Vowel alternations in Matu'uwal Atayal

AFLA-27, 20-22 Aug 2020

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Roadmap

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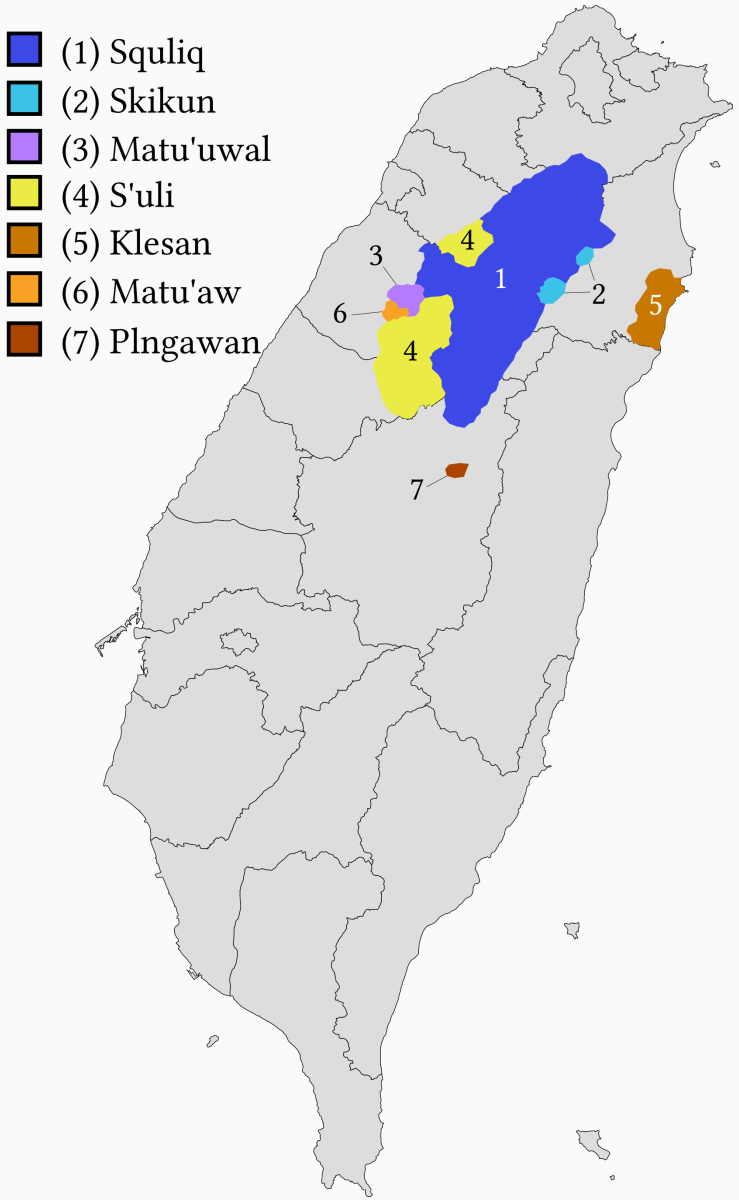
Introduction

General information

- Atayal is an Austronesian language spoken in Northern and Central Taiwan.
- Together with Seediq, it forms the Atayalic primary branch of Austronesian (Blust 1999).
- Matu'uwal is a dialect of Atayal, belonging to the Northern Atayal branch (Goderich 2020).



Consonant inventory of Matu'uwal

p	t	k	q	ʔ
b [β]		g [ɣ]		
	c [t͡s]			
	s	x	h [ħ]	
m	n	ŋ		
	l, r			
w	y [j]			

(Based on Li 1980: 352; Huang 2015: 58; Goderich 2020: 39)

Vowel inventory

i	u
(ə)	
a	

- Stress is always word-final.
- Schwa [ə] cannot appear in word-final (stressed) position.
- Hiatuses are allowed **only** in the head (rightmost) foot.

Synchronic vowel alternations

Synchronic vowel alternation processes

- Historical schwa alternations
- Rhythmic vowel reduction
- Hiatus resolution

Historical schwa alternations

Pre-/infixed form	Suffixed form	Meaning
t<um>ahuk	tahk-un	‘to cook’
ma-bahuq	bahq-an	‘to wash (clothes)’
q<um>ihul	qihl-un	‘to force, compel’
h<um>raq	haraq-un	‘to strip off’
s<um>ku?	suku?-un	‘to put’
s<um>li?	sili?-un	‘to collect’
h<um>gub	hagb-an	‘to pray’
k<um>luh	kalh-un	‘to harvest’
q<um>lu?	qal?-un	‘to close’

Non-alternating vowels

Pre-/infixed form	Suffixed form	Meaning
t<um>aku?	taku?-un	‘to scoop up’
r<um>aŋa?	raŋa?-un	‘to plead’
ma-puhug	puhug-un	‘to break in half’

- Alternating roots contrast with non-alternating ones.

Rhythmic vowel reduction

The fourth-to-last vowel is reduced if it is in the stem (Huang 2017).

k<um>anuhuw	kənuhu-un	‘to stir up trouble’
s<um>iʔuwaʔ	səʔuwaʔ-an	‘to like, want’
ma-siquwing	səquwing-un	‘to disagree’
si-pakati?	pakti?-ani	‘to throw’
m-aksinguwi?	pakasnguwi?-un	‘to fall asleep’

Hiatus resolution

Hiatuses are resolved when they are no longer in the rightmost foot.

k<um>aal	kal-an	‘to speak, say’
r<um>uu?	ru?-un	‘to cling to s.o.’
h<um>ii?	hi?-an	‘to pour’
m-aiq	bayq-an	‘to give’
c<um>aum	cawm-an	‘to rub, wipe’
k<um>ai?	kay?-an	‘to dig’

Interactions between alternation processes

Hiatus and root-final *ə

Rhythmic vowel reduction still applies to roots with a /u~∅/ alternating vowel.

m-ayhul	pihl-an	‘to tread’
tayhuk	tihk-an	‘to arrive’
q<um>aylup	qa-qilp-an	‘to sleep’ (f.)

c.f. *m-aybul — paybul-an* ‘to get water’

Hiatus resolution and rhythmic vowel reduction

Rhythmic vowel reduction applies in roots with a hiatus.

m-ahiiq	pəhiq-un	‘to squeeze, pinch’
qilaap	qa-qlap-an	‘to sleep’ (m.)
m-ahaag	ba-bhag-un	‘to chase’

This is an example of counterbleeding opacity.

Vowel epenthesis and rhythmic vowel reduction

Rhythmic vowel reduction applies to roots with an epenthetic/fortitioned vowel:

g<um>ilbak	gəlabak-an	‘to tidy up’
s<um>ilnga?	səlanga?-an	‘to hurry’

This could be analysed as a feeding relationship.

Geminate avoidance

m-ənaquu?	?<in>anaquu?	‘to repair’
m-ənaqru?	?<in>anaqru?	‘to finish’
m-əna?alu?	?<in>ana?alu?	‘to take s.o.’s place’

This contrasts with the normal behaviour of vowels in this position:

cə?arx-an	c<in>?arx-an	‘to stand’ (m.)
pətiqsu?	m<in>tiqsu?	‘to offer harvest prayers’
m-ərakiyas	m<in>rakiyas	‘to grow (intr.)’

Rule-based analysis

Rule application

	/kVlVh/ + -um-	/kVlVh/ + -un
1. Syllabification	ku.mV.lVh	kV.lV.hun
2. Feature assignment	ku.mV.luh	ka.lV.hun
3. Vowel reduction	ku.m_.luh	ka.l_.hun
4. Resyllabification	kum.luh	kal.hun

The Vowel reduction rule combines both rhythmic vowel reduction (reduce fourth-to-last) and the deletion of unassigned V segments.

Rule interaction

	/bahaag/ + -un
1. Syllabification	ba.ha.a.gun
2. Feature assignment	—
3. Vowel reduction	bə.ha.a.gun
4. Hiatus resolution	bə.ha._.gun
5. Resyllabification	bə.ha.gun

Vowel reduction **must** precede hiatus resolution (counterbleeding).

Different alternations in a single root

	/baiq/ + -an	/baiq/ + -ani
1. Syllabification	ba.i.qan	ba.i.qa.ni
2. Feature assignment	—	—
3. Vowel reduction	—	b_.i.qa.ni
4. Hiatus resolution	ba.y.qan	—
5. Resyllabification	bay.qan	bi.qa.ni

Problematic cases

Conspiracies and surface-oriented restrictions are difficult to model using rule-based approaches without a look-ahead mechanism:

	/gilVbak/ + -um-	/ʔVnaqVrVʔ/ + -in-
1. Syllabification	gu.mi.lV.bak	ʔi.nV.na.qV.rVʔ
2. Feature assignment	—	ʔi.nV.na.qV.ruʔ
3. Vowel reduction	gə.mi.l_.bak	ʔi.n_.na.q_.ruʔ
4. Hiatus resolution	—	—
5. Resyllabification	**gə.mil.bak	**ʔin.naq.ruʔ
Expected:	gu.mil.bak	ʔi.na.naq.ruʔ

Constraint-based analysis

An OT analysis

- Does not require featureless vowel segments.
- Cannot have a separate underlying rhythmic structure:
    - Rhythmic vowel reduction is analyzed using surface-oriented constraint interaction.
- Cannot deal with true opacity.

Vowel epenthesis

Vowel epenthesis is analyzed as a mechanism to avoid complex syllable margins:

/klh/ + -um-	*Complex	Dep-V
a. kumlh	*!	
☞ b. kumluh		*
c. kumuluh		**!

Vowel syncope

All syllables are preferably parsed into binary feet, signified by Parse. This takes precedence over vowel faithfulness:

/pakati?/ + -ani	*Complex	Parse	Max-V
a. pa.(ka.ti).(?a.ni)		*!	
☞ b. (pak.ti).(?a.ni)			*
c. (pka.ti).(?a.ni)	*!		*

Head foot faithfulness

Faith-V(HeadFt): input vowels in the head foot must not be syncopated (Max-V(HeadFt)) or epenthesized (Dep-V(HeadFt))

/gilbak/ + -um-	Faith-V(HeadFt)	Parse	Dep-V
☞ a. gu.(mil.bak)		*	
b. (gu.mi)(la.bak)	*!		*

Hiatus resolution

Hiatuses are only allowed word-finally, therefore we need to have separate constraints to account for this distribution:

- OnsetStr. The *stressed* syllable has to have an onset.
- Onset. All *unstressed* syllables have to have onsets.

/caum/ + -um-	*Complex	Onset	Faith-V(HeadFt)	OnsetStr
☞ a. cu.(ma.um)				*
b. (cu.mum)			*!	
c. (cu.mawm)	*!			

Geminate avoidance

Geminates except /-ww-/ and /-yy-/are avoided in Matu'uwal.
This can be modelled using a cover constraint *Geminate:

/mnubuwag/ + -in-	*Geminate	Parse	Dep-V
☞ a. mi.(na.nu).(bu.wag)		*	*
b. (min.nu).(bu.wag)	*!		

Opacity

Opacity is problematic for classic OT, and is difficult to model:

Ca- /qilaap/ + -an	Onset	Parse	Max-V
☜ a. qaq.(la.pan)		*!	**
☞ b. (qa.qi).(la.pan)			*
c. (qaq.la).(a.pan)	*!		*

Conclusion

Conclusion

- Matu'uwal data exhibits both conspiracy and opacity.
- Neither a purely rule-based nor a classic OT approach can account for all the phenomena.
- A hybrid approach, e.g. Harmonic Serialism, might prove more fruitful.

Thank you

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