

The Impact of Japanese on the Phonology of Plngawan and Klesan Atayal*

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ABSTRACT

Japanese rule in Taiwan (1895–1945) has left a lasting mark on all of Taiwan’s languages, the most obvious of which are the many Japanese lexical borrowings in both Formosan and Sinitic languages of Taiwan. This article looks at a deeper aspect of the impact of Japanese: its influence on the phonological systems of two Atayal dialects—Plngawan and Klesan. In both dialects, Japanese loanwords not only brought with them loan phonemes, but also ushered in changes to phonological constraints. In Klesan, Japanese loans violated constraints on possible syllable structures. In Plngawan, Japanese affected the distribution of its coronal fricatives and affricates, and may have contributed to a phonemic split. The lingering influence of Japanese has loosened phonological restrictions in both dialects, which have also been eroded by loans from other languages, such as Taiwanese Southern Min or Taiwan Mandarin.

Keywords: Formosan languages, Atayal, language contact, loan phonology

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1. Introduction

Atayal is an Austronesian language spoken in the mountains and foothills of northern and central Taiwan. At least seven dialects of Atayal can be identified: Squliq, Skikun, Matu'uwal, S'uli, Matu'aw, Klesan, and Pngawan (Goderich 2020). These have varying degrees of mutual intelligibility, and vocabulary differences between the dialects can be quite pronounced.

Language contact has always been a linguistic constant in Taiwan, both between Formosan languages and, more recently, with Sinitic and even European languages (Zeitoun & Goudin 2024). Unsurprisingly, the period of Japanese rule in Taiwan (1895–1945) is characterized as a time of intense linguistic contact with Japanese. The amount of influence varied from village to village: in some places it was relatively modest and generally limited to modern cultural items, while in others the influence was so pervasive that it gave rise to an Atayal-Japanese creole (Chien & Sanada 2010; Chien 2024, *inter alia*).

This study concentrates on the impact of Japanese on the Pngawan and Klesan dialects of Atayal. Although Japanese loanwords can be found in every Atayal dialect, these two stand out in a comparative wordlist as having a much larger number of loans from Japanese, including cases of replacement of native vocabulary. The reasons for such a strong degree of influence are likely geographical as well as cultural: the villages where Pngawan and Klesan are spoken are situated closer to the regional population centers than others, and were thus more easily reachable. At the same time, Pngawan and Klesan speakers also happened to be more receptive to Japanese authorities and did not aggressively resist them.

When nativizing Japanese lexical borrowings, these dialects used various adaptation strategies to incorporate the loans into their native phonological systems. Nevertheless, their phonologies were influenced by Japanese to varying degrees. Not only did Japanese bring with it new sounds as loan phonemes, it also expanded the list of allowed syllable structures in Klesan, and possibly served as a catalyst in a phonemic split in Pngawan.

All Atayal data in the paper comes from my own field notes, collected between 2012

and 2023.¹ I have consulted five Pngawan speakers (3 female and 2 male, born between 1939 and 1961), and two Klesan speakers (1 female and 1 male, born in 1966 and 1961, respectively). My wordlist contains data on seven Atayal varieties, and for the most part avoids modern cultural items. In many cases, where Pngawan or Klesan employ a Japanese borrowing, other dialects use a native lexical item instead. I believe this underscores the degree of lexical influence Japanese has had on the two dialects. The pressure from the Japanese stratum was significant enough to also alter some aspects of the phonotactic restrictions in both dialects.

The phonologies of Japanese and the two Atayal dialects are introduced in Section 2. Section 3 deals with the various adaptation strategies used by Pngawan and Klesan in dealing with Japanese loanwords. Finally, Section 4 describes how lexical borrowings from Japanese influenced the phonological systems of the two dialects in question.

2. Phonological Systems

The phonological aspects of Japanese loanword adaptation in an Atayal dialect are described in detail by Wu (2014). The adaptation strategies she identified include:

- possible mid vowel heightening,
- possible deletion of (devoiced) high vowels,
- long vowel shortening,
- changing of geminate to singleton consonants,
- remapping of Japanese consonants to Squliq phonemes (especially voiced obstruents and /h/).

Although Wu (2014) used data from only a single dialect (a variety of Squliq Atayal spoken in Heping District, Taichung City 臺中市和平區), the tendencies she describes can mostly be generalized to other Atayal dialects. This section provides a brief overview of the phonology of Japanese loanwords in Atayal, with special attention to cases that

¹ Some of the data also appears in Goderich (2020).

show dialectal variation, and to situations where loans are affected by native phonological rules.

2.1 Japanese Phonology

2.1.1 Consonants

There are various competing analyses of the Japanese consonant system, and not all phonemes are universally accepted by all researchers. The consonant inventory of the language shown in Table 1 follows Labrune (2012a: sec. 3).

Table 1. Japanese consonant inventory

p b	t d	k g	
	(t͡ɕ)		
	s z	(ɕ ʑ)	h
	n	(ŋ)	
w	y [j]		
	r		

The sounds [ɕ], [ʑ], and [t͡ɕ], although frequent (especially in Sino-Japanese words), are not traditionally considered separate phonemes (Labrune 2012a: sec. 3.6.1). Instead, they are viewed as palatalized allophones of /s/, /z/, and /t/, respectively. Combinations with non-front vowels, such as [ɕo] or [ʑa], are analyzed as CyV (so /syo/ and /zya/ in this example).

The Japanese consonant system is characterized by a high degree of allophony. In several cases, the same consonant phoneme may have two or three allophones, depending on the following vowel, as demonstrated in Table 2.

Table 2. Allophony in Japanese consonants

Phoneme	Before /i/	Before /u/	Elsewhere
/h/	[ɸ]	[ɸ]	[h]
/t/	[t͡ɕ]	[t͡ɕ]	[t]
/d/	[z~ɖ͡z]	[z~ɖ͡z]	[d]
/s/	[ɕ]	[s]	[s]
/z/	[ʑ~ɖ͡z]	[z~ɖ͡z]	[z~ɖ͡z]

This paper uses the Hepburn romanization system for writing Japanese. The Hepburn system utilizes a more Anglicized spelling of some consonantal allophones. Palatalized /s, t, d, z/ are written as <sh>, <ch>, <j>, and <j>, respectively, and underlying /hu/ and /tu/ are written as <fu> and <tsu>, approximating their pronunciation.

2.1.2 Vowels

Japanese has a five-vowel system, where all vowels can be short or long, shown in Table 3. All vowel phonemes have their respective IPA values, except for /u/, which is unrounded [ɯ].

Table 3. Japanese vowel inventory

i	u [ɯ]
e	o
a	

In normal Japanese speech, the sequences written as /ei/ and /ou/ represent long mid vowels [e:] and [o:], respectively (Labrune 2012a: sec. 2.7).²

In Japanese, vowels are devoiced under certain conditions, and this is especially common with high vowels (Labrune 2012a: sec. 2.6; Fujimoto 2015). These devoiced vowels may sometimes be completely absent at the phonetic level, though they are present in the underlying representation.

Japanese has an accent system that is realized differently in various dialects. The well-described Tokyo-type accent is defined by the presence or absence of a pitch drop (high to low pitch in two adjacent moras) (Labrune 2012a: sec. 7).

2.1.3 Syllable Structure

Phonological analyses of Japanese have historically concentrated on its moraic properties, eschewing discussion of syllables. Labrune (2012b) even claimed (albeit controversially) that the notion of syllables may not apply to Japanese at all. Nevertheless, in the interest of linguistic comparison, this section will give a brief

² The sequence /ei/ may be pronounced [ei] in conservative, dialectal, or hypercorrected speech (Labrune 2012a: sec. 2.7.1).

description of Japanese syllable structure from a cross-linguistic perspective.

Traditional Japanese phonological analyses describe a set of (C)V units of one mora each. They additionally identify three so-called “special segments” or “moraic units” that cannot occur in onset position (Labrune 2012a: sec. 5):

1. N: the moraic nasal,
2. Q: the first part of a geminate obstruent,
3. R: the second part of a long vowel.

Here, I take the traditional description and put it into a standard framework of syllable types. Syllables may or may not have onsets, and they may be light or heavy. Heavy (i.e. bimoraic) syllables can have a final nasal, a long vowel, or the first part of a geminate obstruent. These syllable types can be combined in pretty much any way without restriction. Table 4 provides a few examples of the different syllable structures that a Japanese word can have. These are by no means exhaustive.

Table 4. Japanese syllable structure examples

Syllable structure	Japanese	Gloss
V.V	u.e	‘top’
C(G)VN.CV	jun.bi ³	‘to prepare’
CVV.CV	kuu.ki	‘air’
CVC _i .C _i VN	nip.pon	‘Japan’

2.2 Atayal Phonology

2.2.1 Consonants

Atayal has a slightly larger number of consonant phonemes, from 16 to 18 (depending on the dialect). Table 5 illustrates the consonant inventory of Atayal, combining Pngawan and Klesan. The only difference between the two dialects is the presence of an additional phoneme /ɬ/ in Pngawan, which Klesan does not have. Atayal

³ Note that *junbi* [d͡ʒum.bi] is underlyingly /zyunbi/.

lacks the Japanese phonemes /d/ and /z/, although it has other phonemes or phonemic distinctions not found in Japanese, such as the distinction between the pairs /t-c/, /g-ŋ/, and /x-h/.

Table 5. Pngawan/Klesan Atayal consonant inventory

p	t	k	ʔ
b [b~v]		g [g~ɣ]	
	c [t͡ʃ]		
	s	x	h
m	n	ŋ	
	l, r		
w	y [j], ɹ		

The voiced obstruents /b/ and /g/ are realized as fricatives in most Atayal dialects, including Klesan. In Pngawan, their pronunciation depends on the environment and the speaker, but there is a tendency to pronounce them as plosives word- (or phrase-) initially, and as fricatives intervocally (voiced obstruents are not found in word-final position in either dialect). The fricative allophone of /b/ may be either [β] or [v].

2.2.2 Palatalization

Somewhat similar to allophony in Japanese consonants is palatalization in Atayal, although it is much more limited in scope. Before the high front vowel /i/, as well as its semivowel counterpart /y/, the phonemes /s/ and /c/ are pronounced as alveolopalatals, as shown in Table 6.

Table 6. Palatalization in Atayal

Phoneme	Before /i/	Elsewhere
/s/	[ç]	[s]
/c/	[t͡ʃ]	[t͡ʃ]

Proto-Atayal had a simple syllable structure, and the maximal allowed syllable was CVC. In its descendants, sequences of the types VGV and V?V were often simplified and coalesced into a single syllable (Goderich 2020: 116–135). This sound change preserved

palatalization on /s/ and /c/, giving rise to additional environments where it occurs, shown in Table 7. Thus, the Proto-Atayal sequence *-iyu- became simply /-yu-/, with the preceding /s/ or /c/ retaining palatalization, as in PA *[qʔ]uciyux ‘fish’ > Pngawan *ucyux*, Klesan *əcyux*.⁴ The final syllable in both dialects is pronounced [t͡ɕux], but such syllables in Atayal are usually interpreted as having a CGV(C) structure, due to their origin and limited distribution.⁵ The PA sequences *-iya- and *-iʔa- became /-e-/ in Pngawan and /-ya-/ in Klesan, preserving palatalization in both dialects: e.g. PA *qusiyaʔ ‘water’ > Pngawan *useʔ* [ʔu.ɕeʔ], cf. Klesan *əsyə* [ʔə.ɕə]. Since Proto-Atayal only had three cardinal vowels, these are all the possible combinations with palatalization.

Table 7. Examples of palatalization in Atayal

Proto-Atayal	Pngawan	Klesan	Gloss
*qusiyaʔ	useʔ [ʔu.ɕeʔ]	əsyə [ʔə.ɕə]	‘water’
*ciʔax	cex [t͡ɕex]	cyax [t͡ɕax]	‘light’
*[qʔ]uciyux	ucyux [ʔu.t͡ɕux]	əcyux [ʔə.t͡ɕux]	‘fish’

Another dialect of Atayal, Squliq, underwent a change in which the glide /y/ fortitioned into a fricative [z~ʒ]. The distribution and frequency of this fortitioned segment depends on the speaker and variety of Squliq (H. Huang 2015a). When it occurs before the vowels /a, o, u/ or the semivowel /w/, it is usually written as <zy>. I will follow this writing convention here for the sound [ʒ] occurring in Japanese loans into Pngawan and Klesan.

2.2.3 Vowels

The vowel system of Atayal dialects ranges from three to six phonemes (Goderich 2020). Most dialects have mid vowels, which originate from coalesced vowel sequences. Table 8 shows the vowel inventory of Atayal dialects.

⁴ The square brackets around *[qʔ] indicate uncertain reconstruction. This means a single sound that may have been *q or *ʔ, and there is not enough data to reconstruct it more precisely.

⁵ Cf. Taoshan Squliq /pəksjuji/ ‘borrow’ in H. Huang (2015b: 64), where the author analyzes an underlying /sj/ (= /sy/) sequence.

Table 8. Atayal vowel inventory

i		u
e	(ə)	o
	a	

Stress in Atayal is always word-final. The vowel schwa [ə] appears in many Atayal dialects as a quasi-phoneme, though its distribution is restricted, and it cannot receive stress. Pngawan does not allow this vowel at all, although Klesan (as well as most other Atayal dialects) does.

Unlike Japanese, Atayal does not have a length distinction in its vowels. The only environment where phonetically long vowels can occur in Atayal is word-final syllables. In Pngawan, there are instances of word-final [i:] and [u:], but these can be analyzed as underlyingly VG sequences /iy/ and /uw/, respectively. No other vowels can be lengthened, vowel lengthening does not occur in non-final positions, and lengthened vowels cannot be followed by a consonant.⁶ Due to these restrictions, such vowels should not be treated as phonemic. These pseudo long vowels in Pngawan contrast with final syllables with a glottal stop /ʔ/ coda: compare /siliʔ/ ‘bird sp. (Grey-cheeked fulvetta)’ and /siliy/ [sili:] ‘to whip [AV.SBJV]’. Klesan Atayal does not appear to have any distinction between pseudo long vowels and words with final glottal stops (Goderich 2020: 48–49).

2.2.4 Syllable Structure

The syllable structure of Klesan is quite simple. Words can be as short as a single syllable, either CVC or maximally CGVC. Codas in the native vocabulary are only allowed in the final syllable. Unlike other Atayal dialects, Klesan does not appear to contrast word-final glottal stops with VG sequences, and thus it is treated here as allowing open final syllables. Full vowels are only allowed in the rightmost foot (i.e. final two syllables); beyond that all vowels in the native vocabulary are reduced to [ə]. Examples of Klesan syllable structure are presented in Table 9.

⁶ See Li (1980: 355) for an analysis of an identical phenomenon in Sqliq Atayal.

Table 9. Klesan syllable structure

Syllable structure	Klesan	Gloss
CVC	mit	'goat'
CGVC	bwax	'rice (seeds)'
CVCV	para	'pygmy deer, muntjac'
CVCVC	wanux	'sambar deer'
CəCVCVC	cəruyun	'shrew'

PIngawan syllable structure is slightly more complex than that of Klesan. PIngawan shows a clear contrast between word-final glottal stops and VG sequences (or “pseudo long vowels”, see Section 2.2.3), exemplified by the near-minimal pair /wagiʔ/ ‘sun’ vs /pagiy/ ‘rice plant’. Unlike Klesan, PIngawan allows word-medial closed syllables natively; it also allows full vowels in the third-to-last syllable and beyond. See Table 10 for examples.

Table 10. PIngawan syllable structure

Syllable structure	PIngawan	Gloss
CVC	ɯk	'eagle'
CGVC	ryuŋ	'k.o. hornet'
CVCVC	wagiʔ	'sun'
CVCVG	pagiy	'rice plant'
CVCCVC	tagliʔ	'waterfall'
CVCVCVC	rakinus	'camphor tree'

Word-final glottal stops are clearly audible in the PIngawan native lexicon, and perceived by the speakers. However, the same cannot be said for Japanese loanwords, where final glottal stops may or may not be present in the same word at different times, and appear to be inserted at phrase boundaries in the surface representation. For this reason, Japanese loans into PIngawan are transcribed here without final glottal stops.

3. Phonological Adaptation in Japanese Loans

3.1 Adaptation of Consonants

There is a considerable amount of overlap between the Japanese and Atayal consonant inventories. The only two Japanese consonant phonemes that are not found in Pngawan and Klesan are /d/ and /z/. The phonetic values of other phonemes may sometimes be different, especially /b/ and /g/, which have distinct allophones in Japanese and Atayal.

Most consonants are mapped faithfully from Japanese to Atayal, including cases of allophony, as shown for Klesan in Table 11. While the transcription differs slightly between the two languages, the phonetic form is almost identical on a segmental level (although Atayal retains its own prosody). In Japanese, [ʃs] and [ʃç] are allophones of /t/, whereas in Klesan these same sounds belong to the /c/ phoneme instead. However, the surface pronunciation is identical in the same environment (before high vowels). Likewise, both Japanese and Klesan /s/ are palatalized to [ç] before /i/, although this is not normally reflected in the conventional Atayal spelling.⁷ Japanese loans into Pngawan work the same way.

Table 11. Allophony in Japanese loanwords into Klesan

Japanese	Klesan	Gloss
shirasagi	sirasagi	‘egret’
tsuyu	cuyu	‘dew’
kachi	kaci	‘win, victory’

Consonants that require adaptation are discussed further in this section.

⁷ The Hepburn romanization, which I am using here, transcribes the allophonic [çi] as <shi> and [ʃçi] as <chi>. Other systems, e.g. Nihonsiki, do not do this. The question is moot for the native Japanese writing system, which uses a syllabary.

3.1.1 Adaptation of [d]

No Atayal dialect has a /d/ phoneme. The Japanese consonant /d/ is normally remapped to /r/ in both Pngawan and Klesan. Examples from both dialects are given in Table 12.

Table 12. Japanese /d/ in Atayal

Japanese	Pngawan	Klesan	Gloss
doku	roku	roku	'poison'
handai	hanray	hanray	'dining table'
denki	reŋki	—	'electric light'

3.1.2 Adaptation of [d͡ʒ]

Japanese [d͡ʒ] (an allophone of /z/) is adapted in Klesan as [ʒ]. Following the writing conventions for Squliq Atayal, it is written as <z> before /i/ and <zy> elsewhere (see Section 2.2.2). Some examples can be seen in Table 13. Note the irregular change of /d/ in Japanese *dojou* 'loach' > Klesan *zyozyo*, which is explained later in this section.

Table 13. Japanese [d͡ʒ] in Klesan

Japanese	Klesan	Gloss
momiji	momizi	'maple tree'
junbi	zyumbi	'to prepare'
dojou	zyozyo	'loach'

In contrast with Klesan, Pngawan is not as invariable in its adaptations of Japanese [d͡ʒ]. There are two main ways it can be adapted: [r] and [ʒ]. Several examples are shown in Table 14. There may be variation between different speakers in the same word, such as *sari* or *sazi* 'spoon' < Japanese *saji*; although even speakers who generally prefer to adapt the phoneme as [r] still have [ʒ] in *benzyo* 'toilet'.

Table 14. Japanese [d͡ʒ] in Pngawan

Japanese	Pngawan	Gloss
joshi	rosi	'girl'
saji	sari~sazi	'spoon'
benjo	benzyo	'toilet'

3.1.3 Adaptation of [ɸ]

Atayal completely lacks a voiceless labial fricative phoneme. In Japanese, [ɸ] is the allophone of /h/ before /u/ (usually transcribed as <f>). There are few examples of loanwords with this allophone in either Pngawan or Klesan, but it is clear that in all cases the sound was remapped to a dorsal fricative: one of /h, x, g/, depending on the word.

As seen in Table 15, Klesan opted for /h/ word-initially, such as in *huke* ‘dandruff’ < Japanese *fuke*. Somewhat surprisingly, in *mogu* ‘blanket’ the adaptation is a voiced fricative [ɣ].

Table 15. Japanese [ɸ] in Klesan

Japanese	Klesan	Gloss
fuke	huke	‘dandruff’
moufu	mogu	‘blanket’

Borrowings in Pngawan, shown in Table 16, seem to follow a similar pattern, with /h/ word-initially, and a velar fricative word-medially. It should be noted that the difference between /h/ and /x/ is quite small in Pngawan compared to other Atayal dialects, and the two phonemes may be merging, at least for some speakers.

Table 16. Japanese [ɸ] in Pngawan

Japanese	Pngawan	Gloss
fune	hune	‘boat’
moufu	moxu	‘blanket’

3.1.4 Adaptation of the Moraic Nasal

The moraic nasal N (here transcribed as <n>), when occurring before a consonant, is mapped to a homorganic nasal in Atayal. Examples for Klesan and Pngawan are given in Table 17.

Table 17. Japanese word-medial N in Atayal

Japanese	Atayal	Gloss
tonbo	tombo (Kl)	‘dragonfly’
handai	hanray (Kl, Pl)	‘dining table’
denki	renji (Pl)	‘electric light’

There are not many examples of loans with word-final N in either Atayal dialect, but the majority map it to /ŋ/, as can be seen in Table 18. The only exception Japanese *botan* ‘button’, which in Pngawan may have either a coronal or a velar nasal, and has a coronal nasal in Klesan.

Table 18. Japanese word-final N in Atayal

Japanese	Pngawan	Klesan	Gloss
yuinoukin	yonokiŋ	yunokiŋ	‘betrothal money’
sekken	sekeŋ	sekeŋ	‘soap’
botan	botan~botan	botan	‘button’

Since *botan* is the only word in the table where the nasal is preceded by /a/, we may suspect that vowel quality plays a role in deciding how the nasal is adapted in Atayal. However, other nasal-final loans in Klesan have /ŋ/, including when preceded by /a/: Japanese *pyonpyon* ‘skipping, hopping’ > Klesan *pyonpyon* ‘hare’, Japanese *dandan* ‘stairs, ladder’ > Klesan *ranran*. This suggests that /ŋ/ is indeed the default adaptation of word-final N, and that the coronal /n/ in *botan* is irregular.

3.1.5 Loss of Gemination

Like vowel length, consonant length or gemination is phonemic in Japanese, but not in Atayal. Atayal deals with geminates in Japanese loans by ignoring them and instead treating them as a single consonant, as seen in examples in Table 19.

Table 19. Loss of gemination in Japanese loans into Atayal

Japanese	Atayal	Gloss
kappa	kapa (Pl)	‘rain coat’
koppu	kopu (Pl, Kl)	‘cup’
sekken	sekeŋ (Pl, Kl)	‘soap’
shakkin	syakiŋ (Kl)	‘debt’

A special case is the moraic nasal N followed by a different nasal, e.g. Japanese *unmei* ‘fate’. In Pngawan and Klesan this word is adapted as *ume*, losing both the /-nm-/ sequence and vowel length, making it homophonous in both dialects with *ume* ‘plum’

(from Japanese *ume*). However, some Pngawan speakers have *unme* for ‘fate’, distinct from *ume* ‘plum’. These same speakers are also more likely to allow the sequence /-nm-/ in the native lexicon, e.g. *sunmami?* ‘to blame [AV]’ (vs *sumami?* for other speakers).

3.1.6 Irregular Changes

Occasionally, Atayal dialects will have unexpected segments in loans from Japanese. For example, Japanese *tageri* ‘Northern lapwing’ > Klesan *takeri* ‘sparrow’, where Japanese /g/ gets mapped to Klesan /k/ instead. Since Klesan /g/ (and /b/) is a fricative, this mapping is not too surprising, however in most cases Japanese /g/ is preserved in Klesan as /g/ [ɣ], e.g. *kega* ‘wound, cut’ or *geri* ‘diarrhea’.

In a few cases, an unfaithful adaptation in Atayal appears to be the result of copying the onset of the following syllable. This is likely the case with Pngawan *tatacumuri* ‘snail’ < Japanese *katatsumuri*, and Klesan *zyozyo* ‘loach’ < Japanese *dojou*. The irregular change in Klesan *zyozyo* makes it into a reduplicated monosyllable in shape (though etymologically speaking, it is not).

Additionally, Klesan spontaneously palatalizes /s/ into [ç] in several Japanese loanwords, shown in Table 20. Spontaneous palatalization of /s/ and /c/ happens in Klesan in native vocabulary as well: PA **capiŋ* ‘palm tree’ > Klesan *cyapiŋ*, PA **bicug* ‘worm’ > Klesan *bicyu*, PA **sasiq* ‘shade’ > Klesan *syasi*. The fact that it occurs in Japanese loanwords is remarkable, since these can be dated specifically to the period of Japanese occupation of Taiwan (1895–1945). We can say for sure that the palatalization process was productive during that time, although it may have begun earlier.

Table 20. Spontaneous palatalization in Japanese loans into Klesan

Japanese	Klesan	Gloss
tokeisou	tokusyo	‘passion fruit’
saji	syazi	‘spoon’
kyuusu	kyusyu	‘teapot, kettle’

3.2 Adaptation of Vowels

The Japanese five-vowel system maps fairly well onto the Pngawan and Klesan inventories. Since in both Pngawan and Klesan mid vowels are phonemic, they are in

general faithfully preserved in Japanese loanwords (although occasional changes do occur, see Section 3.2.5).

Japanese accent is not preserved in Atayal, and loanwords consistently receive final stress, same as native vocabulary.

3.2.1 Loss of Vowel Length

Vowel length is phonemic in Japanese, but Atayal does not have this distinction. As such, any long vowels in Japanese loanwords were neutralized when the words were borrowed into Atayal, as shown in Table 21.

Table 21. Vowel length loss in Japanese loanwords into Atayal

Japanese	Atayal	Gloss
sensei	sinsi (Pl)	'teacher'
yuugi	yugi (Pl)	'dance'
houchou	hocyo (Pl)	'cleaver'
koukan	kokan (Kl)	'to exchange'
koori	kori (Kl)	'ice'
koumori	komori (Kl)	'bat'

It is important to note that final long vowels in Japanese were not preserved in Pngawan using pseudo long vowels or any other VG sequences. See for example Japanese *kanbou* > Pngawan *kanbo* 'headcold', instead of ***kanbow*, which may have been a better representation of vowel length.

Nevertheless, there are several counterexamples. In two Pngawan words, shown in Table 22, vowel length was preserved by breaking it into two syllables, and inserting an epenthetic glottal stop between them. Both words happen to have a long /e/ vowel in Japanese, though they were adapted slightly differently in Pngawan: once as /eʔe/ and once as /eʔi/.

Table 22. Long vowel breaking in Japanese loans into Pngawan

Japanese	Pngawan	Gloss
seinen	seʔenen	'young man'
tokei	tokeʔi	'(alarm) clock'

One Klesan word appears to preserve vowel length from its Japanese source, though it is problematic. Japanese *rangui* ‘wooden palisade’ was loaned into Klesan as *ren.gey*,⁸ with a final VG sequence, although this is not an example of vowel length in Japanese but rather a vowel cluster.

3.2.2 Glottal Stop Epenthesis

Japanese allows words to begin with vowels, but Atayal has obligatory consonant onsets. When vowel-initial words were loaned from Japanese into Atayal, they received an epenthetic glottal stop, as seen in Pngawan examples in Table 23 (word-initial glottal stops are usually unwritten in Atayal, so the data in the table is given as phonetic transcription).

Table 23. Initial glottal stop epenthesis in Japanese loanwords

Japanese	Pngawan	Gloss
inori	[ʔinori]	‘prayer’
ami	[ʔami]	‘net’
abura	[ʔabura]	‘oil’

The presence of this epenthetic glottal stop is evidenced by prefixed forms, such as Pngawan [sa-ʔa-ʔabura] ‘oily’ (*sa-* prefix plus *Ca*-reduplication, meaning ‘to smell like’), or Klesan [sə-ʔami] ‘to cast a net’ (*sə-* inchoative prefix).⁹

3.2.3 Adaptation of Devoiced Vowels

Japanese devoices its vowels in connected speech to various degrees. This is most common with the high vowels /i/ and /u/. Although most loanwords into Atayal have full vowels, occasional devoiced vowels have been adapted using the mid central vowel [ə], seen in examples in Table 24.

⁸ The Klesan spelling <n.g> here stands for two separate segments, not a single velar nasal. The Japanese pronunciation is likewise a nasal followed by a voiced plosive.

⁹ The Atayal prefix *sa-* (or *sə-*) is a verbalizing morpheme that has a wide range of meanings that are generally the same across Atayal dialects. See L. Huang & Hayung (2018: 29) for examples in Sguliq Atayal.

Table 24. Devoiced vowels in Japanese loans into Atayal

Japanese	Klesan	PIngawan	Gloss
tsukue	cəkuye	cəkuye	‘desk’
rousoku	rosok	(rosoku)	‘candle’
tsukau	cəkaw	—	‘to use’

Not all dialects adapted devoiced vowels in the same way. Klesan *cəkaw* ‘to use’ shows vowel lenition indicative of vowel devoicing in Japanese; however, the same word was borrowed into Skikun Atayal as *cukaw*. Klesan *rosok* involves deletion of the final devoiced vowel as well as subsequent resyllabification, so that the loan becomes consonant-final. However, PIngawan *rosoku*, from the same source, preserves the final vowel.

The most remarkable here is a weak vowel in PIngawan *cəkuye*. PIngawan does not allow schwa to occur in its native vocabulary: any instances of Proto-Atayal *ə were either deleted where possible, or else changed into cardinal vowels. Devoiced vowels in Japanese put enough pressure on PIngawan phonology to allow weak vowels, if only in extremely rare circumstances.

3.2.4 Repairing Vowel Clusters

Traditional analyses of Japanese phonology do not identify diphthongs. Instead, sequences of vowels with no intervening consonants are treated as vowel clusters.

In Atayal, there are three strategies for dealing with vowel clusters in Japanese loanwords:

1. transformation into “diphthongs” (VG sequences),
2. epenthesis,
3. coalescence.

Where possible, vowel sequences such as /ai/ and /au/ (but also /oi/) are loaned as a VG sequence in a single syllable. This is the strategy employed in Klesan *cəkaw* ‘to use’ (< *tsukau*), *hanray* ‘dining table’ (< *handai*), and *osoy* ‘slow’ (< *osoi*). It is normally seen at the right edge of words.

Word-medial clusters can be repaired via epenthesis. For example, in Pngawan *cəkuye* ‘desk’ (< *tsukue*) and *hoyiŋ* ‘prison’ (< *houin* ‘court’), the Japanese vowel sequences /ue/ and /oui/ are broken up using the glide /y/. Klesan *cəkuye* ‘desk’ uses the same strategy.

The third strategy is used only occasionally. It can be seen in Pngawan *yonokiŋ*, Klesan *yunokiŋ* ‘bethtal money’, both from Japanese *yuinoukin*. The sequence /ui/ was coalesced into a single vowel, /o/ in Pngawan and /u/ in Klesan.

3.2.5 Sporadic Vowel Changes

Although vowels in loans from Japanese are normally preserved well (barring vowel length and some vowel clusters), unconditioned changes in vowels do sometimes occur. Some may have adequate explanations: the word for ‘teacher’ is *sinsi* in all Atayal dialects (< Japanese *sensei*), but it is likely an early loan, and may have been borrowed indirectly, through languages that do not have mid vowels as distinct phonemes. Other inconsistencies cannot be adequately explained, and could be the result of imperfect learning, or else sporadic sound changes in the recipient language after borrowing.

Pngawan has quite a few examples of forms with sporadic sound changes, sometimes alongside unchanged variants. Examples in Table 25 involve changes of various vowels in different positions within the word. Since there are occasional irregular vowel correspondences between subdialects of Pngawan (Goderich 2024), variant forms of Japanese loans are not unexpected, though their presence suggests that these sporadic vowel changes continued to occur in Pngawan in the 20th century.

Table 25. Sporadic vowel changes in Japanese loans into Pngawan

Japanese	Pngawan	Gloss
nikibi	nekibi	‘pimple’
sekken	sekeŋ~sikiŋ	‘soap’
otonashii	otonasi~atanasi	‘quiet, obedient’
takaku	takoku	‘tall’
usagi	osagi~osaŋi~asaŋi	‘hare’

Note that Japanese *usagi* ‘hare’ was loaned into Pngawan as three variants *osagi~osaŋi~asaŋi*, all with different initial vowels from the source.

Sporadic vowel changes did not necessarily happen synchronously in related terms: Pngawan *takoku* ‘tall’ is a borrowing of the Japanese infinitive adjectival form *takaku* with a sporadic change of the medial vowel,¹⁰ but Pngawan *takay* ‘expensive’ preserves the vowel of the same adjectival root *takai*.

While Klesan does not appear to have had nearly as many sporadic changes in its vowels as Pngawan, at least one example can be found: Japanese *rangui* ‘wooden palisade’ > Klesan *ren.gey*, where all vowels were changed. Since this is an exception to an otherwise faithful representation of Japanese vowel segments, it may be an indirect loan.

4. Loan-Induced Phonological Changes

Section 3 dealt with the changes Pngawan and Klesan made to Japanese words upon loaning them. However, the impact of Japanese pressured both dialects enough for their phonologies and phonotactics to undergo changes, both obvious and subtle. These include the use of Japanese phonemes /d/ and /z/ (mostly in Klesan), new VG sequences, increased distribution of alveolopalatal segments, and changes to the syllable structure of Klesan.

4.1 Loan Phonemes

Japanese [d͡ʑ] (allophone of /z/) is adapted in both Klesan and Pngawan as [ɟ̞] (though less commonly in the latter), as demonstrated in Section 3.1.2. Neither dialect has the sound as part of its native phonological system, unlike Squliq Atayal, where it is commonly found in the inherited vocabulary. Additionally, the [z] allophone of /z/ is found in at least one loanword in Klesan: *seza* < Japanese *seiza* ‘seiza (sitting on one’s heels)’. Despite numerous Squliq loanwords in Klesan, the latter has only a few Atayal roots with /z/; in this regard, Japanese influence managed to punch through all the way to Klesan phonology, while Squliq failed to do so quite so thoroughly.

On the other hand, while Pngawan regularly adapts Japanese /d/ as /r/, Klesan will

¹⁰ For *ku*-final adjectives as ‘infinitive’, see Takezawa (2016: 470).

occasionally have [d] in loans, such as *budo* ‘grapes’ < Japanese *budou* (cf. Pngawan *buro* ‘wild grapes’). There is even an example of hypercorrection: Klesan *bindo* ‘betel nut’ < Japanese *binrou*.

Another way in which Japanese managed to impact Pngawan is its devoiced vowel phenomenon, e.g. Pngawan *cəkuye* ‘desk’ < Japanese *tsukue*. Pngawan completely lacks the vowel [ə] in its native vocabulary, as well as in loans from Seediq dialects that have it as a phoneme. This makes its appearance in a Japanese loanword all the more unusual.

4.2 Phoneme Distribution

The influence of Japanese was not limited to new sounds. It has also impacted constraints on the distribution of the sounds already present in the native Atayal phonology.

4.2.1 Pngawan /-ay/

During the historical development of Pngawan, the Proto-Atayal final sequence *-ay regularly became /-iy/ [i:], e.g. PA **ɲuŋay* ‘monkey’ > Pngawan *ɲuŋiy*. This change has resulted in alternations in verbal roots, such as in *s<um>iliy~silay-un* ‘to whip’, which has /-iy/ at the right edge alternating with /-ay-/ after suffixation. The only inherited word with final /-ay/ is *cubay* ‘very’, an irregular change from PA **cu-balay*.

However, borrowings from Japanese have restored the presence of word-final /-ay/ in the dialect. Several examples are given in Table 26.

Table 26. Pngawan final /-ay/ in Japanese loans

Japanese	Pngawan	Gloss
handai	hanray	‘dining table’
takai	takay	‘expensive’
teppai	tepay	‘raft’
hourai (-mai)	(pagiy) horay	‘rice subsp. (penglai rice)’
hourai-mai	haremay~haremey	‘rice seeds’

Japanese *houraimai*, a rice subspecies name (lit. ‘hourai rice’), may have been borrowed twice: once in the compound *pagiy horay* (lit. ‘horay rice’), and possibly once

more as *haremay~ha.ɿemay* ‘rice seeds’. Although the vowel correspondences in the latter are not perfect, the presence of final /-ay/ indicates that it is likely a loan. (PIngawan is also likely to sporadically change vowels, especially those outside the final foot; see Section 3.2.5.)

Japanese *teppai* ‘raft’, which was borrowed into PIngawan as *tepay*, is itself likely a loan from Taiwanese Southern Min (TSM)¹¹ 竹排 *tik-pâi*. Despite the presence of several TSM loans in PIngawan, the penultimate vowel /e/ and the absence of /k/ both suggest that PIngawan borrowed the word via Japanese.

4.2.2 Klesan /-oy/ and /-ey/

The only VG sequences allowed in Proto-Atayal were *-ay, *-aw, and *-uy. In Klesan, Japanese loanwords may have added the root-final sequences /-ey/ and /-oy/ to the lexicon.

Klesan *osoy* ‘slow’ (< Japanese *osoi*) is an example of the latter. It is also found in the village name *Ropoy* as well as the Patient/Locative subjunctive form of verbal roots ending with /-a/, such as *nəgoy* ‘wait [PV.SBJV]’ (< /naga + -i/). However, *Ropoy* is a proper name (and may itself be a loan), while the /-oy/ in verbal forms is not part of the root. The origin of this verbal /-oy/ is yet to be determined.

The sequence /-ey/ in Klesan *ren.gey* ‘wooden palisade’ (< Japanese *rangui*) appears to contrast with word-final /e/ both in inherited forms like *bəle* ‘good’ and in loanwords such as *ume* ‘plum’ (< Japanese *ume*), although there are no minimal pairs. What’s unusual about this word is the change from Japanese /-ui/ to Klesan /-ey/, which could have instead been adapted as /-uy/.

4.2.3 Distribution of Palatals

In all Atayal dialects, the phonemes /s/ and /c/ (where the latter exists) are palatalized before the vowel /i/. Historical changes in individual Atayal dialects sometimes led to the expansion of palatalizing environments, which are described in

¹¹ The official name of the language was changed in 2024 to ‘Taigi’ (臺灣台語). Since it is a Southern Min variety specific to Taiwan, it has been generally called Taiwanese Southern Min in linguistic literature. In this paper, I will refer to the language as TSM since it is a widely known term, but still acknowledge its official denomination. I thank two anonymous reviewers for their suggestions on language nomenclature.

Section 2.2.2.

In Pngawan, the sounds [s] and [ʃ] can only appear before the vowels /a, u, o/. Conversely, the alveolopalatals [ç] and [ʃç] can be followed by /i, e, u/, and in at least one case, /a/: *siliʔ* [çi.liʔ] ‘Grey-cheeked fulvetta’, *cex* [ʃçex] ‘light’, *ucyux* [ʔu.ʃçux] ‘fish’, and *syaw* [çaw] ‘edge, rim’. The vowels /u/ and /a/ can be included in the latter environment if we make no assumptions about the underlying representation and simply transcribe the sounds as they are pronounced. The distribution here can be argued to be complementary, with the overlap limited to the vowels /u/ and /a/, and there is additional evidence from other Atayal dialects allowing us to treat this palatal + V sequence as a CyV sequence, where the C is a coronal /s/ or /c/.

Japanese loanwords disrupt this delicate balance by increasing the number of environments where these sounds can occur. A number of Japanese loans allow the vowel /o/ to follow palatals, e.g. *basyo* [baço] ‘hunting ground’ (< Japanese *basho* ‘place’), and *hocyo* [hoʃço] ‘meat cleaver’ (< Japanese *houchou*). On the other hand, in several loanwords a coronal [s] precedes the vowel /e/: *seken* [seken] ‘soap’ (< Japanese *sekken*), and *seri* [seri] ‘to tidy up’ (< Japanese *seiri*). (The distribution of Japanese [ts] is more limited, and it does not occur before /e/ except in recent loanwords.)

When taking Japanese loanwords into account, the environments where coronals and palatals can occur overlap to a much greater extent, especially the fricatives [s] and [ç], both of which can now be found before /a, e, o, u/ ([s] cannot be followed by /i/ in Atayal or Japanese). Due to the newly broadened environments of both sounds, the palatals [ç] and [ʃç] could be argued to constitute quasi-phonemes, if not fully independent phonemes.

4.3 Klesan Syllable Structure

4.3.1 Word-Medial Nasal Codas

Proto-Atayal had rigid restrictions on syllable structure, and only word-final syllables could have (non-glide) codas (Goderich 2020: sec. 4.3). Klesan inherited this constraint in its native vocabulary. However, Japanese loanwords may violate this restriction by having a nasal coda in non-final position, as demonstrated in Table 27.

Table 27. Word-medial nasal codas in Japanese loanwords into Klesan

Japanese	Klesan	Gloss
junbi	zyumbi	‘to prepare’
tonbo	tombo	‘dragonfly’
binrou	bindo	‘betel nut’
handai	hanray	‘dining table’
tansu	tansu	‘cabinet’

Klesan does not allow NC clusters in its native vocabulary, but it preserves the syllable structure of Japanese loans rather than repairing the infelicitous structure (Goderich 2020: 47, 65–66). This extends to reduplicated monosyllables, such as *pyonpyon* ‘hare’ (< Japanese *pyonpyon* ‘skipping, hopping’), *rayray* ‘stairs, ladder’ (< Japanese *dandan*), and also possibly *beybey* ‘cricket’ (source unknown).

Accepting NC clusters into the lexicon allowed Klesan to borrow more words with word-medial nasal codas from other sources, for example TSM, with several examples given in Table 28. Since Klesan speakers relocated to their current location in Nan’ao, Yilan 宜蘭南澳 well into the Japanese colonial period (having lived deep in the Central Mountain Range prior to their relocation), their exposure to TSM must have occurred after they were already influenced by Japanese. The timing of this contact is also evidenced by the lack of these lexical items in other Atayal dialects. In an unusual twist, one of the TSM loans in Klesan—*petanko* ‘light-vented bulbul’—does not have a word-medial nasal coda in the source language.¹²

Table 28. Non-final nasal coda in TSM loanwords into Klesan

TSM	Klesan	Gloss
bīn-tháng	bintaŋ	‘washbasin’
pùn-ki	puŋki	‘winnowing basket’
pèh-thâu-khok-á	petanko	‘light-vented bulbul’

Klesan also has a number of loanwords from another Atayal dialect: Sqliq. Some varieties of Sqliq allow the infix *-in-* to form word-medial codas (H. Huang 2015b: 61–

¹² Klesan *petanko* may have been borrowed via Japanese *petako* (not the usual name for this species in Japanese, but used in colonial Taiwan), however the question of the parasitic nasal persists regardless.

62). The cognate form of this infix in Klesan is *-n-* [ən], which is always followed by a vowel. The word *pinkyu* ‘to tell’ can be shown to be a borrowing of Squliq *pinqyu~pinqzyu* based on the irregular correspondence of Klesan /k/ to Squliq /q/ and also the presence of a word-medial coda. Likewise, the word *kinbahan* ‘descendant’ is also most likely a loan because of its non-native syllable structure.

The timing of language contact between Klesan and Squliq is uncertain, and it may have occurred both before and after their relocation.

4.3.2 Prepenultimate Vowels

Klesan, as well as several other Atayal dialects, has a prepenultimate¹³ vowel lenition rule, whereby all vowels outside the rightmost foot are lenited. The outcome of lenition is a schwa [ə]. The lenition rule is most obvious with suffixation: compare *heluk* ‘hair comb’ with *həluk-an* ‘to comb hair [LV]’. The addition of the LV suffix *-an* pushes the initial syllable outside the final foot, where it has to undergo vowel lenition.

While it is ubiquitous in the native lexicon, this vowel lenition rule does not apply to Japanese loanwords. Borrowings from Japanese frequently reach three or more syllables in length, but preserve full vowels in all syllables, as demonstrated in Table 29. (Note the word *hotarukuy* ‘scarab beetle’, where the Japanese *hotaru* ‘firefly’ was appended to the native root *kuy* ‘insect, bug’; it is transcribed as a single word because it has only one primary stress, falling on the final syllable.)

Table 29. Trisyllabic Japanese loanwords into Klesan

Japanese	Klesan	Gloss
nikibi	nikibi	‘pimple’
koumori	komori	‘bat’
shirasagi	sirasagi	‘egret’
hokori	hokori	‘dust’
hotaru ‘firefly’	hotarukuy	‘scarab beetle’

This exception to prepenultimate lenition extends to borrowings from other sources, e.g. *petan̄ko* ‘light-vented bulbul’ (from TSM, though possibly via Japanese), and

¹³ Meaning ‘preceding the penultimate’, i.e. third-to-last and beyond.

kinbahan ‘descendant’ (likely from Squliq). Other words with full vowels outside the final foot are likewise expected to be borrowings, even though no likely source has been found yet; these include *icikoŋ* ‘click beetle’ and *kumurik* ‘leopard cat’.

5. Conclusion

The Pngawan and Klesan dialects of Atayal loaned a significant number of lexical items from Japanese. These loans were adapted to fit into the phonological systems of the recipient languages: all gemination and vowel length distinctions were removed (with only a couple of exceptions for vowel length), and the loanwords received word-final stress just like the native vocabulary. However, some aspects of Japanese still had to be incorporated into Atayal, namely the phonemes /d/ and /z/, which were adapted into Klesan together with the lexical borrowings, and the latter into Pngawan as well, albeit to a lesser extent. The Japanese vowel devoicing phenomenon led to the appearance of the previously non-existent weak vowel [ə] in Pngawan.

Crucially, the influence of the donor language did not stop there: the incompatibility of the syllable structure of Klesan with Japanese meant that Klesan had to loosen its phonotactic restrictions in order to faithfully integrate these lexical borrowings. The effects included allowing nasal codas in non-final syllables, as well as tolerating full vowels outside the final foot; neither of which was permitted in the inherited vocabulary.

The main impact on Pngawan was an increase of the distribution of the alveopalatal sounds [ɕ] and [tɕ]. In the native vocabulary, these sounds had a very limited distribution, being allophones of /s/ and /c/, respectively. Japanese loanwords ushered in additional environments for [s], [ɕ], and [tɕ]. The increase in distribution may have precipitated the phonemecization of alveopalatals. Alveopalatals in Japanese loanwords had less of an influence on Klesan because these segments appeared in more environments to begin with.

Japanese stopped actively influencing Formosan languages after 1945, but its legacy survives to this day. The influx of lexical borrowings from Japanese did not just add new words, on a deeper level it brought about changes in the phonologies of Atayal dialects. These changes may have also paved the way for later borrowings from TSM, and more recently, the inescapable influence of Taiwan Mandarin.

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日語對萬大泰雅語與宜蘭澤敖利泰雅語

音韻系統之影響

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摘 要

日本統治時期 (1895-1945) 對臺灣所有語言都留下深刻的影響，其中最明顯的是臺灣南島語和漢語方言中的許多日語借詞。本文探討日語所影響更深遠的層面——日語是如何影響萬大和宜蘭澤敖利兩種泰雅語方言的音韻系統？這兩種方言，不但有許多日語借詞和借用的音位，甚至因此造成其音韻排列的變化。在宜蘭澤敖利泰雅語中，日語借詞能夠違反音節結構的制約。在萬大方言中，日語影響了其舌冠擦音和塞擦音的分布，並可能促成了音位的分裂。日語持續的影響，鬆綁了兩種方言的音韻限制，使其能夠更輕易地借用其他語言的詞彙，如臺灣閩南語或臺灣華語。

關鍵詞：臺灣南島語，泰雅語，語言接觸，借詞音韻學

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