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THE ASSIMILATION OF JAPANESE LOANWORDS IN TAIWANESE HOKKIEN

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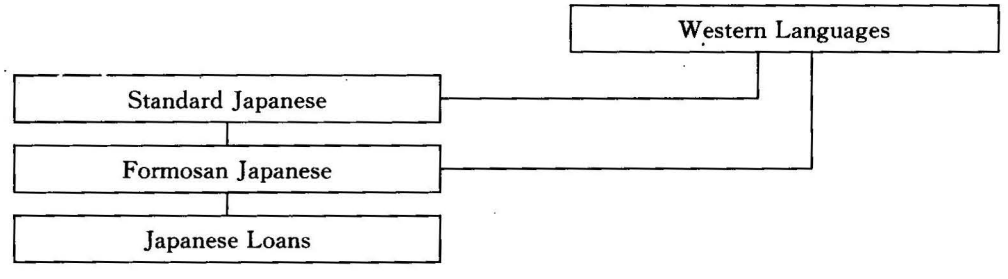
O. Introduction

It is probably one of the rare cases of language contact that Taiwanese Hokkien has developed a set of phonological rules to assimilate Japanese loanwords systematically. Exceptions are expected, but the highly regular application of the rules is amazing. This high regularity must be attributed to the pace of Japanese education in Taiwan and the intensity of the education in the later years of the Japanese administration. By the end of the 50 years of Japanese administration, a variety of Japanese had been developed, well established, and well accepted in Taiwan, which shall be called "Formosan Japanese". It seems that make Taiwanese speak the Emperor's Japanese. The *laissez-faire* probably is the main factor that Taiwanese can find its way to assimilate Japanese words systematically. The venue is Formosan Japanese, through which the great majority of Japanese loanwords are borrowed. Even loans from Western languages have had to be translated into Formosan Japanese pronunciation first in most cases.

In this country, this exact climate is never created by English, education, which is nearly nil except language teaching, nor by Chinese education, which is too ambitious that becomes smothering, disallowing Taiwanese to function normally. Although the history of Chinese education in Taiwan (47 years) is nearly as long as that of Japanese education (50 years), there are only a handful of Mandarin words in Taiwanese that are considered Chinese loans. Most of the cases of the mixture of Mandarin and Taiwanese are considered code-switching rather than borrowing. There is yet no clear system of assimilation rules that can be satisfactorily stated, for the current trend is still aiming at a more standard variety of Mandarin, and a standardized "Taiwanese Mandarin" is still in gestation.

The general process of borrowing Japanese words into Taiwanese is summarized in the following float chart:



It must be understood that since Formosan Japanese has been spoken by the same people who speak Taiwanese, it is very often difficult to distinguish Japanese loans in Taiwanese from their equivalents in Formosan Japanese. However, since Formosan Japanese and Taiwanese are different linguistic systems, it is necessary to label the words as either Japanese or Taiwanese. In the examples in this paper, I will try to distinguish them as best as I can.

The purpose of this paper is to study the Japanese loans in question and state how they are assimilated. In the process of assimilation, Japanese consonants, vowels, and pitches are treated in a way that is acceptable to Hokkien speakers, with variations depending on Taiwanese dialectal differences. Of these segmentals and suprasegementals, pitches are the most spectacular and attract the most attention from scholars and concerned laymen. However, since the assimilation involves more than suprasegmentals, segmentals also receive due length of discussions.

Besides variations, there are also exceptions. At least four reasons can be accounted for them. First, in a minority of cases, Standard Japanese rather than Formosan Japanese is the donor. Second, although Formosan Japanese was a norm in Taiwan which has been supplying most of the loanwords to Taiwanese Hokkien, some of those who did not speak Japanese or those who knew little Japanese made some of their non-standard forms of loanwords to circulate and take root. Third, in the past fortyseven years after Japanese ceased to be the national language of Taiwan, more and more English words have been borrowed into Taiwanese without going through Formosan Japanese. Fourth, Western loanwords in Mandarin and Chinese English have began to interfere with the assimilation rules, especially for initial consonants.

Taiwanese lexical items, including Japanese loanwords, are presented in Taiwanese Roman Orthography (also known as Church Romanization). Owing to the limit of computer characters, tone 8 (lower entering tone) is marked with a grave accent instead, e.g. *jìp-òh* 'to enroll in a school'. Besides, as the traditional Church Romanization is not capable of embodying all the distinctive phonological units in Taiwanese Hokkien, additional graphological presentations are designed, as the following:

v̄ high-rising in live syllable, e.g.
thiān-pú-lah 'tempura'

v̄c high-rising in checked syllable, e.g.
phút-lūt-sūt 'to do...nimbly'

v̀c high-level in checked syllable in combination, e.g.
la-khiát-toh 'racket'

v̂c mid-level in checked syllable in combination, e.g.
siôk-pháng 'loaf bread'

u̍ high-front rounded, e.g.
ū-sí- 'therefore

i̍ high-back unrounded, e.g.
chhī-phián 'floppy disk'

e̍ mid-back unrounded, e.g.
tā-chiá-lé- 'a kind of lottery'

Two of the tones, v̀c and v̂c, are limited to Japanese loans. They are in contrast with traditional tones (see Section 1.4). Almost all the Formosan Japanese words in this paper have their Taiwanese equivalents as loanwords.

1. Pitches and Tones

In the process of assimilating Japanese words, Formosan Japanese pitches have to be

rendered into Taiwanese tones. Four steps are taken for the translation: (1) identifying pitch units, (2) allocating pitch heights to each pitch units, (3) contracting pitch units to form pitch contours, and (4) assigning tones to pitches and contours.

The assignment of tones is based on Taiwanese interpretation of Japanese rimes. Traditionally, it is analyzed in terms of vowel length and syllable position. For instance, sa$_7$abisu 'service' is interpreted in two ways in Taiwanese: sā-bì-sù and sa-bí-suh. The traditional approach, such as in Hung 1985:95–97, considers both a and i in the first instance as the rendering of (Formosan) Japanese long vowels, and in the second instance as short vowels. The approach makes the rules very complicated. (see ibid. and Hsie 1982:45–53) This paper takes another approach and identifies the a and i in the first instance as being specified by the absence of glottality in the donor, and in the second instance as being specified by the presence of glottality. The rules then become very simple.

1.1. Glottality and Pitch Units

With a few exceptions, Formosan Japanese words do not contrast in pitches like Standard Japanese. In other words, the pitches of of a word is predictable. The predictability relies on the nature of Formosan Japanese syllabic units. Some units are specified by the presence of glottality, and some by its absence. In other words, the pitch pattern is ultimately conditioned by the specification of glottality.

In Formosan Japanese, two groups of rimes are recognized based on their behavior with regard to pitches. One group, called "basic pitch units", consists of (1a) Japanese genon, i.e. the vowels a, i, u, e, and o, (1b) Japanese yoon, i.e. ongliding disphthongs ia, iu, and io, and (1c) sequences of vowels followed by a sokuon, i.e. a non-nasal consonant assimilated to its following onset, such as ap, at, as, and ak. This group can carry level pitches only. Another group includes all the live rimes, such as aa. ai, an, yaa, wai, and yan. They can carry contour pitches as well as level pitches.

This difference in pitch superimposition is conditioned by the presence or absence of glottality. When a rime is [+ glottal], no contour is allowed. Group 1 is marked by glottality and, therefore, is not expected to carry a contour pitch. Subgroup (1a) and subgroup (1b) always have a glottal stop following them in isolation. (cf. Hsie 1980:12) This glottal stop is deleted in combination or when preceded by a rime of group 2. Furthermore, in Taiwanese Hokkien, checked rimes have an underlying [+ glottal] feature specification. (Chang Y. 1988:744–47) The Taiwanese glottality in this environment is carried over to Formosan Japanese in subgroup (1c).

Group 2 rimes as a a whole are not marked by glottality at all. Each of them is a combination of two parts, beginning with a basic unit. The ending constituent, called an "offglide", is either an identical vocalic, a semivocalic glide, or a nasal, e.g. a–a, a–i, a–n, ya–a, wa–i, ya–n, etc. The offglides are specified as [– glottal]. The absence of glottality in the offglide makes a rime "alive" and able to form contours.

Both types of the pitch units are listed in the following table. The upper case B, D, and G represents labial, dental, and velar non-nasals respectively.

Basic Pitch Units [+ Glottal]		a i u e o ya yu yo wa aB aD aG iB iD uD oB oG uG yaB yaD yaG yuD yuD yuG WaD
Offglides [–Glottal]	Vocalic	a i u e o
	Semivocalic	i u
	Nasal	m n ng

1.2. Pitch Patterns

A pitch height is assigned to each pitch unit in Japanese. The assignement of pitches works from the end of a word to the beginning in Formosan Japanese. It is show as in the following figure:

(1) All Formosan Japanese words end in a low tone on the final unit, no matter whether it is [+ glottal] or [− glottal], e.g.,

$_{7}$hu 'a light cake made of wheat-gluten'
pa$_{7}$n 'loaf bread'
mi$_{7}$so 'salty bean past'
haba$_{7}$ki 'toe-kick'

(2) Moving forward, the pitch in the penultimate unit is high if the unit is [+ glottal], i.e. belonging to group one, as shown in the last two examples above. The pitch remains low if the unit is [− glottal], i.e. an "offglide", but the antipenultimate unit must be high, e.g.

pu$_{7}$uru 'swimming pool'
ta$_{7}$iru 'tile'
bare$_{7}$nsha 'a kind of orange'

(3) A high pitched unit is preceded by as many other high pitched units as there are, except the beginning unit, in the word, e.g.,

kya ˩ rame$_{7}$ru 'caramel candy'
a ˩ suparage$_{7}$su 'asparagus'

(4) The remaining unit, at the beginning of the word, must have a mid pitch, e.g.,

ha ˩ baki 'toe-kick'
ba ˩ rensha 'a kind of orange'
kya ˩ rameru 'caramel candy'
a ˩ suparagasu 'asparagus'

This mid pitch is not in contrast with the low pitch in Japanese, but its corresponding tone is distinctive in Taiwanese. Examples will be given in the following section on tones.

The pitch pattern in Formosan Japanese thus is very simple. Only one feature, [high], is needed to specify the pitches of syllabic units.

$$[+\text{ glottal}] \rightarrow [-\text{ high}] \;/\; \begin{array}{l} \underline{\quad}\,\# \\ \underline{\quad}\,[+\text{ pitch}]\,\# \\ [-\text{ glottal}] \\ \#\,\underline{\quad}\,[+\text{ high}] \end{array}$$

The initial [− high] is realized as a mid pitch. In other environments, it is realized as a low pitch.

1.3. Contours

When two basic units are adjacent to each other, ascending pitch steps are formed if they are at the beginning of a word, and descending steps are formed if they are at the end of a word. When a rime of the second group, i.e. a basic unit followed by an offglide, occurs at the beginning of a word, there is an upward slide of pitches, and when it occurs toward the end of a word, there is downward slide of pitches. These slides are the pitch contours in Formosan Japanese.

	Initial	Final
Basic + Basic	step up	step down
Basic + Glide	slide up	slide down

In the following examples, the first group illustrates the downward slide, and the second group the upward slide.

pa$_{7}$n 'bread'
mishi$_{7}$n 'sewing machine'
ri$_{7}$ngo 'apple'
bini$_{7}$iru 'thin plastic sheet'

ri$^{\lrcorner}$njin 'carrot'
wa$^{\lrcorner}$ishatsu '(white) shirt'
cho^{7}onekutai 'bow tie'

1.4. Tones

Not all tones in Taiwanese Hokkien are matched with Formosan Japanese pitches. For each pair of steps, two tones are used to match them; for upward slide, a high-rising tone is used; and for downward slide, a high-falling tone is used. The following is a list of indigenous tones with their pitch and contour realizations in isolation and in combination in major dialects. Pitches and contours that are used to translate loanwords are underlined.

TONE CATEGORY	ORTHOGRAPHY	high	mid
1 (A1)	a	falling	high
2 (B)	á	low	falling
3 (C1)	à	low/mid	falling
4 (D1)	ah	low-rising	mid/low
5 (A2)	â	mid	low
7 (C2)	ā	(various)	low
8 (D2)	àh	high-rising	high-rising
9	ā		

Of these tones, 1, 2, 3, 4, and 9 are used to interpret Formosan Japanese pitches and contours. In the following presentations, numerals preceding a hyphen means tones in combination; otherwise, they mean tones in isolation. Examples hereafter will be given in Taiwanese forms.

1–	← min	tho-má-toh 'tomato'
2	← falling	mi-sín 'sewing maching'
2–	← high	ba-tah 'butter'
3	← low	bì-lù 'beer'
3–	← falling	bì-lù 'beer'
4	← low checked	bá-suh 'bus'
9–	← high-rising	oāi-siá-chuh 'shirt'

In loanwords, the pitch hèights of Japanese checked segments are retained as they are in Formosan Japanese. The result is that some checked segments in the loans have tonal realizations that do not exist in indigenous words. These realizations are mid pitch and high pitch in combination. Most Taiwanese dialects do not substitute low pitch (Tone 8, D2) for the mid pitch, and many dialects do not substitute falling pitch (Tone 4, D2) for the high pitch. Instead, new tone categories are recognized as in contrast with the traditional Tone 8 and Tone 4. They are called Entering Tone 1 (1^{e}) and Entering Tone 2 (2^{e}) respectively according to Chang K. 1992. E.g.,

1^{e} siôk-pháng 'loaf bread'
8 siòk-pháng 'cheap bread'
2^{e} la-khiát-toh 'racket'
4 khiat-tòh 'to strike [a match] to ignite'

1.5. Dialectal Variations

According to the statement above, when a final tone is noncontour and is preceded by a contour tone, it will be Tone 3, and the penultimate tone will be Tone 3 in combination (e.g. lín-gò 'apple'). When it is preceded by a level tone, it will be Tone 4, and the penultimate tone will be Tone 2 in combination (e.g. bá-tah 'butter').

Penultimate Tone	Final Tone
3 (falling)	3 (low, live)
2 (high)	4 (low, checked)

Some dialect speakers treat all final units uniformly, however. One variety is to use Tone 3 in all cases, thus bá-tà 'butter'. Another (such as in Juan 1990:109-12) is to use Tone 4 throughout instead, thus phòm-phuh 'water pomp'.

It is also indicated in Section 1.4 that some dialects do not have Tone 1^{e} and Tone 2^{e}. In these dialects (ibid.) Tone 8 is used to render the high mid pitch of Japanese checked rimes, and Tone 4 is used to render the high pitch, e.g.

bàt-té-lih 'battery'
la-khiat-toh 'racket'

2. Syllable Onsets

Hokkien has more voiceless stops and affricates than Japanese. Japanese only has one series of these voiceless obstruents; whereas Hokkien has two, distinguished by aspiration. On the other hand, Hokkien does not distinguish [d], [l] and [r]; whereas Japanese contrasts/d/and/r/. The phonological treatment of Japanese loans involving the voiced dental series is simpler and will be discussed first. That involves the voiceless stops is more complicated. In both cases, there are far more exceptions than pitches in the modern inventory of loanwords. Yet more exceptions concerning the interpretation of consonants in loanwords are caused by current influences from foreign languages, i.e. English and Chinese (see Section 5).

The third category of syllable onsets that involves assimilation is the voiced strident. Some Hokkien dialects do not have a/j/phoneme. In these dialects, Japanese j becomes/l/or/g/, or both.

2.1. Non continuant Voiceless Obstruents

It seems that non-continuant voiceless obstruents in Formosan Japanese can be considered aspirated in their underlying forms. The voiceless affricates are realized as unaspirated in nearly all environments. The stops have very uneven distributions, except in word initial positions.

In word intitial positions, all voiceless stops are aspirated. In the same position, the voiceless affricate is normally aspirated only before ia, a phenomenon that defies explanations. e.g.

phi-sú-tóng 'piston'
tho-lá-khuh 'truck'
khu-lát-chih 'clutch'
chí-bih 'shorty'

chhiàng-sù chhiàng-sù 'by chance'

In medial syllables, the aspiration is not as stable. The norm is that all reduplicatives are aspirated, e.g.

phīn-phóng 'ping-pong'
tha-thá-mih 'straw mattress'

that all dentals become unaspirated, e.g.

bi-tá-bín 'vitamin'
ho-té-luh 'hotel'
o-tó-bái 'motorcycle'
khe-chiáp-puh 'ketchup'

and that all velar stops remain aspirated, e.g.

sa-khá-bah 'Japanese tavern'
kho-khín-gù 'cocking'
ne-khù-tài 'necktie'
chio-khó-lè-tò 'chocolate'

As for labial stops, it is difficult to say which way is more prominent. E.g.,

chhiām-phá-lah-lah 'samurai drama'	chhiām-pá-lah 'samurai drama'
khōm-phá-suh 'compass'	
oān-phì-sù 'a dress'	
sām-phú-luh 'sample'	sām-pú-luh 'sample'
phu-ló-phé-lah 'propeller'	
pha-sú-phò-tò 'passport'	
	e-pú-lóng 'apron'
	thiān-pú-lah 'tempura'
	a-sú-pá-lá-gá-suh 'asparagus'
	lān-pò-siá-chuh 'short-sleeved shirt'

In the final syllable of a word, labials are unaspirated more than aspirated. Dentals are also unaspirated, and cases of unaspirated velar seem to be as numerous as the aspirated. When a syllable follows a checked syllable, then its initial stop is always aspirated. E.g.,

khān-pái 'cheers!'	
gu-lù-pù 'group'	gu-lù-phù 'group'
sût-pái 'spy	
mè-tà 'meter'	
bi-sú-khiát-toh 'biscuit'	
būn-chín 'paper weight'	
thōng-khá-chuh 'fried pork chop'	
ha-bá-khih 'toe-kick'	
phàng-khù 'burst; have a flat tire'	
Kha-lá-ó-kheh 'kara O.K.'	
phàng-khò 'bread crumbs'	
giān-kháng 'entrance-hall'	giān-káng 'entrance-hall'
	bu-lò-kà 'broker'
	bá-kah 'fool'

The overview of the aspiration assignment can then be stated as follows. Japanese stops are aspirated as a norm in Formosan Taiwanese, and Taiwanese borrows Japanese words

accordingly. In non-initial positions, except in reduplicatives, labials regularly become unaspirated in final syllables; dentals become unaspirated; and velars remain aspirated except in final syllables. In reduplicatives, stops also remain aspirated. The whole picture of the normal cases is charted in the figure below, with + stands for [+ aspirated], and-for [− aspirated].

	Initial Medial	Final	Reduplicate	
Labial	+	+ / −	−	+
Dental	+	+	−	+
Velar	+	+	+ / −	+
Affricate	+ / __ ia −	−	−	+ / __ ia −

2.2. d, l, and r

Japanese does not distinguish l and r, and Taiwanese /l/ is a variation of [d, l, r] depending on its following vowel, on its position in a word, and on the speed of utterance. All d, l, and r in the source languages become /l/, which is mostly realized as [1], e.g.

o-lián (oden) 'stuffed bean curd and accompanying food'
nāi-lóong (ribon) 'ribbon'

2.3. j, l, ang g

Some Hokkien dialects in Taiwan do not have /j/. One group treats Japanese /j/ [j, z] uniformly as /l/, e.g.

lió-toh 'good quality; louck'
la-lí-oh 'radio'

The rule for this group is:

[+ coronal, + voiced] → [− strident]

Another group uses /g/ before the high-front vowel, e.g.

gió-toh 'good quality; lucky'
la-gí-oh 'radio'

The additional rule is:

[+ con, + hi, + vd] → [+ bk] / ____ [+ con, + hi, + bk]

It is predictable that the second group of speakers would use /l/ before other vowels occurring after Japanese /j/. Actual examples of such environment are not found, for either group, however. Similarly, since Taiwanese Hokkien /j/ only occurs before /i, u, e/, there is no phonological rule for these dialects to convert /j/ in Japanese loans occurring before /a, o/. It is not known how Japanese za and zo would be assimilated into Taiwanese, for loanwords of this kind are not attested either.

3. Syllabic Consonants and Syllable Codas

Non-onest consonants in Japanese are syllablic in the Japanese phonological system. The non-nasal is identical with its following non-nasal and is thus realized phonetically as the beginning of a long consonants. The nasal in non-final positions is assimilated to the point of articulation of its following consonant. Although syllabic nasals do occur in Taiwanese Hokkien, the Japanese syllabic nasal is not treated as such in loanwords. Both nasal and non-nasal Japanese syllabics become codas in Taiwanese.

In translating Japanese syllabic consonants into Taiwanese syllable codas, Taiwanese

phonotactics plays its rôle. The inventory of vowel-consonant clusters in Taiwanese is as the following. These rimes are presented in Taiwanese Roman Orthography. Actual sounds are included in square brackets when necessary.

im	in	
ip	it	
	ian [en]	eng [ieng]
	iat [et]	ek [iek]
am	an	ang
ap	an	ak
iam		iang
iap		iak
	oan	oang
	oat	oak
	un	
	ut	
	iun	
	iut	
om		ong
op		ok
		iong
		iok .

When a Japanese syllabic consonant becomes a syllable coda in Taiwanese but the resulting rime is illegal in Taiwanese, the final consonant will be changed according to its preceding vowel. The changes are listed in the following figure. For lexical examples of regular rendering see the following sections.

Japanese	→	Taiwanese
ing		in
iG		it
em		ian [en]
eB		iat [et]
wam		oan
waB		oat
yan		iang
yaD		iak
um		un
uB		ut
ong		ng/un
uG		ut
on		ong
oD		ok

Since the foreign clusters of low vowels and dentals are acceptable to Taiwanese, Japanese yan [ian], yaD, on, and oD are often rendered without changing the point of artculation of the codas. E.g.,

Hòn-là 'Honda'

Since im, ip, om, and op are less common than in, it, ong, and ok, they are occasionally substituted by the latter respectively. E.g.,

sít-puh ~ síp-puh 'hot compress'
póng-pù ~ pòm-pù 'water pomp'

Furthermore, since Japanese iom, ioB, ion, ioD, iong, and ioG are either rare or non-occurring, and since words containing them are not borrowed into Taiwanese, they are not listed in the chart above.

3.1. The Non-nasal

In Japanese, the non-nasal syllabic only occor in non-final positions of a word. It is realized as p, b, t, d, s, z, sh, ch, j, ts, k, g. Not all of these phonetic manifestations can occur in Taiwanese as syllable finals. Therefore, in loanwords, all labials are treated as-p, all dentals as −t, and all velars as −k, wherever Taiwanese phonotactics allows. E.g.,

áp-puh 'to erect, as penis'
ât-sá-lih 'without reserve'
tho-lák-khuh 'truck'

Wherever the phonotactic rules do not allow, the point of articulation of the final consonant has to be changed as in the chart above, e.g.

sût-pái (instead of *sûp-pái) 'spy'

Occasionally, a final consonant will be introduced where there is no syllabic non-nasal in standard Japanese, e.g.

khóp-pih 'to copy'
sût-pái (supai) 'spy'

Conversely, a Japanese syllabic non-nasal may not realize in Taiwanese, e.g.

a-sá-lih (assari) 'without reserve'

The addition of a consonant is not exceptional to the assimilation rules, for an additional syllabic non-nasal often occur before a syllabic onset Formosan Japanese. As for the loss of the syllable coda, it is a later development, which yields doublets. For instance, there are two occurrences of the word meaning 'without reserve': ât-sá-lih and a-sá-lih.

3.2. Final Nasal

In loanwords, the Japanese nasal syllabic in word final position is translated into final dental or velar nasal coda. The choice is based on the phonetic height of the vowel. After low vowels, it becomes −ng, and after non-low vowels, it becomes −n. E.g.,

pháng 'loaf bread'
tiān-lóng 'a bowl of rice with tempura'

mi-sín 'sewing-machine'
jiāng-kián [kien] 'to play paper-stone-scissors'
su-púu 'No. 3 club in golf'

The distribution in Taiwanese is as the following figure:

Vowel	Final Nasal
i−, e−, u−	−n
a−, o−	−ng

However, since oang is a rare syllabic in Taiwanese, oan is often preferred for Japanese wan. E.g.,

jiu-sú-oán 'the first point gained after deuce'

3.3. Non-final Nasal

Like the non-nasal syllabic, a Japanese non-final nasal syllablic is assimilated to the point of articulation of its following onset in Taiwanese . It becomes −m before p, b, m, becomes −n before t, d, r, s, z, ch, ts, j, n, and becomes −ng before k, g. Again, these rules of adaptation must be modified by the phonotactic rules of Taiwanese. The instances of nasal syllabic occurring before vowels and h follow the rules for the final nasal syllabic. The first list below are examples of the nasal coda in Taiwanese agreeing with the point of articulation of their following onsets. The second list are those of adjustment according to phonotactic constraints.

lám-pú 'lamp'
sàm-mà 'Cololabis Saira, a mackerel'
oān-táng 'wonton dumpling'
hān-ló-luh 'steering wheel; handlebar'
oān-sé 'made in Taiwan'
līn-jín 'carrot'
jiāng-kián 'to play paper-stone-scissors'
hāng-gó 'a canteen'

thiān-pú-lah 'tempura'
bôk-sìn-gù 'boxing'

Combining the nasal and non-nasal syllabics consonants, the assimilation rules are as the following.

$$[+\text{ nas}] \rightarrow [\text{ Aant, Acor, } -\text{hi }] \;/\; [+\text{ syl, } -\text{lo }] \_\_\_\_ \begin{matrix} \# \\ [-\text{ con }] \end{matrix}$$

$$[+\text{ con }] \rightarrow [\text{ Aant, ßcor, } -\text{cont, } -\text{str }] \;/\; \_\_\_\_ \quad [\text{ Aant, ßcor }]$$

Phonotactic rules will apply following the second rule above. Whether the stop codas are voiced or voiceless is irrelevant. (cf. Chang Y. 1988b:21)

4. Vowels

Except for some dialects, such as in Taipei, in which there are exactly five oral vowels as in Japanese, most Taiwanese Hokkien dialects have at least six oral vowels. The six-oral-vowel dialects are divided into two groups according to the phonetic realization of /o/. Roughly speaking, Mid-south and South Taiwanese dialects do not have a contrast between closed o (orthographically 〈o〉) and open o (orthographically 〈o〉), with the closed o becoming unrounded. This unrounded mid-back vowel (orthographically 〈o〉 also) corresponds to the closed o in other dialects. In order to make the comparison and discussions clear, it is presented as e.

Group 1		Group 2		
i	u	i		u
e	o	e	e	o⁻
a	o⁻		a	

Japanese does not have a contrast between closed o and open o. For Taiwanese dialects to borrow Japanese words, Group 2 uses open o (graphologically 〈o〉) for Japanese o, e.g.

o⁻-tó⁻-bái 'motorcycle'

Group 1 is further divided into two subgroups with regard to the treatment of Japanese o. One renders Japanese o as closed o in all environments, e.g.

o̅-tó̅-bái 'motorcycle'
tho-má-tob 'tomato'

These dialectal differences are charted as the following:

	Live Open	Glottalized
Group 1a	o	oh
Group 1b	o̅	oh
Group 2	o̅	o̅h

5. Exceptions

As already shown sporadically in the passages above, the assimilation rules of Japanese loanwords are not without exceptions. Some exceptions can be explained with reference to non-phonological realms of linguistics. Other exceptions are caused by interference from other phonological systems, including Standard Japanese, Standard English, and Chinese English.

5.1. Morphologically Conditioned Exceptions

Exceptions to the Formosan Japanese phonological systems with regard to loanwords are of two kinds. The first kind is for disambiguation, and the inventory is very small. Many pairs of words whose pitches are in contrast in Standard Japanese become homophones in Formosan Japanese, owing to the lack of contrast in pitch patterns in the latter. In spite of the handicap, homophonous words can be disambiguated in contexts. Among the homophones that cannot be so disambiguated are some personal address terms. The words for 'grandfather' and 'grandmother' are pronounced in the identical pitches as in Standard Japanese and are borrowed into Taiwanese as such. The effect is that they become in contrast with 'uncle' and aunt' respectively:

o-jì-sàng 'grandfather'
(According to Formosan Japanese,
it would be o—jí-sáng)
o-jì-sàng 'uncle'

o-jà-sàng 'grandmother'
(According to Formosan Japanese,
it would be o—bá-sáng)
o-bà-sàng 'aunt'

The second kind of morphologically conditioned exceptions probably has to do with Taiwanese speakers' intuition of words and phrases. In Standard Japanese , no matter how long a word is, there is only one dip of the pitch in that word; but in Formosan Japanese, if a Japanese word is too long, it will be interpreted as a phrase, and there will be a dip within the "phrase". E.g.,

yaki$_7$ulong$_7$teesio$_7$ku 'set meal with fried noodles as the entree'
(Standard Japanese yakiudonte$_7$ishoku)

In loanwords, similarly, if the Taiwanese consider a Japanese word as a phrase, a dip will be added to begin a new word with an initial mid tone. The tone in the syllable before the dip is not lowered to the low tone as in word final syllables, however. In the following example, a dip, or a word juncture in Formosan Japanese, is marked with a . E.g.,

chiō ne–khú-tái 'bow tie'

In this respect, the words for 'grandfather' and 'grandmother' can also be interpreted as phrases rather than compounds. As a matter of fact, Japanese san, a respective address suffix, is treated as a separate word in Formosan Japanese except in 'aunt' and 'uncle'. The two pitch units in san would form a downward slide in Formosan Japanese according to the rules. Nevertheless, the actual pitch is low without a contour. If the segment preceding san is an "offglide", the offglide always has a low pitch in Formosan Japanese and forms a slide with its preceding basic unit, except in 'uncle' and 'aunt'. The slide becomes a falling tone in Taiwanese. In other words, the preceding segments are considered as an independent word. If the segment preceding san is a basic pitch unit, the latter remains high, as in Standard Japanese. A space is used to present this morphologically conditioned juncture, and the tone preceding this address term is marked as it is in combination. E.g.,

Lí Sàng 'M. Li'
Siá Sàng 'M. Hsie'
U–é–nó Sàng 'M. Ueno'

Concerning syllabic onsets, when a Japanese "word" is interpreted as a phrase by Taiwanese, each Formosan Japanese "word" of the phrase retains the specification of aspiration as it is in isolation. For instance, khīn–thá–mah 'testicle' is interpreted as khín 'gold' plus thá–mah 'pellet'. Since thá is aspirated and since thá-mah is a word in the "phrase" khīn-thá-mah, thá-does not follow the norm, and thus remain aspirated. Another example is ba-ká-iá-ló 'you idiot', which is a compound of bá–kah 'fool' and ia-ló 'son of a gun'. Since –kah is already unaspirated, it remains so in the "phrase". Many exceptions probably can be traced to this psychology of morphological analysis.

5.2. Sandhi

Before a doward slide or a descending step, the initial syllabic with a mid-level pitch is occasionally lengthened to carry an upward sliding picth , which becomes a rising tone in Taiwanese. E.g.,

tē-bú-luh 'table'
(Formosan Japanese te$^{\lrcorner}$ bu$_7$ru → te$^{\lrcorner}$ eb$_7$ru)

The lengthening, or new tone assignment, is a sandhi that does not occur in all instances. The instances of occurrences should be considered exceptional at the present stage of phonological development. In other words, it is an optional dissimilation change that causes a pitch to rise before a falling pitch or a descending terrace of pitches. The rule can be stand as:

[+ pitch] → [+ contour] / ____ [+ contour]

The two contours, in Formosan Japanese and in loanwords in Taiwanese, are predictable. The one preceding is always rising, and the one following is always falling.

5.3. New Phonotactic Rules

The influx of foreign words did make Taiwanese Hokkien unable to digest all aspects of the Japanese sound pattern in time, in spite of the climate created by the pace of Japanese education stated in the beginning of this paper. The limit of assimilation and its resulting innovation are expectable, as it occurs in many other languages, such as in post-conquest English and in post-war Japanese. In Taiwanese, there are four areas of innovations.

The first area is the new tones mentioned at the end of Section 1.4. Tone 1^e is definitely an innovation in Taiwan, and Tone 2^e is also very likely so. Hokkien dialects like Amoy do not distinguish Tone 4 from Tone 2^e. In Amoy, the pitch of Tone 4 in combination is high level, like

Tone 2[e]. However, I do not know of any Taiwanese dialect in which the pitch of Tone 4 in combination is high level, like in Amoy.

Taiwanese does not have a height contrast for back rounded vowels in checked syllables. However, since Taiwanese toh is realized as te͘h in Mid-south and South Taiwan (Group 2 in Section 4) and since Japanese o in word-final position is rendered as o͘h in these dialects, a new contrast between oh rime and o͘h rime has come to exist in these dialects. E.g.,

tho͘—má-to͘h 'tomato'

The third area is the coexistence of nasal consonants. In Taiwanese, on nasal initial can occur in a syllable with a nasal coda. In loans, however, Japanese words of this type are often rendered without changing the initials to non-nasals. Doublets occur as a result, e.g.

bān-jiú ~ m͘n-jiú 'a bun with bean-past filling'

where the first form is assimilated, and the second one is not.

Similarly, nasal initials do not occur in real checked syllables, i.e. those end in −p, −t, or −k, in Taiwanese Hokkien. This restraint seems not to apply to loanwords at all. Available data all show that no effort is attempted to assimilate words with this type of syllables. E.g.,

mék-kih 'gilded; plated'
mát-chih 'matches'

5.4. Other Exceptions

One must not think that Formosan Japanese was used by every Taiwanese who spoke Japanese. Just Taipei Mandarin, there are internal idiolectal differences owing to different degrees of standardization. If a word with more standard pitches than normal Formosan Japanese is borrowed into Taiwanese, that word could defy the assimilation rules above. Very few examples of this category are discovered, however. Except the words for 'grandfather' and 'grandmother', ò-bùn 'oven' is another one, which is expected to be ō-bún.

A more important factor of exceptions than higher Japanese proficiency is the interference from other languages, namely, English and Chinese English. The influence of Standard English forms is not easy to distinguish from that of Standard Japanese, as can be seen from 'oven' above. Chinese English influence can be more readily discerned. As discussed in Section 2.2, d in Japanese and other languages are rendered as l in Formosan Japanese and Taiwanese. English /d/ were taught by the Japanese as [d] in Taiwan, and the Taiwanese learned it as /l/. The same /d/ has been taught by the Chinese as [t] since 1945, and the Taiwanese learned it as /t/. As a result of the popularization of English in the past decade, the Formosan Japanese rule is being interfered more and more by Chinese English [t]. Foreign d's in new loans in Taiwanese are mostly treated as t's now, and old forms of the same words in the donor are giving way to new forms. E.g.

biát-toh (beddo) 'Western bed'
(Formosan Japanese biát-loh)

(By the same token, post-war Taiwanese have been taught to pronounce b− and g− in foreign words as [p] and [k] respectively, in spite of the fact that there are [b] and [g] in Taiwanese. Yet, there seems to be no interference in these areas. New loans still keep the b− and g− in the donor languages.)

Furthermore, there is no −m final in Mandarin. Chinese English teaching seems to interfere Taiwanese ability to pronounce final −m in foreign languages, in spite that there is final −m in Taiwanese . The confusion may partly be attributed to the Taiwanese rule of treating foreign

−m as −mu according to Japanese. The following three Taiwanese forms for English 'modem' are excellent examples to illustrate the confusion. Note that the Standard Japanese form is mo$_7$demu and that the Formosan Japanese form would be more$_7$mu (3 syllables), which would yield mo-lé-muh in Taiwanese. However, the actual forms are based on a distorted combination of Formosan Japanese, English, and Chinese English, something like *mode$_7$n (2 syllables).

(1) mo-lián—	Formosan Japanese pitch
	Formosan Japanese initial
	English syllable number
	Chinese English ending
(2) mo-tián—	Formosan Japanese pitch
	Chinese English initial
	English syllable number
	Chinese English ending
(3) mō-tián—	the same as (2),
	with the first syllable changed
	according to the optional sandhi rule

A fourth form, mō−lián, is exepected but does not occur, as yet.

6. Conclusion

In the past century, Taiwanese has been systematically borrowing Japanese lexical items and well assimilated most of them. The venue through which the words are borrowed is the local variety called "Formosan Japanese ". It was a second language for the educated. It even became the first language of some Taiwanese, just like today's Taipei Mandarin and Taiwanese Mandarin. Since it is a second language, or a creole, in a sense, it is heavily influenced by local languages, especially Hokkien. Therefore, a study of Japanese loans in Taiwanese has to be carried out in the light of this variety of Japanese.

Formosan Japanese has long ceased to function as a dialect of a national language in Taiwan, though there are some speakers left. Nevertheless, its phonological system is still the main venue through which Taiwanese borrows Japanese words and even Western words. The rules to assimilate Japanese words are simple. Of the Japanese phonological units that undergo the rules, pitches receive the most attention from many people. Yet, so far nobody has made a neat statement of them. This paper divides Formosan Japanese rimes into two categories of pitch units according to the specification of glottality and is able to state Formosan Japanese pitch pattern in three rules and state Taiwanese rendition of the pitches in terms of pitch terracing and pitch contours.

Probably owing to the great amount of foreign combinations of segmentals and suprasegmentals, Taiwanese is not prepared to and still does not prepare to assimilate some of them. New syllable types and syllabic types occur as a result. Formerly illegal sequences of segmentals and non−existing tone categories become acceptable, and phonotactic restrictions are slightly eased.

As Formosan Japanese is becoming unfamiliar to the majority of the people in Taiwan, the old assimilation rules are less and less followed. Native speakers of Taiwanese Hokkien are more aware of Standard Japanese pitch patterns and Western language stress patterns, especially English. Chiness English also provides Taiwanese with a very productive rule to assimilate d in foreign words. More and more irregularities are occurring. There were irregularities even before 1945, of course; however, cases are rare, and some of them are for the purpose of semantic contrast.

It is expected that in the near feature the Formosan Japanese phonological system will be completely up-rooted from Taiwanese speakers' intuition. At that time, with new words

substituting old Japanese loans, new order might be established. In between, there will be chaos like Mandarin loans in Taiwanese. For the time being, while the assimilation rules based on Formosan Japanese phonology are still productive, it is important to discover them. This paper endeavors to cover all the important aspects, but there must be many minor ones that this paper fails to study. I cannot but leave them to future researches.

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