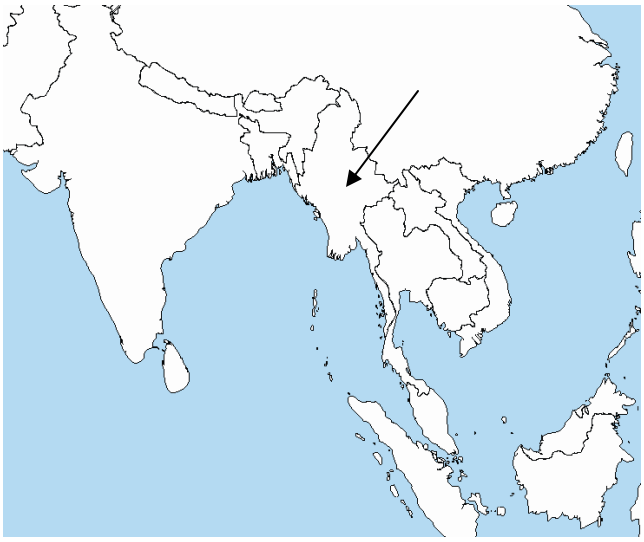
THE CODA CONDITION AND THE NATURE OF GLIDES – IN BURMESE

1. Introduction

Burmese is the official language of Burma, with more than 30 million native speakers.



2. Burmese phonotactics

2.1 Syllable structure

Onset

- The syllable must have an onset. A glottal stop /ʔ/ is epenthesized to vowel initial words.
- Onset clusters only when the second consonant is a glide /w/ or /j/
- /w/ combines with any preceding consonant
- /j/ combines with preceding labial stops (Cornyn 1944:7)

Coda

- The coda can only be /ʔ/ or a nasal /N/
- When followed by a consonant, /ʔ/ and /N/ assimilate to it in place
- When utterance final, /N/ is velar after diphthongs, otherwise it has a weak coronal articulation (Bennett/Lehman 1994, Lehman p.c.)

2.2 Vowel inventory

The following tables show the phonetic distribution of vowels in Burmese:

Open syllables

i	u
e	o
ɛ	ɔ
a	

Syllables closed by /N/

ɪ	ʊ		
		ej	ow
ʌ		aj	aw

Syllables closed by /ʔ/

ɪ	ʊ		
		ej	ow
ɛ			
ʌ		aj	aw

- The main distinction goes between open and closed syllables
- Open syllables have no diphthongs
- Closed syllables have no mid vowels (except /-ɛʔ/

3. Burmese vowel mapping – loanword phonology

- There are no processes in Burmese that close an open syllable or open a closed syllable
- The distribution in 2.2 is therefore static
- To discover the active phonological constraints, we need to look at the adaptation of loanwords

What we want to know:

- Are diphthongs banned from open syllables?
- If so, why?

Loanword material from Chang 2003, Green 2005 and my own eliciations.

3.1 Mapping of mid diphthongs

- To see whether diphthongs are banned from open syllables, we'll look at how Burmese treats English /ej/ and /ow/
- English /ej/ and /ow/ are maintained in closed syllables:

'cake'	/kejʔ/	'oats'	/ʔowʔ/
'gate'	/gejʔ/	'phone'	/p^{h}owN^{3}/

- English /ej/ and /ow/ become high mid vowels in open syllables:

'café'	/ka^{2}pe^{3}/	'banjo'	/bʌN^{2}d͡ʒo^{2}/
'DJ'	/di^{2}d͡ʒe^{2}/	'dingo'	/dɪN^{2}go^{2}/

- The loanword phonology matches the distribution in the native lexicon
- Diphthongs are not allowed in open syllables
- To answer why, we must first look at the Burmese coda

4. The Burmese coda

- The coda ends in /ʔ/ or /N/
- Both are the canonical 'placeless' consonants
- /ʔ/ has no supra-laryngeal place features
- /N/'s articulation is determined by the preceding or following segments, hence it has no independent place features
- The strict conditions on what is allowed to appear in the coda testify to the existence of the 'coda condition' in Burmese
- Coda condition: The final segment of the coda must be placeless (Itô 1988)

4.1 Coda condition for diphthongs

- The coda condition bans certain segments from the right edge of the syllable
- Loanwords show that diphthongs are banned from the right edge of the syllable
- So, the coda condition must somehow apply to diphthongs too
- Green's (1995, 2005) solution is to apply the coda condition to both vowels and consonants, and have it refer to the last mora of the syllable, not the last segment
- Since there is no evidence for morae in Burmese, the connection must lie elsewhere

Claim: Burmese glides are consonantal. Syllables cannot end in a diphthong because its final segment is a consonant with oral place features.

5. Consonantal glides

- Glides are traditionally represented as underlying vowels that surface as glides by syllabification rules
- In a number of cases, glides undergo phonological processes that otherwise affect consonants, not vowels
- In some languages, glides in some morphemes behave like vowels, in other morphemes like consonants
- Hence there is a difference between vocalic glides and consonantal glides
- A consonantal glide is specified in its underlying representation as being a glide by nature → underlying glide

5.1 Detecting underlying glides in Burmese

- A basic diagnostics for detecting underlying glides is if they 'over-abound'
- Glides 'over-abound' if they exist in a position where one otherwise would expect vowels (cf. Levi 2004)
- This applies to the pre-consonantal position, i.e. an output [jCV]/[wCV] for the expected [iCV]/[uCV]

5.2 Underlying glides in Burmese

- Given the coda condition in Burmese, an over-abundance of glides would only be detectable in the onset
- From 2.1, we know that /w/ can follow any consonant
- So if Burmese allows an onset /jw-/, glides 'over-abound'
- /jw-/ is a common onset: /jwa^{1}/ 'be fragile, /jwa^{2}/ 'village', /jwe^{1}/ 'move', /jwe^{3}/ 'choose', /jwɛ^{1}/ 'be across', /ʔəjwe^{2}/ 'age', /jwɛʔ/ 'carry on the head' etc. (Bernot 1989)
- It is necessary to specify the onset /jw-/ as having an underlying glide /j/ to prevent it from becoming /ʔiw-/ or /ʔəw-/[1]

5.3 Burmese diphthongs end in a consonant

- Levi (2004:11) proposes that if there is no evidence for underlying glides, the speaker will assume that all glides are vocalic
- This avoids an unnecessary stipulation of extra segments in the inventory
- The principle should work both ways
- Since there is no evidence in Burmese for vocalic glides, speakers assume that all glides are underlying
- The diphthongs /ej/, /ow/, /aj/ and /aw/ end in a consonant

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[1] /ʔə-/ is a reduced syllable ('minor syllable'). For the reduction of underlying /i/ to /ə/, cf. /iʔ-ko^{2}/ 'older brother', /iʔ-ma^{3}/ 'older sister' > /ʔə-ko^{2}/, /ʔə-ma^{3}/ (Armstrong/Tin 1925:26, Bernot 1992:308).

- Since /j/ and /w/ have oral place features, they are ruled out in the coda by the coda condition → no diphthongs in open syllables
- If /j/ and /w/ are followed by another consonant (/ʔ/ or /N/), they are not affected by the coda condition → diphthongs in closed syllables

6. Burmese vowel phonemes

- With the exception of /-ɛʔ/ and /-ajʔ/, the vowels /e/, /ɛ/, /o/, /ɔ/ are in complementary distribution in the Burmese lexicon with the diphthongs /ej/, /aj/, /ow/, /aw/
- The common claim has been that the mid monophthongs and the diphthongs are allophones, with the exception of /ɛ/ and /aj/ (Bernot 1963, Mehnert/Richter 1972-77, Green 2005)

6.1 More Burmese vowel mapping

- We've already seen that /ej/ and /ow/ in open syllables map to /e/ and /o/ in loanword phonology
- If mid vowels and diphthongs are allophones, then mid vowels should map on to diphthongs
- This is not the case
- English lax /e/ is mapped to /ɪ/ in a syllable closed by a nasal:

'November'	/no^{2}wɪN^{2}ba^{2}/	'ball pen'	/bɔ^{3}pɪN^{2}/

- English lax /o/ is mapped to /ʊ/ in a syllable closed by a nasal:

'John'	/d͡ʒʊN^{2}/	'Krypton'	/kəɾɪʔpətʊN^{2}/
'sitcom'	/sɪʔkʊN^{2}/	'Honda'	/hʊN^{2}da^{2}/

- English lax /o/ is mapped to /ɔ/, with *coda deletion*:

'hot dog'	/hɔ^{1} dɔ^{1}/	'jackpot'	/d͡ʒʌʔpɔ^{1}/
'Adolf'	/e^{2}dɔ^{1}/	'fork'	/p^{h}ɔ^{1}/

- Summary: the diphthongs /ej/ and /ow/ map to /e/ and /o/ in open syllables, but mid vowels *never* map to diphthongs → no allophony

7. Coda deletion

- The mapping of English lax /o/ shows that coda deletion is a licit strategy to create a permissible string
- Coda deletion occurs also when the input syllable ends in /l/ and /r/ (for rhotic English) (Chang 2003:76):

‘e-mail’	/ʔi^{3}me^3/	‘Nicole’	/ni^{2}ko^3/
‘car’	/ka^3/	‘store’	/səto^3/

- Claim: coda deletion applies to all oral sonorants: /l/, /ɾ/, /j/, /w/
- /ej/ and /ow/ map to /e/ and /o/ in open syllables by coda deletion of /j/ and /w/

8. Coda epenthesis

- Burmese also allows a new coda to be created in order to preserve the input segments
- English /aj/ in an open syllable is preserved by epenthesizing /ʔ/ or /N/ (i.e. by closing the syllable):

‘July’	/zu^{2}lajN^2/	‘bicycle’	/bajN^{2}səkɛ^2/
‘typhoon’	/tajʔp^{h}ʊN^2/	‘ice cream’	/ajʔsəkəjɪN^3/

- Burmese prefers coda epenthesis to coda deletion of a glide, if the outcome of deletion would be a syllable in /-a/

8.1 Mapping of /aw/

- The traditional approach sees /aw/ as an allophone of /ɔ/
- This predicts that /aw/ in an open syllable would map to /ɔ/
- For the current analysis with coda deletion and coda epenthesis, it is irrelevant that /aw/ and /ɔ/ do not contrast
- Given the treatment of /aj/, it rather predicts that /aw/ would undergo coda epenthesis
- Which is true:

‘powder’	/pawN^{2}da^2/	‘fow’	/p^{h}awN^3/

9. Conclusions

- Loanword phonology can tell us what the active constraints in Burmese are
- In Burmese, open syllables don’t have diphthongs
- Diphthongs are banned from open syllables by the coda condition
- Burmese glides are consonantal with an oral place feature
- Input diphthongs /ej/ and /ow/ in open syllables become /e/ and /o/ by coda deletion, not by allophonic distribution

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