras of the head foot are epenthetic: e.g. in *s⟨u⟩t⟨ó⟩res⟨u⟩* ‘stress’, or *d⟨ó⟩rama* ‘drama’.

5. Iambicity

In keeping with the present view of constraints in terms of edge-interior implication, I adopt the claim of Kager (1993) that iambicity has only to do with directional headedness of feet:

> “Essentially, we are claiming that heavy syllable stress has a source that is independent from directional foot parsing, much as Prince (1983) distinguishes QS from perfect gridding.” (Kager 1993)

Under this view, we see iambic feet as feet with noninitial accent, with iambicity formulated below as an edge-interior implication constraint.

10) ACCENT-NONINITIAL-μ(FT) “The left edge of the head of a tonal complex coincides with the interior of a foot.: $\forall$ μ_i, a mora, where μ_i has a path of association with T’, the head of a tonal complex and a path of association with F, a foot, $\exists$ μ_j, such that μ_j has a path of association with F and $\mu_j \prec \mu_i$.”

This formulation rules out both accented monomoraic Feet and accented heavy syllables from being iambic.

6. Nonfinal mora and nonfinal foot

Not only do loanwords avoid accenting the final foot, but when a loanword is bimoraic, accent of the final mora is avoided. (e.g. *óhu* ‘off’, *égo* ‘ego’, *hámu* ‘ham’)

Nonfinality is also evident in compound accent: analyses of compound accent posit constraints NONFINAL-μ, NONFINAL-FT (Kubozono 1995) and NONFINAL-σ (Alderete 2001). The first two of these constraints are adopted here and formulated as follows.

11) NONFINAL-μ “Do not accent the final mora of the Pwd.” (The right edge of an accented mora coincides with the interior of a Pwd.) “$\forall \mu_i$, an accented mora, $\exists$ ω_k a prosodic word with a path of association to μ_i such that $\exists$ μ_j a mora distinct from μ_i and with a path of association to ω_k such that $\mu_i \prec \mu_j$.”

12) HEAD-FOOT-NONFINAL-PWD “The head foot is nonfinal in the Pwd.” (The right edge of the head foot coincides with the interior of a Pwd.) “$\forall F_i$, a head foot $\exists$ ω_k a prosodic word with a path of association to F_i such that $\exists$ F_j a foot distinct from F_i and with a path of association to ω_k such that $F_i \prec F_j$.”

7. Weight to accent

In the exceptional sub-pattern exemplified by *(pu)(rée)* ‘play’ ((2) above) syllable weight appears to attract accent in a pitch-accent version of the weight-to-stress principle. A weight-to-accent constraint is formulated as follows:

13) WEIGHT-TO-ACCENT “The left edge of a heavy syllable coincides with the left edge of a tonal complex.” Or, using Eisner’s schema: “The right edge of mora and the interior of a syllable coincides with the right edge of the head of a tonal complex.”

8. Ranking of constraints

We can now motivate a ranking of the above constraints by making the following generalizations about loanword accent.

a. As discussed above in §2, ACCENT-MINIMAL-PWD (5) must be undominated to account for the restricted domain of loanword accent.[3]

b. If there is a nonfinal foot in the minimal prosodic word with at least one non-epenthetic vowel we never accent the final foot. Therefore a necessary (but not sufficient) condition for accenting the final foot is that the penultimate foot has all epenthetic vowels. This generalization is straightforwardly expressed if HEAD-FT-NONFINAL-MWD (8) is undominated.

c. The final mora is very rarely accented in loanwords (<1% (Kubozono 2006), §6 above), suggesting that NONFINALμ (11) is undominated.

d. The iambic constraint ACCENT-NONINITIAL-μ-(FT) (10) is violated where a degenerate foot receives accent (e.g. *(p⟨ú⟩)(rin)* ‘pudding’, or *(dó)(rama)* ‘drama’), or where a heavy syllable is accented (e.g. *(pu)(rée)* ‘play’). Therefore the accent pattern of *(dó)(rama)* ‘drama’ implies that NONFINAL-μ dominates ACCENT-NONINITIAL-μ-(FT).[4] We could otherwise satisfy ACCENT-NONINITIAL-μ-(FT) at the expense of violating NONFINAL-μ by giving final accent to **doramá*.

e. The failure of the final heavy syllable to attract accent in *(supú)(ree)* ‘spray’ suggests that constraint ACCENT-NONINITIAL-μ-(FT) dominates WAP (weight-to accent), since in we accent the LL (light-light) foot instead of the final H (heavy) foot.

f. WEIGHT-TO-ACCENT must dominate HEAD-FT-NONFINAL-PWD, since in *(pu)(rée)* ‘play’, we accent the heavy syllable at the expense of violating HEAD-FT-NONFINAL-PWD.

These conclusions point to the following ranking.

14) HDFTNONF-MWD, NONFIN-μ $\gg$ ACC-NONINIT-μ(FT) $\gg$ WAP $\gg$ HDFTNONF-PWD

[3] I adopt here the hypothesis that in Japanese, feet are bimoraic and not disyllabic. (Poser 1990) Degenerate, monomoraic feet are possible, but not, for example, a disyllabic foot consisting of a light and heavy or heavy and light syllable sequence, which would be trimoraic. This rules out footings such as a single LH foot for *purin* ‘pudding’ or *puree* ‘play’.

[4] I take the footing of 3μ words like *dorama* to be $(\mu)(\mu\mu)$ and not $*(\mu\mu)(\mu)$ owing to a presumed undominated constraint such as “All-Feet-L”.

9. Deriving loanword accent

I shall now show how the proposed ranking will derive both the default antepenultimate loanword accent pattern and the exceptional sub-pattern with an accented heavy final syllable, without resorting to constraint conjunction. The undominated constraint HEAD-FT-NONFINAL-MWD will prevent accentuation of the final foot unless all nonfinal feet have epenthetic moras.

In Table 2, which derives *(s⟨u⟩t⟨ó⟩)(res⟨u⟩)* ‘stress’, the penultimate foot has *all* epenthetic vowels, so no candidate can satisfy HDFTNONF-MWD. The optimal candidate will have an iambic foot with nonfinal accent. (Head feet are underlined in this and subsequent tableaux.)

Table 2: *(s⟨u⟩t⟨ó⟩)(res⟨u⟩) ‘stress’ (1 of 3 ganging effects present: epenthetic V)*

/stres/	HDFTNONF-MWD	NONFIN-μ	ACC-NONINIT-μ(FT)	WAP	HDFTNONF-PWD
a. (s⟨ú⟩t⟨o⟩)(res⟨u⟩)	*		*!		
b. ☞ (s⟨u⟩t⟨ó⟩)(res⟨u⟩)	*				
c. (s⟨u⟩t⟨o⟩)(rés⟨u⟩)	*		*!		*
d. (s⟨u⟩t⟨o⟩)(res⟨ú⟩)	*	*!			*

In Table 3, since the [u] is not epenthetic, accenting the leftmost foot satisfies HDFTNONF-MWD, which eliminates candidate (b).

Table 3: *(pú)(rin) ‘pudding’ (2 of 3 ganging effects present: degenerate foot and heavy syllable)*

/purin/	HDFTNONF-MWD	NONFIN-μ	ACC-NONINIT-μ(FT)	WAP	HDFTNONF-PWD
a. ☞ (pú)(rin)			*	*	
b. (pu)(rín)	*!		*		*

In Table 4 as in Table 2 above, the penultimate foot has only an epenthetic vowel, so no candidate can satisfy HDFTNONF-MWD. No candidate can have a noninitial accent in a foot since accent in a heavy syllable can occur only on the leftmost mora. WEIGHTTOACCENT will therefore derive an output with the heavy syllable accented.

Table 4: *(p⟨u⟩)(rée) ‘play’ (all 3 ganging effects present)*

/plee/	HDFTNONF-MWD	NONFIN-μ	ACC-NONINIT-μ(FT)	WAP	HDFTNONF-PWD
a. (p⟨ú⟩)(ree)	*		*	*!	
b. ☞ (p⟨u⟩)(rée)	*		*		*

In Table 5 as in (2) and (4) above, the penultimate foot has only an epenthetic vowel, so no candidate can satisfy HDFTNONF-MWD. The only iambic candidate (c) violates NONFINALμ. The remaining two candidates both violate ACC-NONINIT-μ(FT). Since there is no heavy syllable, default accent is derived here by HDFTNONF-PWD.

In Table 6, as in Tables 2, 4, and 5 above, the penultimate foot has only epenthetic vowels, so no candidate can satisfy HDFTNONF-MWD. Because the first foot is bimoraic, an iambic foot is possible in candidate (b), the only one that satisfies ACC-NONINIT-μ(FT).

To summarize the tableaux, rather than seeing cases of accentuation of the heavy final syllable as a ganging effect, this analysis views it as Emergence of the Unmarked, where in Table 4 antepenultimate accent is not preferred by the action of either HEAD-FT-NONFINAL-MWD or the iambic constraint.

Table 5: *(d⟨ó⟩)(rama) 'drama' (2 of 3 ganging effects present: epenthetic V and degenerate foot)*

/drama/	HdFtNonF-Mwd	Nonfin-μ	Acc-Noninit-μ(Ft)	WAP	HdFtNonF-Pwd
a. ☞ <u>(d⟨ó⟩)</u>(rama)	*		*		
b. (d⟨o⟩)<u>(ráma)</u>	*		*		*!
c. (d⟨o⟩)<u>(ramá)</u>	*	*!			*

Table 6: *(s⟨u⟩p⟨ú⟩)(ree) 'spray' (2 of 3 ganging effects: epenthetic V's and heavy σ)*

/spree/	HdFtNonF-Mwd	Nonfin-μ	Acc-Noninit-μ(Ft)	WAP	HdFtNonF-Pwd
a. <u>(s⟨ú⟩p⟨u⟩)</u>(ree)	*		*!	*	
b. ☞ <u>(s⟨u⟩p⟨ú⟩)</u>(ree)	*			*	
c. (s⟨u⟩p⟨u⟩)<u>(rée)</u>	*		*!		*

10. Independent evidence for constraints

10.1 Nonfinal-Ft, Nonfinal-μ

As discussed in §6 above, Nonfinal-Ft and Nonfinal-mora constraints are motivated by compound accent patterns.

10.2 Iambic feet and Nonfinal accent in Yamato nouns

In bimoraic Yamato nouns, initial accent (i.e. trochaic) is 40% more common than final accent (i.e. iambic) (Rosen 2001). But if Nonfin-μ dominates Acc-Noninit-μ(Ft), as motivated by the above tableaux, we would expect initial accent to predominate. Therefore, to the extent that statistical patterns among Yamato nouns are evidence of constraint ranking, bimoraic nouns confirm the proposed ranking of these two constraints.

As far as trimoraic Yamato nouns are concerned, initial and final accent are far more common than medial accent (Rosen 2001). Initially-accented words would have accent on the nonfinal foot. The Nonfinal-μ constraint is violated for 3μ nouns with final accent but final accented words would have iambic feet and medially accented words trochaic feet, assuming a $(\mu)(\mu\mu)$ footing pattern. The following table shows how the three possible loci for trimoraic accented Yamato nouns each fares with respect to the ranking proposed above: Head-Foot-Nonfinal-Mwd, Nonfinal-mora $\gg$ Accent-Noninitial-Mora(Ft).

Table 7: *Yamato trimoraic nouns*

	Head-Foot-Nonfinal-Mwd	Nonfinal-mora	Accent-Noninitial-Mora(Ft)
$(\acute{\mu})(\mu\mu)$ (most common)			*
$(\mu)(\acute{\mu}\mu)$ (least common)	*		*
$(\mu)(\mu\acute{\mu})$ (second most common)	*	*	

We can see that the ranking motivated for loanword accent does not exactly fit with statistical patterns for trimoraic Yamato nouns. In particular, the Nonfinal-mora constraint would be expected to make final-accent trimoraic nouns less common than medially accent ones.

10.3 Weight-to-Accent effects should not occur in Yamato words

In loanwords, we saw an apparent emergent effect of syllable weight attracting accent. Recall, however, that that effect could only emerge, under the proposed ranking, when the penultimate foot was degenerate and had an epenthetic vowel. Given the absence of epenthetic vowels in Yamato words, such an environment cannot occur there to trigger attraction of accent by weight. If statistical tendencies among Yamato words indicate constraint ranking, we would not expect heavy syllables to attract accent the way they do in loanwords. This is in fact what we find when we examine, for example, trimoraic, accented Yamato words that have heavy syllables. Given the scarcity of heavy syllables in Yamato words, we find only 34 monomorphemic, trimoraic nouns with heavy syllables. Of these, only four show a weight-to-accent attraction effect, as shown by the data below.

Words that show attraction of accent by weight:

kyúuri	cucumber	kinóo	yesterday
káiko	silkworm	sakái	boundary

Words that do not show attraction of accent by weight:

aoi	hollyhock	(unacc)	kaori	fragrance	(unacc)
atai	value	(unacc)	sumoo	sumo	(unacc)
kaina	a plant	(unacc)	tonoi	night duty	(unacc)
kárei	flatfish		yaito	moxibustion	(unacc)
hitai	forehead	(unacc)	yakko	slave	(unacc)
íoo	sulfur		yámai	illness	
kaeru	frog	(unacc)	yoroi	armour	(unacc)
haori	coat	(unacc)	yowai	age	(unacc)
kurai	position	(unacc)	tagai	mutual	(unacc)
sanae	rice sprouts	(unacc)	aida	interval	(unacc)
onná	woman		sázae	wreath, shell	
otto	husband	(unacc)	oogí	fan	
syuuto	father-in-law	(unacc)	tonbo	dragonfly	(unacc)
taira	flat	(unacc)	toogé	mtn. pass	
aorí	horse-mudguards		ugai	gargle	(unacc)

11. Exceptional loanword accent patterns

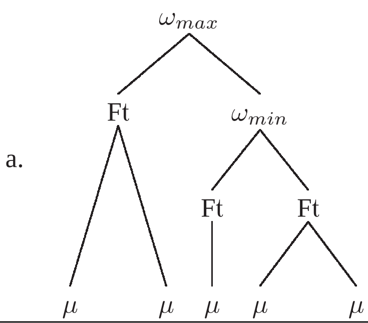
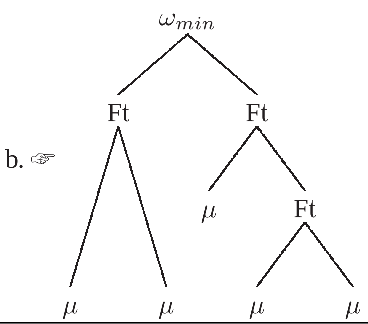
11.1 Pre-antepenultimate accent

Kubozono (2006:24ff) observes a *pre-antepenultimate* pattern that departs from the default antepenultimate pattern and seems to be common especially among younger speakers. He suggests that the pattern may be partly due to a diachronic change from an iambic to a trochaic pattern. He also observes, citing a number of previous studies, that words ending in light-light-heavy ĹLH (15a) and heavy-light-heavy H́LH (15b) syllable patterns often receive pre-antepenultimate accent. Examples are shown in 15. The heavy-light-heavy cases can actually be explained under the present analysis if we posit constraints that require *prosodic word binarity* (see §11.1.1 below), which would cause a heavy-light-heavy syllable pattern to be parsed as one minimal prosodic word.

15) a. *ó.p⟨u⟩.syon* ‘option’; *ó.ri.on* ‘Orion’; *t⟨ó⟩.ro.fii* ‘trophy’; *s⟨ú⟩.ri.raa* ‘thriller’

b. *máa.ga.rin* ‘margarine’; *b⟨u⟩.rók.ko.rii* ‘broccoli’; *fán.ta.zii* ‘fantasy’; *páa.t⟨o⟩.naa* ‘partner’; *háa.mo.nii* ‘harmony’ (Kubozono 2006:24)

Table 8: *Prosodic adjunction structures*

$/(\mu\mu)_\sigma(\mu)_\sigma(\mu\mu)_\sigma/$	PWD-BIN	FT-BIN
a. 	*!	*
b. ☞ 		*

11.1.1 Deriving a H́LH pattern (15b)

Consider a PROSODIC-WORD-BINARITY constraint which is analogous to a FOOT-BINARITY constraint and is violated if a ω (prosodic word) node fails to dominate two feet.

Analogously, a FT-BIN constraint is violated if a Ft node fails to dominate two moras.

In a heavy-light-heavy syllable pattern, each heavy syllable is forced to occur in the same foot. This gives us two possible prosodic structures for a HLH syllable pattern within Itô and Mester's (2006) prosodic adjunction framework if we allow adjunction to the foot as well as to the prosodic word:

Candidate structure (b) is optimal because it does not violate prosodic word binarity. Under this analysis, a heavy-light-heavy loanword can be parsed by one minimal prosodic word, allowing accent anywhere in that domain. As shown below, the constraint ranking motivated above will derive accent on the initial heavy syllable of a HLH pattern. In candidate (a), above, if it were the case that the light syllable is dominated directly by ω_{min} under Weak Layering (Itô and Mester 1992), as long as PWD-BIN dominates FT-BIN, candidate (a) would still be sub-optimal even though it would satisfy FT-BIN.

In Table 9, a structure that parses all three feet to ω_{min} allows accent of the initial syllable. Accenting the initial rather than the final heavy syllable allows nonfinality to be satisfied.

Table 9: *háamonii 'harmony' : With prosodic structure of candidate (b) in Table 8 above.*

/harmoni:/	HDFTNONF-MWD	NONFIN-μ	ACC-NONINIT-μ(FT)	WAP	HDFTNONF-PWD
a. ☞ (háa)(mo)(nii)			*	*	
b. (haa)(mó)(nii)			*	**!	
c. (haa)(mo)(níi)	*!		*	*	*

11.1.2 ĹLH pattern

For a light-light-heavy syllable pattern, we see both pre-antepenultimate accent (LĹH: *órion* 'Orion') and antepenultimate accent (ĹLH: *s⟨u⟩p⟨ú⟩ree* 'spray'). We might wonder if the accent pattern of *órion* 'Orion' could be due to avoidance of a pitch-accent equivalent of *stress-weight clash* (Antilla 2006, Inkelas 1999) that avoids accenting a mora adjacent to a heavy syllable, whereas in *s⟨u⟩p⟨ú⟩ree* 'spray' *accent-weight-clash* is superseded by *accent shift* (Haraguchi 1991) away from the voiceless high vowel between the two voiceless obstruents in the pre-antepenultimate position.

The problem with such a hypothesis is that the two constraints would incorrectly force accent away to the final heavy syllable: (See Table 11.) Suppose, for example that *ACCENT-WEIGHT-CLASH and *V̥́ are formulated as follows:

16) *ACCENT-WEIGHT-CLASH "The right edge of a L tone aligns with the right edge of a syllable."
*V̥́ "The head of a tonal complex does not coincide with a voiceless vowel."

Consider now the following tableau for *órion* 'Orion', with the prosodic structure of (8b) above. Inclusion of the constraint *ACCENT-WEIGHT-CLASH will not affect prior derivations except for *s⟨u⟩p⟨ú⟩ree* 'spray'. The constraint *ACC-WT-CLASH must dominate ACC-NONINIT-μ(FT) to account for why the accented foot is trochaic in order to avoid accent-weight clash.

Table 10: *Tableau for* órion *'Orion'*

/orion/	HDFTNONF-MWD	NONFIN-μ	*ACC-WT-CLASH	ACC-NONINIT-μ(FT)	WAP	HDFTNONF-PWD
a. ☞ (óri)(on)				*	*	
b. (orí)(on)			*!		*	
c. (ori)(ón)	*!			*		*

In *(s⟨u̥⟩p⟨ú⟩)(ree) 'spray'*, by contrast, we might try to explain the differing accent pattern from *órion* 'Orion' by avoidance of accenting the voiceless vowel in *su̥púree*. This would mean that *V̥́ must dominate *ACC-WT-CLASH. The tableau with this ranking is shown in Table 11. We can see that this ranking gives the wrong result, with accent forced away from both moras in the nonfinal foot to the final heavy syllable. Thus the accent difference between *(s⟨u̥⟩p⟨ú⟩)(ree) 'spray'* and *órion* 'Orion' does not appear to be explainable by the grammar.

Table 11: *(s⟨u̥⟩p⟨ú⟩)(ree) 'spray' (repeated from Table 6 with* *ACCENT-VOICELESS *(=*V̥́) (undominated) and* *ACCENT-WEIGHT-CLASH *added)*

/spree/	*V̥́	HDFTNF-MWD	NONFIN-μ	*ACC-WT-CLSH	ACC-NONIN-μ(FT)	WAP	HDFTNF-PWD
a. (s⟨ú̥⟩p⟨u⟩)(ree)	*!	*			*	*	
b. ☹ (s⟨u̥⟩p⟨ú⟩)(ree)		*		*!		*	
c. !☞! (s⟨u̥⟩p⟨u⟩)(rée)		*			*		*

11.2 Words with acronymic origin

Words of acronymic origin (borrowed from English) are another exception to the patterns discussed so far. These words seem to behave like compounds, where each acronymic 'letter' acts like a separate constituent, with accent occurring on the second constituent. (See also Kubozono and Ogawa 2004.) Examples are in (17).

17) *es⟨u⟩píi* 'S.P.' ('special person'); *en⟨u⟩zyíi* 'N.G.' ('no good'); *oobíi* 'O.B." ('old boy')

11.3 Unaccented loanwords

Kubozono (2006:28ff) points out that many loanwords, especially those that have four moras, two final light syllables, and a non-epenthetic final vowel are unaccented. Some examples are given in (18).

18) *angora* ‘angora’; *ar*⟨*u*⟩*paka* ‘alpaca’; *kyaramer*⟨*u*⟩ ‘caramel’; *katarog*⟨*u*⟩ ‘catalogue’; etc.

Kubozono gives a partial explanation of this fact by saying that unaccented four-mora loanwords mimic the pattern of four-mora native words, which lack epenthetic vowels, usually lack heavy syllables among the final two, and are usually unaccented. What he does not explain, however, is why *three*-mora loanwords do not show the same tendency to be unaccented, given that about 62% of monomoraic three-mora native words are unaccented (Rosen 2001). In addition, it is difficult to find many four-mora native words that are truly monomorphemic, and whose accent pattern is therefore not affected by compound accentuation.

Kubozono further suggests that final epenthetic vowels tend to prevent an unaccented pattern from arising because they do not constitute a separate syllable and act like non-syllabic moras, forming the equivalent of a heavy syllable with the preceding vowel. He does not give any phonetic evidence to back up this claim, nor does he suggest that any such phonetic evidence might exist. He suggests that the presumed heavy syllable attracts accent to the word but not necessarily to the syllable itself, because of the avoidance of accenting the final foot.

Clearly, more work needs to be done in explaining why and when unaccented loanwords occur.

12. Conclusions

In this account we see accent locus as determined by its alignment with phonological and morphological domains. As a result, attraction of accent to a heavy syllable is an emergent effect that occurs only when neither nonfinality in the morphological word nor iambicity in the foot can be satisfied.

13. References

Akinlabi, Akin and Mark Liberman. (2000) Tonal Complexes and Tonal Alignment. NELS 31.

Alderete, John. (1995) Head Dependence in Stress-Epenthesis Interaction. In Ben Hermans and Marc van Oostendorp (eds.), *The Derivational Residue in Phonological Optimality Theory*. Amsterdam: John Benjamins, pp. 29-50.

Alderete, John. (2001) *Morphologically governed accent in Optimality Theory*. Routledge publishing series, Outstanding dissertations in Linguistics, Routledge, New York.

Anttila, Arto. (2006) Metrical variation in Finnish. Handout for a talk given at Variation in Optimality Theory, IU Phonology Fest, 19-22 June, 2006

Archangeli, Diana and Douglas Pulleyblank. (1994) *Grounded Phonology*, The MIT Press, Cambridge, MA.

Eisner, Jason M. (1997) What constraints should OT allow? Talk handout, Annual Meeting of the Linguistic Society of America, Chicago.

Fukazawa, Haruka and Mafuyu Kitahara. (2005) Ranking Paradoxes and Consonant Voicing in Japanese. In *Voicing in Japanese*, van de Weijer, Jeroen, Kensuke Nanjo and Tetsuo Nishihara, (eds.), Mouton de Gruyter, Berlin, New York.

Haraguchi, Shosuke. (1991). *A theory of stress and accent*. *Studies in Generative Grammar 37.* Dordrecht & Providence, RI: Foris Publications.

Inkelas, Sharon. (1999) Exceptional stress-attracting suffixes in Turkish: representations vs. the grammar. In H. van der Hulst, R. Kager, and Wim Zonneveld (eds.). *The Prosody-Morphology Interface*. Cambridge University Press.

Itô, Junko and Armin Mester. (1992) Weak Layering and Word Binarity. Ms. University of California at Santa Cruz.

Itô, Junko and Armin Mester. (2006) Prosodic Adjunction in Japanese Compounds. Proceedings of Formal Approaches to Japanese Linguistics 4, Osaka, 2006 (MIT Working Papers in Linguistics)

Itô , Junko, Yoshihisa Kitagawa, and R. Armin Mester. (1992) Prosodic type preservation in Japanese: Evidence from zuuja-go. SRC-92-05. Syntax Research Center, University of California, Santa Cruz.

Kager, René. (1993) Alternatives to the iambic-trochaic law. Natural language and linguistic theory 1993, vol. 11, no. 3, pp. 381-432

Kubozono, Haruo. (1995) Constraint interaction in Japanese phonology: Evidence from compound accent. Phonology at Santa Cruz 4: 21-38.

Kubozono, Haruo and Shinji Ogawa. (2004) Emergence of Unaccented Words in Japanese. Speech Prosody 2004. Nara, Japan.

Kubozono, Haruo. (2006) Where does Loanword Prosody Come from?: A Case Study of Japanese Loanword Accent. Lingua. 2006, vol. 116, no 7, pp. 921-1194.

Kubozono, Haruo (2001) Epenthetic vowels and accent in Japanese: Facts and paradoxes. In J. van de Weijer and T. Nishihara (eds.) *Issues in Japanese Phonology and Morphology*. Mouton de Gruyter.

Pierrehumbert, Janet, and Mary Beckman. (1988) *Japanese Tone Structure*, Cambridge, Massachusetts: MIT Press.

McCawley, James. (1968) *The phonological component of a grammar of Japanese.* Mouton. The Hague.

Mester, Armin. (1990). Patterns of truncation. Linguistic Inquiry, 21:478âĂŞ485

Poser, William. (1984) The Phonetics and Phonology of Tone and Intonation in Japanese. Ph. D. Dissertation. MIT.

Poser, William. (1990) Evidence for foot structure in Japanese. *Language* 66: 78-105.

Prince, Alan. (1983) Relating to the grid. Linguistic Inquiry, 14:19–100.

Prince, Alan and Paul Smolensky. (1993). Optimality Theory. Ms.

Pulleyblank, Douglas. (1984) Autosegmental Accent. Proceedings of NELS 14. Amherst: GLSA, 343-359.

Rosen, Eric. (2001) Phonological processes interacting with the lexicon: variable and non-regular effects in Japanese phonology. Ph.D. thesis. University of British Columbia.

Smolensky, Paul. 1995. Local conjunction. Ms. Department of Cognitive Science, Johns Hopkins University.

Tanaka, Shin-ichi. (2008) Adjacency in the Typology of Dissimilation: Another Case for Lyman's Law in Japanese Loanwords. 2008. Handout for talk given at Atami Phonology Festa, Third Joint meeting of the Phonological Association in Kansai and Tokyo Circle of Phonologists, Atami, Japan, February 21-22, 2008.