# The Assimilation of Japanese Loanwords in Taiwanese Hokkien[*]

0. 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 the Japanese Government in Taiwan did not have the intention to make Taiwanese speak the Emperor's Japanese. *Laissez-faire* is probably the main factor in assimilating Japanese words systematically into Taiwanese.[1]

Through Formosan Japanese, the great majority of Japanese loanwords is borrowed. In most cases, even loans from Western languages have to be translated first into Formosan Japanese pronunciation. This general process of borrowing Japanese words into Taiwanese is summarized in the following flow chart:
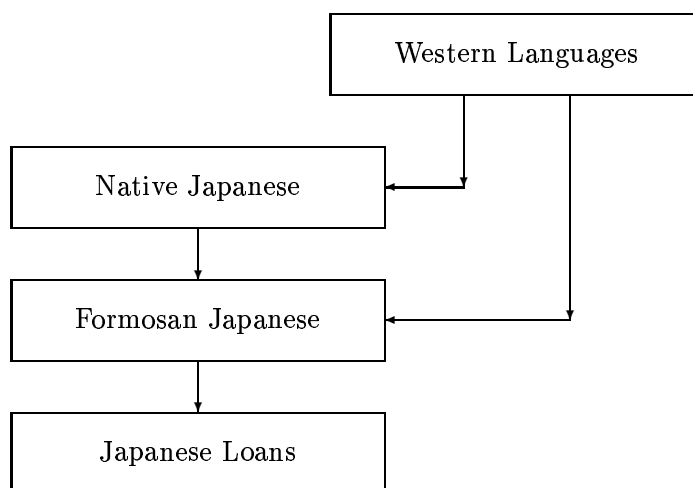
It must be understood that since Formosan Japanese has been spoken by the same people who speak Taiwanese, it is very often difficult to distinguish Japanese loans in Taiwanese from their

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[1]This exact linguistic climate is never created by English education, which is mostly limited in the classrooms, nor by Chinese education. Although the history of Chinese education in Taiwan (since 1945) 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 still no clear system of assimilation rules that can be satisfactorily stated, since the current trend continues to aim at a more standard variety of Mandarin. A standardized "Taiwanese Mandarin" is still in gestation.

equivalents in Formosan Japanese. However, since Formosan Japanese and Taiwanese have different linguistic systems, it is necessary to label the words as either Japanese or Taiwanese. Almost all the Formosan Japanese words in this paper have their Taiwanese equivalents as loanwords, and I will try to distinguish them as best as possible. Unless set off from the text, Japanese words are shown in slanted typeface.

The purpose of this paper is to study the phonology of Japanese loans in question and to 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. Of these segmentals and suprasegmentals, 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 discussion.

The phonological treatments of Japanese words vary according to Taiwanese dialectal differences. Yet, the variation is slight. Besides variation, there are also exceptions to the rules of assimilation. At least four reasons can be accounted for the exceptions. First, in a minority of cases of lexical borrowing, native Japanese rather than Formosan Japanese is the donor.[2] Second, although Formosan Japanese, which supplies most of the loanwords to Taiwanese Hokkien, is the norm in Taiwan, those who did not speak Japanese or those who knew little Japanese allowed their "corruptive" forms of loanwords to circulate and take root. Third, in the past forty-seven 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 begun 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). However, since the traditional orthography is not capable of embodying all the distinctive phonological units in Taiwanese Hokkien, additional graphological presentations are designed, as the following:

V̌	—	high-rising in live syllables, e.g., _thiǎn-pú-lah_ 'tempura'.
V̌C	—	high-rising in checked syllables, e.g., _phŭt-lŭt-sŭt_ 'nimbly' (native word).
V́C	—	high-level in checked syllables in combination, e.g., _la-khiát-toh_ 'racket'; high-falling in checked syllables in isolation, e.g., _kát_ 'f–k!' (native word).
V̂C	—	mid-level in checked syllables in combination, e.g., _siôk-pháng_ 'loaf bread'.
u˙	—	high-front rounded, e.g., _ŭ˙-sí_ 'therefore'.
i˙	—	high-back unrounded, e.g., _chhĭ˙-phián_ 'floppy disk'.
e˙	—	mid-back unrounded, e.g., _tà-chiá-lé˙_ 'a kind of lottery'.

Two of the tones, V́C in combination and V̂C, are limited to Japanese loans. They contrast with traditional tones (see §1.4).

1.   Pitches and Tones

In the process of assimilating Japanese words, Formosan Japanese pitches have to be translated into Taiwanese tones. Four steps are taken for the translation: (1) identifying pitch units,[3] (2) allocating pitch heights to each pitch units, (3) contracting pitch units to form pitch contours,

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[2]I am thankful to Professor Murakami (村上嘉英) of Tenri University for reminding me that most of the teachers in Taiwan under Japanese administration came from southern Japan. That is to say, the norm of Formosan Japanese is southern Japanese rather than Standard Japanese. Since the identification of the exact sources is impossible at present, these sources are dubbed "native Japanese" without further identification in the paper.

[3]The terms 'syllables' and 'moras' are avoided here due to their different meanings assigned by different scholars of Japanese.

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 <u>syllable</u> position. For instance, *sa↓abisu* 'service' is interpreted in two ways in Taiwanese: *să-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 <u>long vowels</u>, and in the second instance as <u>short vowels</u>. This treatment makes the rules exceedingly complicated (see *ibid.* and Hsie 1982:17–45). 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 (i.e., Formosan Japanese), and in the second instance as being specified by the presence of glottality. The rules then become simple.

1.1   Glottality and Pitch Units

With a few exceptions, Formosan Japanese words do not contrast in pitches like native Japanese. In other words, the pitches of a word in Formosan Japanese are 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 *gen'on*, i.e., the vowels a, i, u, e, and o;

(1b)   Japanese *yōon*, i.e., ongliding diphthongs ya, yu, yo, and wa; and

(1c)   sequences of a vowel or a diphthong 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 when they are in isolation (cf. Hsie 1980:12). This glottal stop is deleted when preceding another rime or when preceded by a rime of group 2. Furthermore, in Taiwanese Hokkien, checked rimes have an underlying [+glottal] feature specification (Chang Y. 1988a:744–747). The Taiwanese glottality in this environment is carried over to Formosan Japanese in subgroup (1c).

Group 2 rimes are not marked by glottality at all. Each of them is a combination of two parts, beginning with a basic unit, the glottal stop of which is deleted. 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. These 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 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 assignment of pitches starts from the end of a word and works to the beginning in Formosan Japanese. It is demonstrated in the following figure:

(1) All Formosan Japanese words end in a low tone on the final unit, whether it is [+glottal] or [−glottal], e.g.,

> ↓*hu* 'a light cake made of wheat-gluten'
> *pa*↓*n* 'bread'
> *mi*↓*so* 'salty bean past'
> *haba*↓*ki* 'toe-kick'

(2) 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*↓*uru* 'swimming pool'
> *ta*↓*iru* 'tile'
> *bera*↓*nra* 'balcony'

(3) With the exception of the beginning unit in a word, all pitch units preceding the high pitched unit are also high pitched, e.g.,

> *kya*↑*rame*↓*ru* 'caramel candy'
> *a*↑*suparaga*↓*su* 'asparagus'

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

> *ha*↑*baki* 'toe-kick'
> *be*↑*ranra* 'balcony'
> *kya*↑*rameru* 'caramel candy'
> *a*↑*suparagasu* 'asparagus'

This mid pitch does not contrast with the low pitch in Formosan 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 is thus very simple. Only one feature, high, is needed to specify the pitches of the syllabic units.

$$[+pitch] \rightarrow [-high]/ \begin{cases} \underline{\hspace{1.5cm}}\# \\ \underline{\hspace{1.5cm}}[+pitch]\# \\ [-glottal] \\ \#\underline{\hspace{1.5cm}}[+high] \end{cases}$$

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, <u>ascending pitch steps</u> are formed if the units are at the beginning of a word, and <u>descending steps</u> are formed if the units 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 <u>upward slide</u> of pitches, and when it occurs toward the end of a word, there is <u>downward slide</u> of pitches. These slides are the pitch contours in Formosan Japanese.

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

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

> <u>*pa↓n*</u> 'bread'
> <u>*mishi↓n*</u> 'sewing machine'
> <u>*ri↓ngo*</u> 'apple'
> <u>*bini↓iru*</u> 'thin plastic sheet'
>
> <u>*ni↑njin*</u> 'carrot'
> <u>*wa↑ishatsu*</u> '(white) shirt'
> <u>*cho↑onekutai*</u> '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 shown in italics.

Tone Category	Orthography	Isolation	Combination
1 (A1)	a	high	*mid*
2 (B)	á	*falling*	*high*
3 (C1)	à	*low*	*falling*
4 (D1)	ah	*low*/mid	falling
5 (A2)	â	low-rising	mid/low
7 (C2)	ā	mid	low
8 (D2)	a̍h	(various)	low
9	ă	high-rising	*high-rising*

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 indicate tones in combination; otherwise, they indicate tones in isolation. Examples hereafter will be given in Taiwanese forms.

Tone	Pitch	Example
1-	mid	<u>*tho*</u>-*má-toh* 'tomato'
2	falling	*mi-<u>sín</u>* 'sewing machine'
2-	high	<u>*bá*</u>-*tah* 'butter'
3	low	*bì-<u>lù</u>* 'beer'
3-	falling	<u>*bì*</u>-*lù* 'beer'
4	low checked	*bá-<u>suh</u>* 'bus'
9-	high-rising	<u>*o ǎi*</u>-*siá-chuh* 'shirt'

In loanwords, the pitch heights 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 in combination and high pitch in combination. There is probably not any Taiwanese dialect that substitutes low pitch (Tone 8 or D2) for the mid pitch, and many dialects do not substitute falling pitch (Tone 4 or D2) for the high pitch. Instead, new tone categories are recognized as contrasting with the traditional Tone 8 and Tone 4. They are called Entering Tone 1 (1ᵉ) and Entering Tone 2 (2ᵉ), respectively, according to Chang K. (1992), e.g.,

1ᵉ	*siôk-pháng*	'loaf bread'
8	*siȯk pháng*	'cheap bread' (*siȯk*: native word, 俗)
2ᵉ	*la-khiát-toh*	'racket'
4	*khiat-toh*	'to strike [a match] to ignite' (native word)

1.5   Dialectal Variations

According to the statement above, when a final tone is non-contour and is preceded by a contour tone, it will be Tone 3 in isolation, 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 in isolation, 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 *pòm-phuh* 'water pump'.

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

> *bȧt-té-lih* 'battery'
> *la-khiat-toh* 'racket'

In the dialects, if any, where there is no contrastive Tone 1ᵉ 'loaf bread' and 'cheap bread' would be homophonous.[4]

2.   Syllable Onsets

The problems in mapping Taiwanese Hokkien onsets with Japanese ones fall into two areas, voiceless stops and voiced dentals. 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/. As for the voiced dentals, a subcategory that involves the problem of assimilation is the voiced strident. Some Hokkien dialects do not have a /j/ phoneme. In these dialects, Japanese *j* becomes /l/, /g/, or /ch/.

The phonological treatment of Japanese loans involving the voiced dental series is simpler. That which involves the voiceless stops is rather complicated. In both cases, with the exception of the strident, there are far more irregularities than pitches in the modern inventory of loanwords. The complication concerning the interpretation of consonants in loanwords has

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[4]Folk etymology did change *siôk-pháng* to *siȯk-pháng* for 'loaf bread' in many Taiwanese dialects. Yet it does not necessarily mean that they do not distinguish tone 1ᵉ from tone 8.

recently increased as a result of current influences from foreign languages, i.e., English and Chinese (see §5).

2.1 Non-continuant Voiceless Obstruents

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

In word **initial** positions, all voiceless stops are aspirated. In the same position, the voiceless affricate is normally aspirated only before *ia*, a phenomenon that cannot be explained at the present stage, e.g.,

> *phi-sú-tóng* 'piston'
> *tho-lák-khuh* 'truck'
> *khu-lát-chih* 'clutch'
> *chí-bih* 'shorty'
>
> *chhiàng-sù* 'chance'

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

> *phĩn-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 the occurrences of the voiceless velar stop remain aspirated, e.g.,

> *sa-khá-bah* 'Japanese tavern'
> *kho-khìn-gù* 'cocking'
> *ne-khú-tái* 'necktie'
> *chio-khó-lè-tò* 'chocolate'

As for the labial stop, it is difficult to say which way is more prominent, e.g.,

> *chhiăm-phá-lah* 'samurai drama'   *chhiăm-pá-lah* 'samurai drama'
> *khŏm-phá-suh* 'compass'
> *oăn-phì-sù* 'one-piece dress'
> *săm-phú-luh* 'sample'   *săm-pú-luh* 'sample'
> *phu-ló-phé-lah* 'propeller'
> *pha-sú-phò-tò* 'passport'
>
>   *e-pú-lóng* 'apron'
>   *thiăn-pú-lah* 'tempura'
>   *a-sú-pá-lá-gá-suh* 'asparagus'
>   *lăn-pó-siá-chuh* 'short-sleeved shirt'

In the **final** syllable of a word, the labial is more often unaspirated than aspirated. Dentals are also unaspirated, and cases of unaspirated velar seem to be as numerous as the aspirated, e.g.,

gu-lù-pù 'group'   gu-lù-phù 'group'
khăn-pái 'cheers!'
sût-pái 'spy'

mè-tà 'meter (measuring machine)'
bi-sú-khiát-toh 'biscuit'

bŭn-chín 'paper weight'
thŏng-khá-chuh 'fried pork chop'
                                               ha-bá-khih 'toe-kick'
                                               phàng-khù 'burst, esp. tires'
                                               kha-lá-ó-kheh 'kara O.K.'
                                               phàng-khò 'bread crumbs'
giăn-káng 'entrance-hall'   giăn-kháng 'entrance-hall'
bu-lò-kà 'broker'
bá-kah 'fool'

When a syllable follows a checked syllable, its voiceless velar stop initial is normally aspirated, e.g.,

bák-khuh 'to back a car'
sák-khuh 'condom'
tho-lák-khuh 'truck'

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, the voiceless <u>labial</u> onset regularly becomes unaspirated in final syllables; <u>dentals</u> become unaspirated; and the <u>velar</u> onset remains aspirated, except in final syllables. In <u>reduplicatives</u>, 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 between *l* and *r*, and Taiwanese /l/ has three allophones, [d], [l], and [r], whose occurrences depend on its following vowel, on its position in a word, and on the tempo of the utterances. All *d*, *l*, and *r* in the source languages become /l/ in Taiwanese Hokkien, which is mostly realized as [l], e.g.,

o·-lián (*oden*) 'a dish of assorted food, including bean curd, white radish,
    fish paste, etc.'
năi-lóng (*nairon*) 'nylon'
li-bóng (*ribon*) 'ribbon'

2.3 j, l, and g

Some Hokkien dialects in Taiwan do not have /j/. Various ways are employed to translate Japanese /j/[j, z]. One way treats it uniformly as /l/, e.g.,

> _lió-toh_ 'good quality'
> _la-lí-oh_ 'radio'
> _lò-lì_ (zōri) 'flip-flops; Japanese slippers'

The rule for this group is:

$$\begin{bmatrix} +coronal \\ +voiced \end{bmatrix} \rightarrow [-strident]$$

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

> _gió-toh_ 'good quality'
> _la-gí-oh_ 'radio'

The additional rule is:

$$\begin{bmatrix} +consonantal \\ +high \\ +voiced \end{bmatrix} \rightarrow [+back]/\underline{\hspace{1cm}} \begin{bmatrix} -consonantal \\ +high \\ -back \end{bmatrix}$$

It is predictable that the second group of speakers would use /l/ before other vowels occurring after Japanese /j/. A third way, such as Lȯk-káng (鹿港, Lùgǎng)[5] and Thong-siau (通宵, Tongsiao),[6] substitutes /ch/ for /j/, e.g.,

> _la-chí-oh_ 'radio'

The assimilation rule is simply:

$$\begin{bmatrix} +coronal \\ +strident \end{bmatrix} \rightarrow [-voiced]$$

2.4   Nasal Onsets

In Hokkien, a syllable only allows a nasal nonsyllabic at most. Historical nasal onsets all have become non-nasals in syllables where there is a nasal coda. Following this rule, Japanese nasal onsets in this environment are translated into their non-nasal counterparts, e.g.,

> _bǎn-jiú_ (manjū) 'a bun with red-bean paste filling'
> _lǐn-jín_ (ninjin) 'carrot'

otherwise, they remain nasals, e.g.,

> _sàm-mà_ 'Cololabis Saira or mackerel sury pike (a fish)'
> _su-pá-nah_ 'spanner'

3.   Syllabic Consonants and Syllable Codas

Non-onset consonants in Japanese are syllabic in the Japanese phonological system. The non-nasal is identical to its following non-nasal onset and is thus realized phonologically as the beginning of a long consonant. 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 role. The inventory of vowel-consonant clusters in Taiwanese is as follows. These rimes are presented in Taiwanese Roman Orthography. Actual sounds are included in square brackets when necessary.

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[5]Information from Mr. Hung Wei-jen (洪惟仁), commenting at the Conference.
[6]Information from Ms. Li Ts'un-chih (李存智), personal contact.

im	in				
ip	it				
	ian	[en]	eng	[ieŋ]	
	iat	[et]	ek	[iek]	
am	an		ang		
ap	at		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, and 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
ung		ng/un
uG		ut
on		ong
oD		ok

Since the foreign clusters of low-back vowels and dentals are acceptable in Taiwanese, Japanese *on* and *oD* are often rendered without changing the point of articulation of the codas, e.g.,

Hòn-là 'Honda'

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

síp-puh → *sít-puh* 'hot compress (in medicine)'
pòm-pù → *pòng-pù* 'water pump'

Furthermore, since Japanese *iom*, *ioB*, *ion*, *ioD*, *iong*, and *ioG* are either rare or non-occurring, and since Japanese words containing these rimes are not attested in Taiwanese, these rimes are not listed in the chart above.

3.1 The Non-nasal

In Japanese, the non-nasal syllabic only occurs in non-final positions of a word. It is realized as *p, b, t, d, s, z, sh, ch, j, ts, k*, and *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'

If a vowel-consonant combination is not permissible, 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 native Japanese, e.g.,

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

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

> *a-sá-lih* (*assari*) 'without reserve'
> *tho-lá-khuh* (*torakku*) 'truck'

The addition of a syllable coda can sometimes be a later development; whereas the loss of the coda is always a later development. Both changes yield doublets, e.g.,

> **Addition:**   *siá-chuh*   →   *siát-chuh*
> **Deletion:**   *ât-sá-lih*   →   *a-sá-lih*

3.2 Non-final Nasal

Like the non-nasal syllabic, a Japanese non-final nasal syllabic is assimilated to the point of articulation of its following onset in Taiwanese. It becomes -*m* before *p, b,* and *m*; it becomes -*n* before *t, d, r, s, z, ch, ts, j,* and *n*; and it becomes -*ng* before *k* and *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 (§3.3). The first list below contains examples of the nasal coda in Taiwanese which agree with the point of articulation of their following onsets. The second list gives examples of adjustment according to phonotactic constraints.

> *làm-pù* 'lamp'
> *sàm-mà* 'Cololabis Saira or mackerel sury pike (a fish)'
> *oăn-táng* 'wonton dumpling'
> *hăn-ló-luh* 'steering wheel; handlebar'
> *oăn-sé* 'made in Taiwan'
> *phĭn-siát-toh* 'tweezers'
> *jiăng-kián* 'to play paper-stone-scissors'
> *hăng-gó* 'a canteen'

> *thiăn-pú-lah* 'tempura'
> *bôk-sìn-gù* 'boxing'
> *phia-chìn-kò* 'slingshot; pinball'

3.3   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* 'bread'
> *thiǎn-lóng* 'a bowl of rice with tempura'
>
> *mi-sín* 'sewing-machine'
> *jiǎng-kián* [ken] 'to play paper-stone-scissors'
> *su-pún* 'No. 3 (wooden) golf club'

The distribution in Taiwanese is illustrated in 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'

3.4   The Rules

Combining the treatments of the nasal and non-nasal syllabic consonants and the syllabic nasal, the assimilation rules are as follows:

$$[+nasal] \rightarrow \begin{bmatrix} \alpha anterior \\ \alpha coronal \\ -\alpha high \end{bmatrix} / \begin{bmatrix} +syllabic \\ -\alpha low \end{bmatrix} \underline{\hspace{1cm}} \begin{cases} \# \\ [-consonantal] \end{cases}$$

$$[+consonantal] \rightarrow \begin{bmatrix} \alpha anterior \\ \beta coronal \\ -continuant \\ -strident \end{bmatrix} / \underline{\hspace{1cm}} \begin{bmatrix} \alpha anterior \\ \beta coronal \end{bmatrix}$$

Phonotactic rules will be applied 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 Sin-siā-á (台中新社, Xinshè),[7] where 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 three groups according to the phonetic realizations of /o/ and /oˑ/. Roughly speaking, Mid-south and South Taiwanese dialects do not have a contrast between closed *o* (orthographically <o>) and open *o* (orthographically <oˑ>). Whether close or open, the rounded mid-back vowel in these dialects corresponds to the open *o* in other dialects, and their unrounded mid-back vowel (orthographically <o> also) corresponds to the closed *o* in other dialects. In order to make the comparison and discussion clearer, the unrounded one is presented as *eˑ* (cf. the end of §0).

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[7]Personal field data.

	Group 1		**Group 2**			**Group 3**		
	i	u	i		u	i		u
	e	o \<o\>	e	e˙ \<o\>	o˙ \<o˙\>	e	e˙ \<o\>	o \<o˙\>
	a	o˙ \<o˙\>	a			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* \<o˙\> for Japanese *o*, e.g.,

> <u>o˙-tó˙-bái</u> 'motorcycle'
> <u>tho˙-má-to˙h</u> 'tomato'

Group 3 renders Japanese *o* as closed *o* in all environments, e.g.,

> <u>o-tó-bái</u> 'motorcycle'
> <u>tho-má-toh</u> 'tomato'

Group 1 is further divided into two subgroups with regard to the treatment of Japanese *o*. One is the same as Group 3, and the other uses closed *o* in glottalized syllables and open *o* in live open syllables, e.g.,

> <u>tho˙-má-toh</u> 'tomato'

These dialectal differences in treating Japanese *o* are charted in the following figure:

	Live Open	**Glottalized**
Group 1a	o	oh
Group 1b	o˙	oh
Group 2	o˙	o˙h
Group 3	o	oh

5.   Exceptions

As already shown in various places 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 interferences from other phonological systems, including Standard Japanese, Standard English, and Chinese English.

5.1   Morphologically Conditioned Exceptions

There are two kinds of exceptions to the Formosan Japanese phonological systems with regard to loanwords. The <u>first</u> kind is for disambiguation, and the inventory is very small. Due to the lack of contrast in pitch pattern in Formosan Japanese, many pairs of words whose pitches are contrastive in native Japanese become homophones in Formosan Japanese. In spite of this handicap, almost all homophonous words can be disambiguated in contexts. Among the homophones that cannot be so disambiguated are some personal address terms, and another measure is adopted to distinguish these terms. The pitches of the Formosan Japanese words for 'grandfather' and 'grandmother' are identical with those in native Japanese and are borrowed into Taiwanese as such. The effect is that they start to contrast with 'uncle' and 'aunt', respectively:

> *o-jì-sàng* 'grandfather' (According to Formosan Japanese, it would be
>   *o-jí-sáng*, identical with 'uncle')
> *o-jí-sáng* 'uncle'
>
> *o-bà-sàng* 'grandmother' (According to Formosan Japanese, it would be
>   *o-bá-sáng*, identical with 'aunt')
> *o-bá-sáng* 'aunt'

The <u>second</u> kind of morphologically conditioned exceptions probably has to do with Taiwanese speakers' intuition of words and phrases. In native 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.,

<p style="text-align:center;">yaki↓uron↓teesho↓ku 'set meal with fried noodles as the entrée'
(Standard Japanese yakiudonte↓ishoku)</p>

In loanwords, similarly, if the Taiwanese consider a Japanese word as a phrase, word junctures will occur within the Taiwanese "phrase" in places where the dips are in Formosan Japanese, and an initial mid tone will begin each new word. The tone in the syllable before the juncture, however, is not lowered to the low tone, as in final syllables of isolated words. In the following example, a dip, or a word juncture, in Formosan Japanese, is marked with a leads-to sign ⤳, e.g.,

<p style="text-align:center;"><u>chǒ</u>⤳ne↑kuta↓i 'bow tie'</p>

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* (an honorific address suffix) and *chan* (an intimate address suffix) are treated as separate words in Formosan Japanese, except in 'aunt' and 'uncle'. The two pitch units in *san* and *chan* would form a downward slide in Formosan Japanese according to the rules, i.e., *sa↓n* and *cha↓n*. Nevertheless, the actual pitch is low without a contour, i.e., ↓*san* and ↓*chan*. As for the strings preceding *san* and *chan*, they are also considered as separate words. If the last segment in these strings is an "offglide", except in 'aunt' and 'uncle', the offglide always has a low pitch in Formosan Japanese and forms a downward slide with its preceding basic unit. The slide before *san* or *chan* becomes a falling tone in Taiwanese, as shown in the first three examples below. On the other hand, if the segment preceding *san* or *chan* is a basic pitch unit, the pitch of this segment remains high, as in native Japanese, and a high tone in Taiwanese is assigned to it in the loanwords, as in the other three examples below. A space is used to present this morphologically conditioned juncture, and the tone preceding this address terms is marked as it is a tone in combination, e.g.,

<p style="margin-left:2em;">Lì Sàng 'M. Li'
Sà Chiàng 'Sa'
ùn chiàng 'Chauffeur' (intimate in Taiwanese, though disparaging in
                           native Japanese)
Siá Sàng 'M. Sia'
U-é-nó Sàng 'M. Ueno'
Tha-má Chiàng 'Tama'</p>

Concerning syllabic onsets, when a Japanese "word" is interpreted as a phrase in Taiwanese, each Formosan Japanese "word" of the phrase retains the specification of aspiration as if it were in isolation. For instance, *khĩn-<u>thá</u>-mah* 'testicle' is interpreted as *khín* 'gold' plus *<u>thá</u>-mah* 'pellet'. Since *<u>thá</u>-mah* is a word in the "phrase" *khĩn-<u>thá</u>-mah*, *thá-* does not follow the aspiration rule (in §2.1) and thus remains as *thá-*, without becoming unaspirated. Another example is *ba-<u>ká</u>-iá-ló* 'you idiot', which is a compound of *ba-<u>kah</u>* 'fool' and *iá-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 downward slide or a descending step, the initial syllabic with a mid-level pitch is occasionally lengthened to carry an upward sliding pitch, which becomes a rising tone in Taiwanese, e.g.,

thĕ-bú-luh 'table' (Formosan Japanese *te↑bu↓ru → te↑ebu↓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 stated as:

$$[+pitch] \rightarrow [+contour]/\underline{\hspace{1cm}}[+contour]$$

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

5.3 New Phonotactic Rules

In spite of the linguistic climate created by the pace of Japanese education stated in the beginning of this paper, the influx of foreign words made Taiwanese Hokkien unable to digest all aspects of the Japanese sound pattern over time. The limitations on assimilation and their resulting innovations are expected, as it occurs in many other languages, such as Post-Conquest English and Postwar 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 (in combination only) is an innovation in Taiwanese, so is Tone 2^e in combination in many dialects. Some dialects do not distinguish Tone 4 in combination from Tone 2^e in combination. In these dialects, the pitch of Tone 4 in combination is high level, like that of Tone 2^e in combination. In other dialects, the pitch of Tone 4 in combination is high-falling, contrasting to that of Tone 2^e in combination, which is high level. In the latter dialects, Tone 2^e in combination, therefore, is an innovation.

The second area concerns checked rimes. Taiwanese Hokkien does not have a height contrast for non-high back rounded vowels in checked syllables. However, since the Taiwanese rime *oh*, such as in *toh* 'table; desk', is realized as *e·h* in Mid-south and South Taiwan (Group 2 and Group 3 in §4), and since Japanese *o* in word-final position is rendered as *o·h* in these dialects, a new contrast between *oh* rime and *o·h* rime has come to exist in these dialects, e.g.,

*chhiá*ⁿ-*toh* 'to give a feast' (native word, 請桌)
tho·-má-to·h 'tomato'

The third area is the coexistence of nasal consonants. As stated in Section 2.4, no nasal initial can occur in a Hokkien syllable with a nasal coda. In loanwords, however, Japanese words of this type are often rendered without changing the initials to non-nasals. Doublets occur as a result, e.g.,

bǎn-jiú ∼ *mǎn-jiú* 'a bun with red-bean past filling'

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

Similarly, in the fourth area, nasal initials do not occur in real checked syllables, i.e., those that end in *-p, -t,* or *-k,* in Taiwanese Hokkien. This restraint seems not to apply to loanwords at all. Available data show that no effort has been made to assimilate words with syllables of type, 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 like Taipei Mandarin, there are internal idiolectal differences due to different degrees of standardization. If a word with more standard pitches than in normal Formosan Japanese is borrowed into Taiwanese, that word could defy the assimilation rules above. Only a few examples of this category are discovered, however. In addition to the words for 'grandfather' and 'grandmother', *ò-bùn* 'oven' is another one, which is expected to be *ŏ-bún*.

Another factor of exceptions 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 native Japanese, as can be seen from 'oven' above. Chinese English influence can be more readily recognized. As discussed in Section 2.2, [d] in Japanese and other languages are rendered as /l/[l, r, d] in Formosan Japanese and Taiwanese. English [d] and Japanese [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], and the Taiwanese, since 1945, have been learning it as /t/[t]. As a result of the popularization of English in the past decades, Chinese English [t] is interfering more and more with Formosan Japanese. Foreign [d]'s in new loans in Taiwanese are treated mostly 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' (according to Formosan Japanese would
>   be *biát-loh*)

Postwar Taiwanese also have been taught to pronounce /b/ and /g/ in foreign words as [p] and [k], respectively. Yet, there seems to be no interference in these areas. New loans still keep the /b/ and /g/ in the donor languages as [b] and [g], respectively.

Furthermore, there is no /m/ final in Mandarin. Chinese English teaching seems to interfere with the Taiwanese's ability to pronounce final [m] in foreign languages, despite the existence of 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↓demu* and that the Formosan Japanese form would be *more↓mu* (3 syllables), which would yield *mo-lé-muh* in Taiwanese. However, the actual forms are something like **mode↓n* (2 syllables), which are based on a distorted combination of Formosan Japanese, English, and Chinese English.

(1) *mo-lián* —   Formosan Japanese pitch
                   Formosan Japanese onset
                   English syllable number
                   Chinese English coda

(2) *mo-tián* —   Formosan Japanese pitch
                   Chinese English onset
                   English syllable number
                   Chinese English coda

(3) *mŏ-tián* —   the same as (2),
                   with the first syllable changed
                   according to the optional sandhi rule

A fourth form, *mŏ-lián*, is expected but is not recorded, as yet.

6.   Conclusion

In the past century, Taiwanese has been systematically borrowing Japanese lexical items and assimilated most of them well. The means by which the words were 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 the Japanese national language in Taiwan, though there are some speakers left. Nevertheless, its phonological system is still the main channel 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 an adequate statement of them. This paper divides Formosan Japanese rimes into two categories of pitch units according to the specification of glottality. The paper is, therefore, able to state Formosan Japanese pitch pattern in only three rules. The recognition of glottality also enables the paper to state Taiwanese rendition of the pitches in terms of pitch terracing and pitch contours.

Supposing the basic Formosan Japanese pitch is [+high], the three rules of Formosan Japanese pitch pattern (§1.2) are as follows:

(1) in word final position, the pitch is [−high];
(2) in the penultimate position, the pitch of a [−glottal] unit is [−high];
(3) in the initial position, the pitch is [−high], which is phonetically mid.

Between a [+glottal, −high] pitch unit and a [+high] unit, in either order, there is no pitch contour. Two Taiwanese level tones will be assigned to them when the word is borrowed. A [+glottal] unit and a following [−glottal] unit of different pitch heights will form a contour, either rising or falling, depending on the position of the unit cluster in a word, and a single Taiwanese contour tone will be assigned when the word is borrowed (§§1.3, 1.4).

Beside the Tone Assignment Rules, this paper also captures many segmental translation rules. Of these rules, the Aspiration Rules are neither simple nor explanatory, but they are intriguing (§2.1). As for the Denasalization Rule (§2.4) and the Coda Rules (§§3.1–3.3), they have to be subject to phonotactic constraints in Taiwanese Hokkien.

Nevertheless, probably due to the great amount of foreign combinations of segmentals and suprasegmentals that occur in the borrowed words, Taiwanese is not prepared to assimilate all of these combinations. 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, people follow the old assimilation rules less and less. Native speakers of Taiwanese Hokkien are more aware of Standard Japanese pitch patterns and Western language stress patterns, especially in English. Chinese English also provides Taiwanese with a productive alternative rule to assimilate [d] in foreign words. Increasing irregularities are occurring. There have been irregularities even before 1945, of course; however, the cases are rare, and some of them are for the purpose of semantic contrast.

It is expected that in the near future the Formosan Japanese phonological system will be completely uprooted from Taiwanese speakers' intuition. At that time, with new words substituting for old Japanese loans, new order might be established. In between the two orders, there will be chaos. Presently, while the assimilation rules based on Formosan Japanese phonology are still productive, it is important to capture them. This paper endeavors to cover

all the important aspects, but there must be many minor ones that this paper fails to study, which I will leave to future research.