Japanese Loanwords into Taiwanese Southern Min

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1. Introduction

In this paper we will explore some issues with regard to the tonal adaptation of Japanese loanwords into Taiwanese Southern Min (TSM). This paper will focus on the suprasegmental patterns of the two languages. TSM is a tonal language typically described as having seven tones in its tonal inventory. Japanese is a pitch accent language with only two different pitches. In addition, TSM has a "one-morpheme-per-syllable" tendency while there are many monomorphemic polysyllabic words in Japanese. The differences between the two languages might have some effect on the tonal adaptation.

We intend to answer two main research questions: 1) Does the pitch accent system in Japanese play a role in the tonal adaptation of Japanese loanwords into TSM? 2) How is the pitch accent system of Japanese loanwords nativized to fit the tone patterns in TSM? This paper will show that original source accent is not recognized but there is accentuation that is assigned to the Japanese loanwords in TSM. Additionally, the tonal adaptation into TSM reflects closely the default accentuation of Japanese grammar and is further affected by rime structures of the adapted forms.

2. Background

2.1 The tone patterns of Taiwanese Southern Min

The Min dialects are one of the ten major Chinese dialect groups. TSM is the southern Min dialect spoken in Taiwan. TSM has a comparably large tonal inventory. The number of tones in Taiwanese Southern Min is still controversial and there is yet no consensus. Most linguists take there to be seven (Chen, 1987; Cheng, 1979; Chung, 1996), including five non-checked tones (H, M, L, LM, HL) and two checked tones (H, M)[1]. A non-checked tone refers to a tone realized on an open or a sonorant-closed syllable, which is supposedly longer in duration, and a checked tone refers to a tone realized on a stop-closed syllable, which is shorter in duration (Zhang, 1998). Each syllable in TSM has a particular tonal value attached to it. TSM is one of the Chinese languages, which are well known for the "one-morpheme-per-syllable" tendency (Hsieh, 2006). It is possible that this property might have some effect on the nativization of Japanese loanwords, which have monomorphemic polysyllabic words.

2.2 The pitch pattern of Japanese

While TSM has seven tones with three different pitches (H, M, L), Japanese has just two different pitches (H, L). As a pitch-accent language, Japanese is similar to tone languages, including TSM, in that each mora in a word is associated with a specific tone or pitch. However, in Japanese, though the location of the accent of a word is not predicable, given the location of the accent of a word, the pitch or tonal pattern of the entire word is predictable, unlike the case with tone languages (Tsujimura, 2007).

In Japanese, words can be accented or unaccented. The assumed source language for the TSM borrowing discussed in this paper is Tokyo Japanese. The Tokyo dialect of Japanese has traditionally been described in terms of the way each tone-bearing unit carries either a high (H) tone or low (L) tone (Hasegawa, 1999). Sugiyama (2006) mentions some generalizations of pitch accent patterns in Tokyo Japanese. For unaccented words, the first syllable has a low pitch and the remaining syllables have a high pitch. For accented words, one syllable is marked for accent. If the accent falls on the first syllable, the syllable has a high pitch and all the following syllables have a low pitch. If the accent falls on the second or later syllable, the first syllable has a low pitch and the syllables from the second until the accented one all have a high pitch. Low tone is assigned to the initial syllable unless it is accented; this is the well-known "initial lowering rule" in Tokyo Japanese (Haraguchi, 1977, among others.) After the accented syllable, all the remaining syllables have a low pitch. Hasegawa notes (1999) that because the initial L is considered as default, only the location where pitch drops from H to L is significant in Japanese tonal phenomena. In line

[1] Checked tones are underlined throughout the paper.

with this, accent is manifested as the H tone that is immediately followed by L tone.

3. Data and description of Japanese loanwords

The data used in this paper are collected by Hsieh (2006). He notes that his corpus consists of about 200 items, drawn from Tung (1972), Ang (1985, 1996), Chang (1995), Tsao (1993), Hsieh (2003), Lien (2005), Ong (2005) and his own field notes. The pitch accent patterns from Japanese are based on *NHK Pronunciation and Accent Dictionary* (NHK 1998).

In the following data sets, we observe that source accent location is not recognized in the borrowing into TSM. Nonetheless, what we will term 'accent' is assigned to the TSM borrowed form, either on the penultimate or antepenultimate mora. The accent is realized as a high tone in TSM. We should note that in TSM, checked-syllables, which are closed by an obstruent-stop, are monomoraic. Such CVO syllables (where O = obstruent) along with CV syllables are monomoraic while the syllable types CVV, CV_iV_j, and CVN are bimoraic. Such heavy syllables can bear contour tones while CVO and CV syllables do not. From this, it can be inferred that vowels and coda sonorants are moraic in TSM but obstruents are not.

3.1 The H tone falls on the <u>penultimate</u> mora

The Japanese loanwords in which the H tone accent falls on the penultimate mora in TSM are presented in (1)-(4). These words when borrowed either end in a bimoraic syllable or two light syllables.

(1) Mono-syllabic words

	Japanese		Taiwanese		Gloss
a.	pan	HL	pHaN	**H**L	'bread'

(2) Disyllabic words

	Japanese		Taiwanese		Gloss
a.	susi	LH*	suþi?	**H**<u>M</u>	'sushi'
	miso	HL	miso?	**H**<u>M</u>	'miso (soybean paste)'
	tippu	HLL	tþip.pu?	**H**<u>M</u>	'tip(gratuity)'
	setto	HLL	seto?/	**H**<u>M</u>	'to style hair'
			set.to?	**H**<u>M</u>	
	bataa	HLL	bata?	**H**<u>M</u>	'butter'
b.	kaban	LHH	kHabaN	M**H**L	'bag'
	oden	LHL	•len	M**H**L	'kind of Japanese dish'
	remon	HLL	leboN	M**H**L	'lemon'
c.	kanban	LHHH	kHampaN	MH**H**L	'signborad'
	kanpai	LHHH	kHampai	MH**H**L	'to toast'
	zyanken	LLHL	tþiaNkHen	MH**H**L	'scissor-paper-rock'
	enzin	HLLL	entþin	MH**H**L	'engine'
	nairon	HLLL	nailoN	MH**H**L	'nylon'
	kaaten	HLLL	kHaten	MH**H**L	'curtain'
	kyuunyuu	LHHH	kHjunju	MH**H**L	'choke (car part)'

(3) Trisyllabic words

	Japanese		Taiwanese		Gloss
a.	arumi	LHH	alumi?	M**H**M	aluminum’
	sasimi	LHH*	saþimi?	M**H**M	‘slices of raw fish’
	kamera	HLL	kHamela?	M**H**M	‘camera’
	sulippa	HLLL	sulipa?/	M**H**M/	‘slipper’
			sulip.pa?	M**H**M	
	takkuru	HLLL	tHakHulu?	M**H**M	‘tackle(rugby)’
	torakku	LHLL	tH•lakHu?/	M**H**M/	‘truck’
			tH•lak.kHu?	M**H**M	
	assari	LLHL	asali?/	M**H**M/	‘openhearted’
			at.sali?	M**H**M	
	batterii	LHHHH	bateli?	M**H**M	‘battery’
	takusii	HLLL	tHakHusi?	M**H**M	‘taxi’
	burazyaa	LHLL	bulatþja?	M**H**M	‘brassiere’
	riyakaa	LHHL	li.a.kHa?	M**H**M	‘bicycle trailer’
b.	marason	LHHH	malasoN	MH**H**L	‘marathon’
	takuan	LHLL	tHakHubaN	MH**H**L	‘pickle daikon radish’
	rakkasan	LHLL	lakHasaN	MH**H**L	‘parachute’
	nekutai	HLLL	nekutai	MH**H**L	‘necktie’
	abunai	LHHL	abunai	MH**H**L	‘dangerous’
	oziisan	LHLLL	•lisaN	MH**H**L	‘mid-aged man’
	obaasan	LHLLL	•basaN	MH**H**L	‘mid-aged woman’
c.	handoru	HLLL	hantolu?	MH**H**M	‘bumper’
	aisatu	HLLL	aisatsu?	MH**H**M	‘greeting’
	waisyatu	LHHH	waiþjatsu?	MH**H**M	‘shirt’

(4) Quadrisyllabic words

	Japanese		Taiwanese		Gloss
a.	katarogu	LHHH	kHataloku?	MH**H**M	‘catalog’
	osibori	LHLL	oþimoli?	MH**H**M	‘steamed hand towel’
	misosiru	LHHL	misoþilu?	MH**H**M	‘miso soup’
	sutorippu	LHHLL	sutolipu?	MH**H**M	‘strip dance’
			sutolip.pu?	MH**H**M	
	bakkumiraa	LHHLL	bak.kHumila?	MH**H**M	‘side windows’

From the given data (1)-(4), we find that no matter where the location of the accent in the source word is and no matter how many syllables the word contains, the penultimate mora in the adapted word always carries a high tone, which reflects the accent of the word.

3.2 The High tone falls on the antepenultimate mora

The words in which the high tone falls on the antepenultimate mora are shown in (5)-(7). These words end in a sequence of a penultimate bimoraic syllable followed by a final monomoraic syllable.

(5) Disyllabic words

	Japanese		Taiwanese		Gloss
a.	taiya	LHH	tʰaija?	**H**LM	'tire'
	taoru	HLL	tʰaulu?	**H**LM	'towel'
	meesi	LHH	meeβi?	**H**LM	'business card'
	biiru	HLL	biilu?	**H**LM	'beer'
	mootaa	HLLL	moota?	**H**LM	'motor'
	banpaa	HLLL	banpa?	**H**LM	'bumper'
	raitaa	HLLL	laita?	**H**LM	'lighter'
	tansu	LHH	tʰaNsu?	**H**LM	'closet'
	penti	HLL	pʰentβI	**H**LM	'pinch'

(6) Trisyllabic words

	Japanese		Taiwanese		Gloss
a.	doraibaa	LHHHH	lolaiba?	M**H**LM	'screwdriver'
	kuriimu	LHLL	kʰuliimu?	M**H**LM	'cream'
	massaazi	LLHLL	masataaβi?	M**H**LM	'massage'
	burookaa	LHHHH	bulookʰa?	M**H**LM	'broker'
	patinko	LHHH	pʰatβʰiNko?	M**H**LM	'Japanese gambling game'
	toranku	LHLL	tʰ•laNkʰu?	M**H**LM	'trunk'
b.	bansookoo	LHHHHH	bansooko?	MH**H**LM	'Band-Aid'

(7) Quadrisyllabic words

	Japanese		Taiwanese		Gloss
a.	sutoraiku	LHHLL	sutolauku?	MH**H**LM	'strike (baseball)'
	pasupooto	LHHLL	pʰasupʰooto?	MH**H**LM	'passport'
	sutenresu	LHLLL	sutenleesu?	MH**H**LM	'stainless steel'

From the data in (5)-(7), again, we see that the location of the accent in the Japanese words is disregarded. Also, regardless of the number of syllables a word contains, the antepenultimate mora always carries a high tone.

3.3 Generalizations

The data sets in subsections 3.1 and 3.2 show that the location of rightmost high tone can vary between the penultimate and antepenultimate mora. In our analysis, we consider that high tone on the penultimate mora as reflecting a default pattern. Thus, for Japanese loanwords in TSM we propose that a left-headed2 bimoraic right edge foot is assigned over the last two moras in TSM. The head of this trochaic foot has H-tone accent. Additionally, in the data in (5)-(7), we find that words which ends in heavy-light syllable

2 Duanmu (2004) proposes that the basic metrical structure in Chinese includes both moraic trochee (left-headed moriac feet) and the syllabic trochee (left-headed syllabic feet), which can be called the dual-trochee. Taiwanese Southern Min is one of the Chinese dialects and it might also have this property.

sequences (CVV/CVN/CV_iV_j-CVO) always have a high tone on the antepenultimate mora; that is, such words have a falling contour (HL) on the bimoraic penultimate syllable, and this syllable can be considered as accented. Based on this fact, we infer that only syllable peaks are accentable and moraic codas are unaccentable. In these words ending in a heavy-light sequence, the final syllable is not footed and a trochaic foot is assigned over the heavy penultimate syllable; the head of this trochaic foot is assigned the H-tone accent. Thus, we note that accent location in the source word is not recognized and that accent is assigned by a default right edge trochaic foot in the TSM form. Further discussion and analysis with regard to the location of the high tone will be provided in the section 4.

Moreover, one can observe that tonal adaptation mimics closely (not exactly) the default accentuation of Japanese grammar. According to Shinohara (2000), in Japanese the default accentuation is the head of a non-final bimoraic trochaic foot while in TSM the accent on Japanese loanwords is assigned to the head of a final bimoraic trochaic foot. We further observe that once the accented mora is assigned H-tone all the other tones are predictable on the Japanese loanwords in TSM as reflected by the data sets in (1)-(7). Specifically, the word-initial mora (if unaccented) always has Mid (M) tone. (This perhaps reflects the initial lowering rule of Japanese.) Any moras that occur between the initial M tone and the accentual H-tone are assigned H tone. With respect to the moras after the accented one, a non-peak mora that is part of the syllable that is accented is assigned low tone as seen in (1a), (1c), (2b), (5), (6), and (7); a final monomoraic syllable is assigned M tone. Note the similarity to pitch accent assignment found in Japanese, in which L is assigned to all syllables following the accented syllable and there is L tone on the initial syllable (if unaccented) and H tone on any syllable between the initial and accentual H.

4. The default accentuation (the location of H tone: reflection of the accent)

As mentioned earlier, the location of the accent in Japanese is unpredictable, i.e. lexically-determined. So when Japanese words are borrowed by TSM, source accent location is not recognized. TSM uses a nativized pattern to reflect the accentuation of Japanese. In Japanese loanwords into TSM, a default high tone is assigned to the penultimate mora to show the prominence as the reflection of the accent in Japanese. The prominence is the head of a final bimoraic trochaic foot. However, if the word ends in heavy-light (CVV, CVN, CV_iV_j-CVO) syllable sequences, the high tone is assigned to the antepenultimate mora due to the fact that only syllable peaks are accentable. In what follows, we will provide an optimality-theoretic account for the location of the high tone with the variation between penultimate mora and antepenultimate mora.

4.1 The H tone falls on the penultimate mora

Consider the case where H tone falls on the penultimate mora. We know that prominence coincides with the head of a final bimoraic trochaic foot. The relevant constraints are given in (8) (cf. Prince and Smolensky, 1993, p.58; on Latin antepenultimate accent).

(8) **Foot-Binary**: Feet are binary at some level of analysis.

Align (F, R, PrWd, R) (Align-R): Align the right edge of every foot with the right edge of a prosodic word (PrWd).

Parse-Syllable (Parse-S): Parse every syllable into a foot.

Head-Left (Head-L): Trochaic feet

We assume that there is only one foot for the accentuation in a word borrowed into TSM. Since the accented syllable is at the beginning of a pitch fall, if words borrowed into TSM had two accents they would have two pitch falls, but this does not occur. According to McCarthy and Prince (1993), non-iterative foot-parsing can be obtained by ranking the constraint Align-R higher than the constraint Parse-S, as shown in the tableau (9).

(9) Align-R >> Parse-S

	Align-R	Parse-S
☞ a. σ σ (σ σ)		**
b.(σ σ)(σ σ)	*!*	

In (9), the winning candidate (9a) violates the lower-ranked constraint Parse-S and the failed candidate (9b)

is ruled out by fatal violation of Align-R.

Next, consider the fact that the prominence (the H tone) falls on the head of a bimoraic trochaic foot, the constraint Head-L must be higher-ranked than Head-R, as shown in the tableau (10).

(10) Head-L>> Head-R

HM	Head-L	Head-R
a. (μ **μ**)	*!	
☞ b. (**μ** μ)		*!

In (10), the candidate (10b) wins over the candidate (10a) by virtue of having a trochaic foot.

Then, consider that the H tone falls on the head of a bimoraic final foot. This can be obtained by ranking the constraint Align-R higher than the constraint Align-L, as shown in (11).

(11) Align-R>> Align-L

alumi? M**H**M	Align-R	Align-L
☞ a. μ (**μ** μ)		*
b. (**μ** μ) μ	*!	

Based on the above discussion and transitivity, the rankings of all the constraints used in (9)-(11) can be seen in (12).

(12) Align-R>> Parse-S, Align-L
Head-L >> Head-R

4.2 The H tone falls on the antepenultimate mora

In addition to the words in which the H tone falls on the penultimate mora, there are also words in which the H tone falls on the antepenultimate mora. Revisiting the data in (5)-(7), we find that the word with a H tone on the antepenultimate mora ends in a heavy-light (CVV/CVN/CV_iV_j-CVO) syllable sequence, where a sonorant coda occupies the penultimate mora, that is, the default position. Based on this fact, we assume that when the penultimate mora is not the peak of a syllable, the accent avoids being placed on a moraic coda or a non-peak element (e.g. tʰai.ja? **H**LM̲ 'tire'). Thus, we formulate the constraint in (13), showing that only syllable peaks can bear the accent (the H tone).

(13) Foot-Head-Peak (Ft-Head-Peak): Foot heads must be syllable peaks.

Now, let us consider the word *lai.ta?* **H**LM̲ 'lighter.' The H tone falls on the antepenultimate mora rather than the penultimate mora, so we know that the constraint Ft-Head-Peak must outrank the constraint Align-R, as shown in (14).

(14) Ft-Head-Peak >> Align-R

lai.ta? **H**LM̲	Ft-Head-peak	Align-R
a. μ (**μ** μ)	*!	
☞ b. (**μ** μ) μ		*

Since the actual form is (14b), the constraint it violates must be lower-ranked. Then the failed candidate (14a) has a H tone on the moraic coda and therefore is ruled out by violation of the higher-ranked constraint Ft-Head-Peak. From (12) and (14), we can get a fuller ranking, as shown in (15).

(15) Ft-Head-Peak >> Align-R>> Parse-S, Align-L

4.3 Local Summary

In section 4, we have analyzed the location of the H tone, which reflects the accent of the word borrowed into TSM. From the given data, it is found that the default prominent position is on the penultimate mora. Also, we find that when the words end in heavy-light sequences, the H tone falls on the antepenultimate

mora. The shift of the prominent position from the default position (the penultimate mora) to the antepenultimate mora is triggered by the property that only peaks are accentable. To account for the variation between the penultimate mora and the antepenultimate mora, we have proposed and ranked some relevant phonological constraints given in this section. In the next section, we will discuss further the tonal assignment on Japanese loanwords in TSM.

5. Tonal adaptations and the pitch accent assignment

In this section, we will provide an OT analysis to account for the tonal adaptation in Japanese loanwords into TSM. As mentioned earlier, in Japanese the location of the accent is unpredictable, but given the location of the accent, the pitch or tonal pattern of the entire word is predictable. In the previous section, we discussed how to determine the location of the accent of the words borrowed into TSM. Now, we will turn to the pitch accent assignment of the entire word.

According to Hasegawa (1999), the pitch accent pattern in Tokyo Japanese can be correctly derived by application of the following rules: (1) assign H to all syllables up to the accented syllable, if any, or to the final syllable if no syllable is marked accented; (2) assign L to all syllables following the accented syllable; (3) reassign L to the initial syllable unless it is accented. She further claims that in this analysis, accent is manifested as the H tone that is immediately followed by a L tone. Alongside this, we know that the accent in a Japanese word is marked by a falling pitch (H+L) and the accented syllable is the one just before the drop in pitch. This phenomenon is reflected by tonal adaptation of TSM in that a H tone is assigned to the accented prominent mora by default to the head of the right-edge foot (the location of the accent in Japanese is disregarded) and the syllable (or mora) after the accented mora always carries a M or L tone. To account for the tone on the accented more, we propose the constraint Prominent-H, as shown in (16).

(16) **Prominent-H**: Assign H tone to the head of a foot

Recall the data in section 3, where we can find that H tone is assigned to all syllables up to the accented syllable. In the words with multiple H tones, it is hypothesized that the H tone is linked to neighboring moras since the H tones are always on adjacent moras. Thus, we know that H tone spreads leftwards. Additionally, in considering the **Initial Lowering Rule** of Tokyo Japanese, i.e. assign L to the initial syllable unless it is accented, it is found in Japanese loanwords of TSM that the initial mora has a default M tone. The two properties 1) H tone spreads leftwards and 2) initial lowering effect with a default M tone on the initial mora can be exemplified by the word *kʰampai* MH**H**L ‘to toast.’ To account for the fact that H tone spreads leftwards, we propose the constraint Align-L (H, Wd), as shown in (17).

(17) **Align-L (H, Wd)**: Align H tone with the left edge of a prosodic word.

In addition, we use the constraint Initial M to account for the property that the initial mora has a default M tone unless it is accented, as shown in (18).

(18) **Initial-M**: Assign M tone on the initial mora.

As for the ranking of the constraints in (16)-(18), we need to consider the following discussion. First, since every word has a H tone, which is assigned to the prominent mora, we know that the constraint Prominent-H must be undominated. In considering the word *pʰa N* HL ‘bread,’ it is seen that the initial mora carries a H tone rather than a M tone because it is accented as the prominent mora. Thus, the constraint Prominent-H must outrank the constraint Initial-M. The ranking is reflected by the tableau (19).

(19) Prominent-H >> Initial-M

pHa N	Prominent-H	Initial-M
a. H L ☞ (pHa N)		*
b. M L (pHa N)	*!	
c. M M (pHa N)	*!	
d. M H (pHa N)	*!	

In (19), the possible candidates (19b) and (19c) are both eliminated by the constraint prominent-H since the prominent mora (the penultimate mora) does not carry a H tone. Also, the candidate (19d) is ruled out by the constraint Prominent-H since the H tone does not fall on the foot head but the last mora of the foot. The winning candidate (19a) violates the lower-ranked constraint Initial-M but fulfills the higher-ranked constraint Prominent-H. So the ranking in (19) can yield the actual form.

Let us consider a word with more syllables, misoþilu? MHHM ‘miso soup.’ In this word, we find that H tone is assigned to all syllables up to the accented mora, i.e. H tone spreads leftwards, but not to the initial mora. Thus, it is seen that the constraint Initial-M must be higher-ranked than the constrain Align-L (H, Wd). Incorporating this with the ranking in (19), we can build the ranking of the constraints in the tableau (20). In (20), the winning candidate only violates the lower-ranked constraint Align-L (H, Wd). The candidate (20b) violates the higher-ranked constraint Initial-M and the candidate (20c) violates the higher-ranked constraint Prominent-H, so both are eliminated.

(20) Prominent-H >> Initial-M >> Align-L (H, Wd)

misoþilu?	Prominent-H	Initial-M	Align-L (H, Wd)
☞ a. M H M mi so (þi lu?)			*
b. H M mi so (þi lu?)		*!	
c. M H M mi so(þi lu?)	*!		*

In this section we have provided an OT analysis that accounts for tonal adaptation in TSM. While we have not given a complete analysis (e.g. we have not accounted for the predictable difference of the final mora being M or L) it is clear that the loanword data reflect a pitch accent system similar to that of Japanese. In the next section, we will revisit the data in Section 3 to describe how tonal adaptation is affected by rime structure.

6. Tonal adaptations and rime structures

This section discusses the effect of rime structure on tonal realization of Japanese loanwords. In TSM, there are 7 tones, including 5 non-checked tones (H, M, L, LM, HL) and two checked tones (H, M). Looking at the given data in Section 3, we find that there are 3 different pitches (H, M, and L) in Japanese loanwords. Furthermore, it is shown that rime structure have some effect on tonal realization. First, consider the data in (21). We see that CV syllables always carry a level tone, either H or M; CVO syllables always carry a checked M-tone in word-final position. Thus, we know that an obstruent coda is not moraic since it does

not carry a tone of its own.

(21)

	Japanese		Taiwanese		Gloss
a.	susi	LH*	suβi?	H<u>M</u>	‘sushi’
	miso	HL	miso?	H<u>M</u>	‘miso (soybean paste)’
b.	arumi	LHH	alumi?	MH<u>M</u>	‘aluminum’
	kamera	HLL	kʰamela?	MH<u>M</u>	‘camera’
c.	katarogu	LHHH	kʰataloku?	MHH<u>M</u>	‘catalog’
	misosiru	LHHL	misoβilu?	MHH<u>M</u>	‘miso soup’

Then, in considering the data in (22), it is shown that CVN syllables are bimoraic and can carry a contour tone (HL). That is, a nasal coda carries a tone.

(22)

	Japanese		Taiwanese		Gloss
a.	pan	HL	pʰaN	HL	‘bread’
b.	kaban	LHH	kʰabaN	MHL	‘bag’
	remon	HLL	leboN	MHL	‘lemon’
c.	marason	LHHH	malasoN	MHHL	‘marathon’
	takuan	LHLL	tʰakʰubaN	MHHL	‘pickle daikon radish’
d.	tansu	LHH	tʰaNsu?	HL<u>M</u>	‘closet’
	penti	HLL	pʰentβi	HL<u>M</u>	‘pinch’
e.	patinko	LHHH	pʰatβʰiNko?	MHL<u>M</u>	‘Japanese gambling game’
	toranku	LHLL	tʰ•laNkʰu?	MHL<u>M</u>	‘trunk’

Also, diphthongs can carry contour tones, as shown in the data (23).

(23)

	Japanese		Taiwanese		Gloss
a.	taiya	LHH	tʰaija?	HL<u>M</u>	‘tire’
	taoru	HLL	tʰaulu?	HL<u>M</u>	‘towel’
b.	nekutai	HLLL	nekutai	MHHL	‘necktie’
	abunai	LHHL	abunai	MHHL	‘dangerous’
c.	doraibaa	LHHHH	lolaiba?	MHL<u>M</u>	‘screwdriver’
d.	sutoraiku	LHHLL	sutolauku?	MHHL<u>M</u>	‘strike (baseball)’

Similarly, the data in (24) show that long vowels can bear contour tones.

(24)

	Japanese		Taiwanese		Gloss
a.	meesi	LHH	meeβi?	HL<u>M</u>	‘business card’
	biiru	HLL	biilu?	HL<u>M</u>	‘beer’
b.	kuriimu	LHLL	kʰuliimu?	MHL<u>M</u>	‘cream’
	massaazi	LLHLL	masaatβi?	MHL<u>M</u>	‘massage’

c.	burookaa	LHHHH	bulookʰa?	MHL<u>M</u>	‘broker’
d.	pasupooto	LHHLL	pʰasupʰooto?	MHHL<u>M</u>	‘passport’

As a result, we can make a generalization that an obstruent coda is not moraic but a sonorant coda is moraic. This is consistent with Gordon (2001) who conducted a survey of contour tones in 105 languages. He found a hierarchy of tone bearing ability, whereby CVV is heaviest, followed by CVR3, followed by CVO and CV. From the data in (21)-(24), we see that CVV and CVN syllables have contour tones while CVO and CV syllables do not. Now consider the data in (25). Here, we find that heavy syllables may bear the tones HL or MH. When the heavy syllable is initial and unaccented, it bears MH due to the default tonal assignment (i.e. it can be accounted for by the constraint ranking presented in the previous section); when the heavy syllable is accented, it bears HL. In an accented heavy syllable (CVV/CVN/CV_iV_j), the 2nd mora carries L tone.

(25)

Japanese		Taiwanese		Gloss
a. kanban	LHHH	kʰampaN	MH**H**L	‘signborad’
b. kanpai	LHHH	kʰampai	MH**H**L	‘to toast’
c. zyanken	LLHL	tɸiaNkʰen	MH**H**L	‘scissor-paper-rock’
d. enzin	HLLL	entɸin	MH**H**L	‘engine’
e. nairon	HLLL	nailoN	MH**H**L	‘nylon’
f. kaaten	HLLL	kʰaten	MH**H**L	‘curtain’
g. kyuunyuu	LHHH	kʰjunju	MH**H**L	‘choke (car part)’

One interesting observation noted by Hsieh (2006) is that the MH tone that is realized on the initial syllable in (25) does not otherwise occur in TSM. We account for such data by the constraint rankings proposed in the previous section; they would be difficult to account for in other analyses.

6. Do rime structures determine the loan tones? (Hsieh 2006)

Different from our analysis, Hsieh (2006) argues that it is the rime structure that determines the loan tones with the source Japanese accent being totally disregarded. The source language pitch patterns are ignored and the tone assigned to the loanwords is a bijective function of the rime structure. Furthermore, he proposes tone assignment rules, as given in (26) where rime type is matched to a specific tone. He further claims that general tone sandhi4 in TSM applies to Japanese loanwords as well.

(26) Tone assignment rules (Hsieh, 2006)

a. CV	H
b. CVN/CVV/CViVj	HL
c. CVO (checked syllable)	M

There are some problems in Hsieh’s analysis that remain unsolved. His analysis is complicated in that it needs to refer to tone sandhi, chain shifts, and some special rules for loanwords. First, consider what motivates tonal chain shifts. Hsieh (2006) argues that “the motivation for tonal chain-shifts in Taiwanese is better analyzed as the intolerance of tonal neutralization on the non-final position of a tone group due to the fact that non-final syllables are proven to be significantly shorter than the domain-final syllable.” However, as he points out, the domain-final lengthening account is apparently not applicable *word-internally*. Second, consider older attested loanwords longer than four syllables, such as *asupʰalagasu?* MHHHH<u>M</u> ‘asparagus’ and *sanhulanɸisuko?* MHHHHH<u>M</u> ‘San Francisco.’ It can be seen that the medial syllables all carry high tone regardless of their rime structures. Also, tonal sandhi does not apply to the two words. But our analysis

3 CVR indicates the syllables containing a short vowel plus a sonorant coda.

4 See Hsieh (2006), p. 13.

posited independently of these two forms is strongly supported by the cases of words longer than four syllables. Tonal adaptation as seen by the Japanese loanwords in (1)-(7) can simply be accounted for by pitch accent assignment that seems to reflect a default accentuation. This is done by our optimality-theoretic analysis presented in Sections 4 and 5.

7. Concluding remarks

In this paper we have offered a new conception of the tonal pattern of borrowed Japanese words into TSM. Specifically, we claim that Japanese loanwords in TSM are assigned tone by a pitch accent system. We have offered an optimality-theoretic analysis of tonal adaptations of Japanese loanwords into TSM. We believe the pitch accent nature of TSM tonal adaptation is clear from the data in (1)-(7) and does not reflect matching rhyme type to tone as in Hsieh (2006). A larger question is where this pitch accent system comes from. There are several possible answers that are not necessarily mutually exclusive. Firstly, the accentuation of Japanese loanwords in TSM may be an emergent pattern that either reflects Universal Grammar or covert foot structure existing within TSM. Secondly, it may reflect some default tonal assignment borrowed from Japanese or already existing within TSM. And thirdly, this may be an interesting case where the pitch accent system of Japanese is borrowed into TSM but without the lexical specifications of accent on the Japanese words. The way in which the borrowings into TSM mimic in a general way Japanese word intonation (i.e. with an initial rise, then H tone to the accented mora, followed by a final fall) is suggestive of a case of borrowing. We leave this interesting matter for future research.

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