

Highs and lows:  
Tone splits from vowel height in Raja Ampat

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Tone split 1: Metnyo Ambel

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Tone split 2: Ma'ya

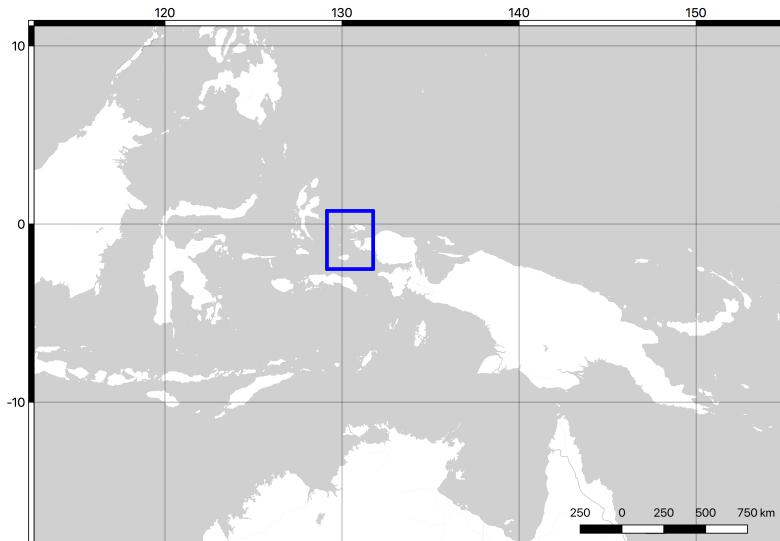
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Discussion

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Current research

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Tone split 1: Metnyo Ambel



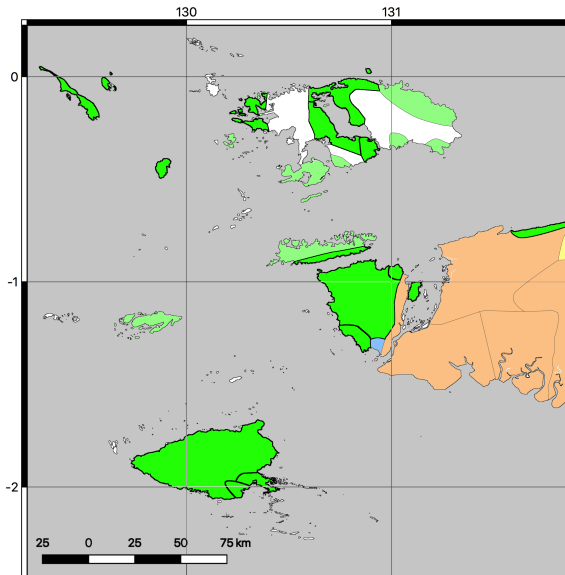
Tone split 2: Ma'ya

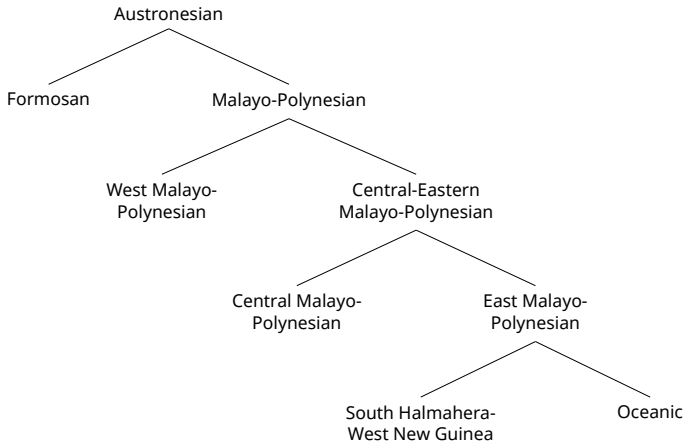


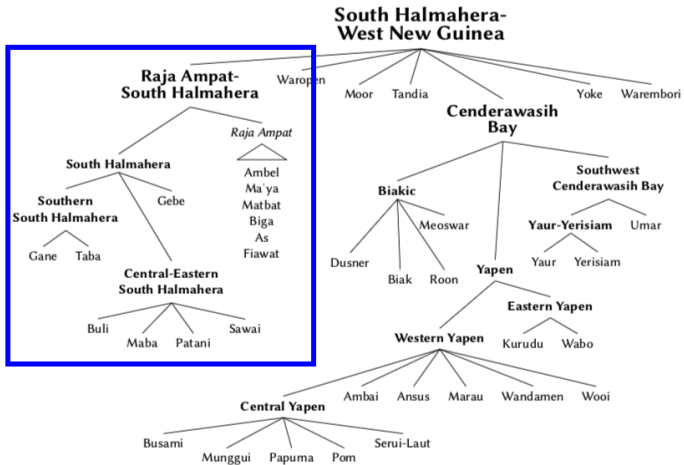
Discussion



Current research







After Kamholz (2014)



# Tone splits from vowel height in Raja Ampat

1. Tone split 1: Metnyo Ambel
2. Tone split 2: Ma'ya
3. Discussion
4. Current research

Tone split 1: Metnyo Ambel



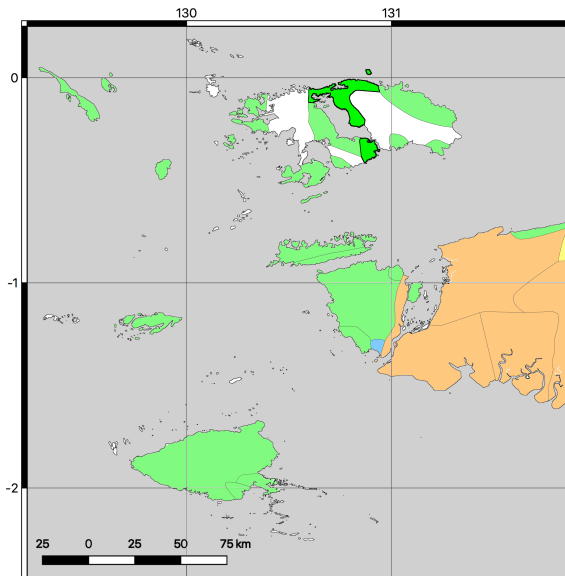
Tone split 2: Ma'ya



Discussion



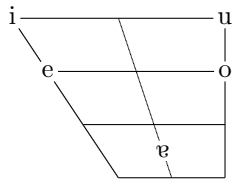
Current research





## Ambel (Arnold 2018a,b)

	labial	coronal	velar	labial- velar
stops	p b	t d	k g	
fricatives	f (> h)	s		
nasals	m	n		
liquids		l r		
semivowels		j		w







## Ambel (Arnold 2018a,b)

### ► Metnyo Ambel:

/H/		/Ø/	
tún	‘moon’	tun	‘thorn’
súp	‘bathe.1sg’	sup	‘repeat.1sg’
y-ún	‘1sg-pick.up’	y-un	‘1sg-know’

### ► Metsam Ambel:

/H/		/LH/		/Ø/	
páy	‘heron’	běy	‘sago’	gey	‘areca nut’



## Tonal correspondences (Arnold 2020)

Set		Metsam		Metnyo		Proto-Ambel
A	-	H	::	H	}	*H
B	-	∅	::	∅	}	*∅
C	-	∅	::	H		
D	-	LH	::	∅	}	*LH
E	-	LH	::	H		



## Correspondence set B: Metsam Ø :: Metnyo Ø

- Most items in set B can be reconstructed with \*i or \*u:

		Metsam	Metnyo	
1.	<b>'earthquake'</b>	<b>suy</b>	<b>suy</b>	<b>*suy</b>
2.	<b>'enter'</b>	<b>sun</b>	<b>sun</b>	<b>*sun</b>
3.	<b>'five'</b>	<b>lim</b>	<b>lim</b>	<b>*lim</b>
4.	<b>'honey'</b>	<b>ful</b>	<b>hul</b>	<b>*ful</b>
5.	<b>'nine'</b>	<b>siw</b>	<b>siw</b>	<b>*siw</b>
6.	<b>'octopus'</b>	<b>kit</b>	<b>kit</b>	<b>*kit</b>
7.	<b>'good'</b>	<b>fey</b>	<b>hey</b>	
8.	<b>'house'</b>	<b>now</b>	<b>now</b>	
9.	<b>'two'</b>	<b>low</b>	<b>low</b>	...



## Correspondence set B: Metsam Ø :: Metnyo Ø

	<b>Metsam</b>	<b>Metnyo</b>	<b>Other RASH cognates</b>	<b>Proto-RASH</b>
7. 'good'	fey	hey	As <i>fi</i> , Biga <i>fi</i> , Buli <i>mafia</i> , Gane <i>fia</i> , Ma'ya 'fi <sup>3</sup> , Matbat <i>fi<sup>3</sup></i>	*fi
8. 'house'	now	now	Biga <i>pnu</i> 'village', Buli <i>pnu</i> 'village', Ma'ya 'pnu <sup>3</sup> 'village', Matbat <i>nu<sup>3</sup></i> 'village'	*pnu 'village'
9. 'two'	low	low	As <i>lu</i> , Biga <i>lu</i> , Buli [si]lu, Gane <i>plu</i> , Ma'ya 'lu <sup>3</sup> , Matbat <i>lu<sup>3</sup></i> , Taba <i>-lu</i>	*lu



## Correspondence set B: Metsam Ø :: Metnyo Ø

- Most items in set B can be reconstructed with \*i or \*u:

		<b>Metsam</b>	<b>Metnyo</b>	
1.	‘earthquake’	suy	suy	*suy
2.	‘enter’	sun	sun	*sun
3.	‘five’	lim	lim	*lim
4.	‘honey’	ful	hul	*ful
5.	‘nine’	siw	siw	*siw
6.	‘octopus’	kit	kit	*kit
7.	‘ <b>good</b> ’	<b>fey</b>	<b>hey</b>	<b>*fi</b>
8.	‘ <b>house</b> ’	<b>now</b>	<b>now</b>	<b>*nu</b>
9.	‘ <b>two</b> ’	<b>low</b>	<b>low</b>	<b>*lu</b> ...



## Correspondence set C: Metsam Ø :: Metnyo H

- Most items in set C can be reconstructed with \*e, \*a, or \*o:

	Metsam	Metnyo	
1. 'ascend'	sa	sá	*sa
2. 'canoe'	wan	wán	*wan
3. 'full'	fon	hón	*fon
4. 'rice'	fa	há	*fa
5. 'betel fruit'	nyan	nyán	*nyan
6. 'areca nut'	gey	gíy	*gey
7. 'rain'	mey	míy	*mey
8. 'coconut'	kowt	kút	*kowt
9. 'moon'	town	tún	

13/15  
 (~87%)



## Correspondence set B: Metsam $\emptyset$ :: Metnyo $\emptyset$

- Most items in set B can be reconstructed with \*i or \*u:

		<b>Metsam</b>	<b>Metnyo</b>	
1.	'earthquake'	suy	suy	*suy
2.	'enter'	sun	sun	*sun
3.	'five'	lim	lim	*lim
4.	'honey'	ful	hul	*ful
5.	'nine'	siw	siw	*siw
6.	'octopus'	kit	kit	*kit
7.	'good'	fey	hey	*fi
8.	'house'	now	now	*nu
9.	'two'	low	low	
				19/24 (~79%)



## Metnyo Ambel tone split: Summary

- ▶ Proto-Ambel \* $\emptyset$  >  $\emptyset$  / V [+close]  
> High elsewhere
  
- ▶ Conditions account for 32/39 cognates in sets B & C (p=0.00006)





# Tone splits from vowel height in Raja Ampat

1. Tone split 1: Metnyo Ambel

2. Tone split 2: Ma'ya

3. Discussion

4. Current research

Tone split 1: Metnyo Ambel

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Tone split 2: Ma'ya

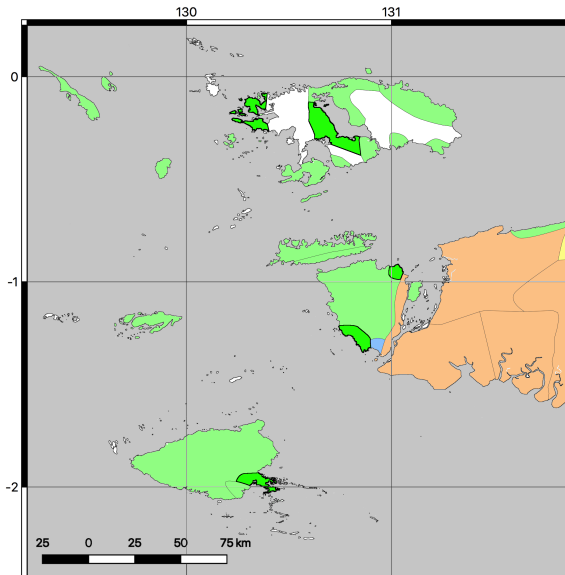
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Discussion

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Current research

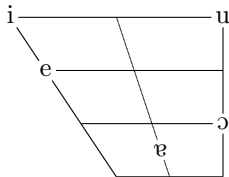
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## Ma'ya (Remijsen 2001)

	labial		coronal		velar		labial- velar	glottal
stops	p	b	t	d	k	g		(ʔ)
fricatives	f		s					
nasals		m		n				
liquids			l	r				
semivowels				j			w	





## Ma'ya (Remijsen 2001)

### ► Tone:

Rise/Low	/ <sup>12</sup> /	'sa <sup>12</sup>	'sweep'
High	/ <sup>3</sup> /	'sa <sup>3</sup>	'climb'
toneless		'sa	'one'

- Restricted to word-final syllables

### ► Stress:

- Primary correlate = length
- Penultimate and final syllables

e.g. ma'na<sup>3</sup> 'grease' vs. 'mana<sup>3</sup> 'light'

Tone split 1: Metnyo Ambel



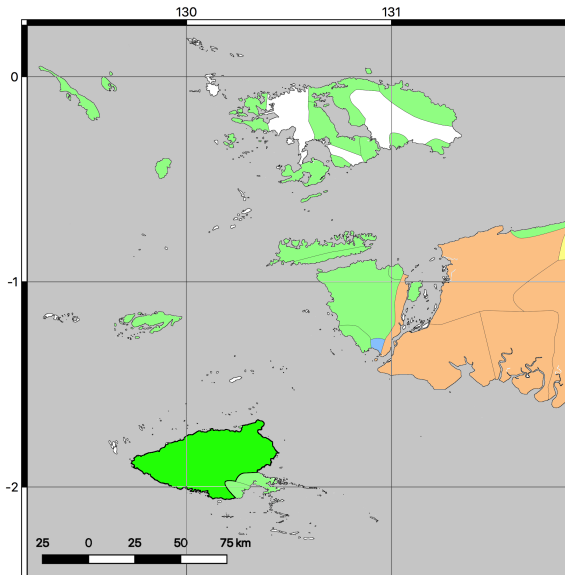
Tone split 2: Ma'ya



Discussion



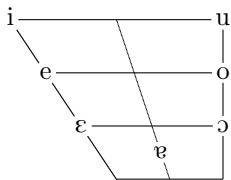
Current research





## Matbat (Remijsen 2007)

	labial		coronal		velar		labial- velar
stops	p	b	t	d	k	g	
fricatives	f		s				
nasals		m		n		ŋ	
liquids			l	(r)			
semivowels				j			w





## Matbat (Remijsen 2007)

### ► Tone:

Low	/ <sup>1</sup> /	na <sup>1</sup> n ‘betel’	
High	/ <sup>3</sup> /		de <sup>3</sup> ‘house’
Extra-high Fall	/ <sup>41</sup> /		de <sup>41</sup> ‘1PL.I-go.down’
Low Fall	/ <sup>21</sup> /	na <sup>21</sup> n ‘name’	
Low Rise	/ <sup>12</sup> /	na <sup>12</sup> n ‘animal’	
Rise-Fall	/ <sup>121</sup> /		de <sup>121</sup> ‘sick’

## Tonal correspondences: Ma'ya and Matbat (Arnold 2018c)

<b>Set</b>		<b>Matbat</b>		<b>Ma'ya</b>	
A	–	Extra-High	::	Rise	1/41
B	–	High	::	High	17/41
C	–	High	::	Rise	12/41
D	–	High	::	toneless	1/41
E	–	Rise	::	Rise	2/41
F	–	Low	::	Rise	2/41
G	–	Low Fall	::	toneless	4/41
H	–	Low Fall	::	Rise	2/41





## Correspondence set C: Matbat High :: Ma'ya Rise

- All items in set C have non-close vowels

		<b>Matbat</b>	<b>Ma'ya</b>	
1.	'canoe'	wa <sup>3</sup> ŋ	'wa <sup>12</sup> k	
2.	'fire'	ya <sup>3</sup> p	'la <sup>12</sup> p	
3.	'four'	fa <sup>3</sup> t	'fa <sup>12</sup> t	
4.	'full'	fo <sup>3</sup> n	'fo <sup>12</sup> n	
5.	'ground'	ba <sup>3</sup> t	'ba <sup>12</sup> t	
6.	'mother'	ne <sup>3</sup> n	'ne <sup>12</sup> n	
7.	'rice'	fa <sup>3</sup> s	'fa <sup>12</sup> s	
8.	'sand'	ye <sup>3</sup> n	'le <sup>12</sup> n	
9.	'see'	-ε <sup>3</sup> ŋ	'-e <sup>12</sup> m	
10.	'snake'	ko <sup>3</sup> k	'ko <sup>12</sup> k	...



## Correspondence set B: Matbat High :: Ma'ya High

- Many items in set B have close vowels...

		<b>Matbat</b>	<b>Ma'ya</b>
1.	'breast'	su <sup>3</sup>	'su <sup>3</sup> s
2.	'enter'	hu <sup>3</sup> ŋ	'su <sup>3</sup> n
3.	'five'	li <sup>3</sup> m	'li <sup>3</sup> m
4.	'good'	fi <sup>3</sup>	'fi <sup>3</sup>
5.	'kill'	bu <sup>3</sup> n	'bu <sup>3</sup> n
6.	'louse'	wu <sup>3</sup> t	'u <sup>3</sup> t
7.	'two'	lu <sup>3</sup>	'lu <sup>3</sup>
8.	'village'	nu <sup>3</sup>	'pnu <sup>3</sup>
9.	'white'	bu <sup>3</sup>	'bu <sup>3</sup> s
10.	'woman'	(wa <sup>1</sup> t)bi <sup>3</sup> n	'pi <sup>3</sup> n



## Correspondence set B: Matbat High :: Ma'ya High

- ...but some do not

	<b>Matbat</b>	<b>Ma'ya</b>
11. 'come'	bo <sup>3</sup> t	'bo <sup>3</sup> t
12. 'mountain'	he <sup>3</sup> l	'ye <sup>3</sup> l
13. 'sea turtle'	fe <sup>3</sup> n	'fe <sup>3</sup> n
14. 'eight'	-wa <sup>3</sup> l	'wa <sup>3</sup> l
15. 'ascend'	ha <sup>3</sup>	'sa <sup>3</sup>
16. 'seawards'	lo <sup>3</sup> w	'lo <sup>3</sup> l
17. 'three'	to <sup>3</sup> l	'to <sup>3</sup> l

## Correspondence set B: Matbat High :: Ma'ya High

		<b>Matbat</b>	<b>Ma'ya</b>	<b>Other RASH cognates</b>
11.	'come'	bo <sup>3</sup> t	'bo <sup>3</sup> t	Batta <b>bu<sup>1</sup>t</b> , Biga <b>bu<sup>3</sup>t</b> , Kawe Ma'ya <b>but</b> , Laganyan Ma'ya <b>but</b> , Wauyai Ma'ya <b>but</b> , Salawati <b>bu<sup>3</sup>t</b>
12.	'mountain'	he <sup>3</sup> l	'ye <sup>3</sup> l	Proto-Ambel * <b>i<sup>3</sup>l</b> , Biga <b>i<sup>3</sup>l</b> , Kawe Ma'ya <b>yil</b> , Laganyan Ma'ya <b>yil</b> , Wauyai Ma'ya <b>yil</b>
13.	'sea turtle'	fe <sup>3</sup> n	'fe <sup>3</sup> n	Proto-Ambel * <b>fi<sup>3</sup>n</b> , Batta <b>fi<sup>12</sup>n</b> , Biga <b>fi<sup>3</sup>n</b> , Buli <i>fen</i> , Gane <i>fen</i> , Kawe Ma'ya <b>fin</b> , Laganyan Ma'ya <b>fin</b> , Salawati <b>fi<sup>3</sup>n</b> , Sawai <i>fEn</i> , Taba <i>hen</i>



## Correspondence set B: Matbat High :: Ma'ya High

- ...but some do not

	<b>Matbat</b>	<b>Ma'ya</b>
11. 'come'	bo <sup>3</sup> t	'bo <sup>3</sup> t
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15. 'ascend'	ha <sup>3</sup>	'sa <sup>3</sup>
16. 'seawards'	lo <sup>3</sup> w	'lo <sup>3</sup> l
17. 'three'	to <sup>3</sup> l	'to <sup>3</sup> l



## Ma<sup>1</sup>ya tone split: Summary

- ▶ Proto-Ma<sup>1</sup>ya-Matbat \*High > High / V [+close]  
> Rise elsewhere
  
- ▶ Conditions account for 22/30 cognates in sets B, C, D (p=0.001)



# Tone splits from vowel height in Raja Ampat

1. Tone split 1: Metnyo Ambel

2. Tone split 2: Ma'ya

**3. Discussion**

4. Current research



## Diachronic effect of vowel quality on tone

*“...intrinsic fundamental frequency variations caused by vowel height rarely, if at all, give rise to the development of phonological tones”*

Hombert (1977)

*“...tone rarely or never originat[es]... from vowel height”*

Hombert et al. (1979)





## Diachronic effect of vowel quality on tone

### ► Tonogenesis:

- **U** (Angkuic; Svantesson 1988, 1991)
- **Limburgian Dutch** (Germanic; Boersma 2017)
- **Cèmuhî** (Oceanic; Rivierre 2001)

Open syls with prevocalic  
voiceless obstruents  
> H if the vowel was \*i or \*u  
otherwise > L

### ► Tone splits:

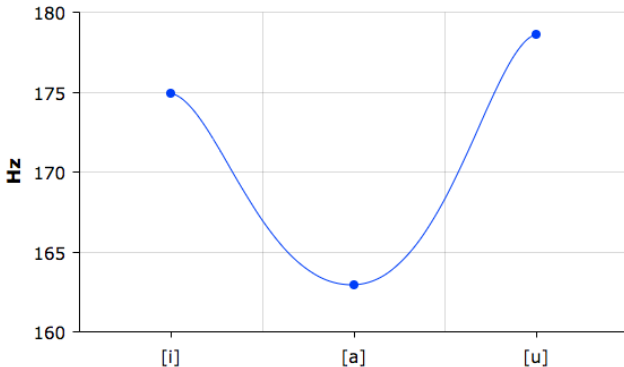
- **Bench'** (Omotic; Tesfaye an
- **Lugbara** (Moru-Madi; Andersen 1986)
- **Yerisiam** (SHWNG; Kamholz 2014)

Formerly predictable extra-high  
pitch on High-toned syllables with  
/i/ or /u/ > Extra-High tone



## Intrinsic fundamental frequency (IF0)

- ▶ All else being equal, close vowels are produced with higher  $f_0$  than non-close vowels



English: extrapolated from Whalen and Levitt (1995)



# Diachronic effect of vowel quality on tone

## ► Tonogenesis:

- **U** (Angkuic; Svantesson 1988, 1989)
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- **Cèmuhî** (Oceanic; Rivierre 2001)

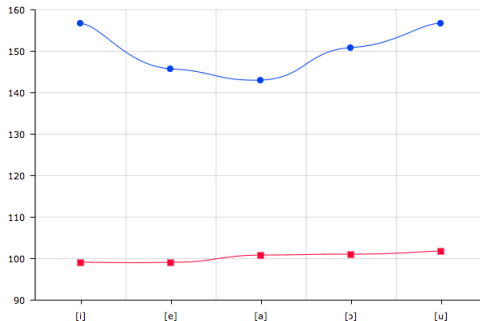
## ► Tone splits:

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## Intrinsic fundamental frequency (IF0)

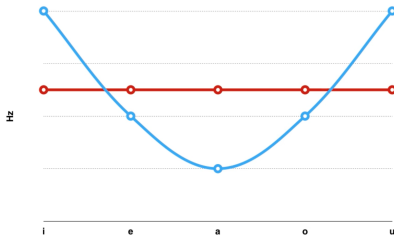
- ▶ All else being equal, close vowels are produced with higher  $f_0$  than non-close vowels...
- ▶ ...except in low-pitched contexts



Taiwanese Chinese: extrapolated from Zee (1980)

## Intrinsic pitch

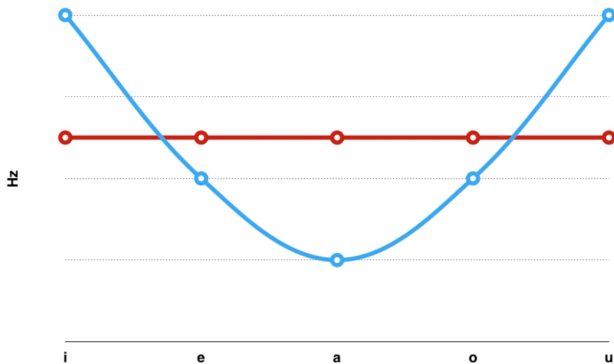
- ▶ An auditory mechanism by which hearers perceive close vowels as *lower* in pitch than non-close vowels
- ▶ Thought to be auditory compensation for IF0 – ‘compensatory listening’ (Gussenhoven 2007)



e.g. Hombert 1977; Stoll 1984; Silverman 1987; Fowler and Brown 1997

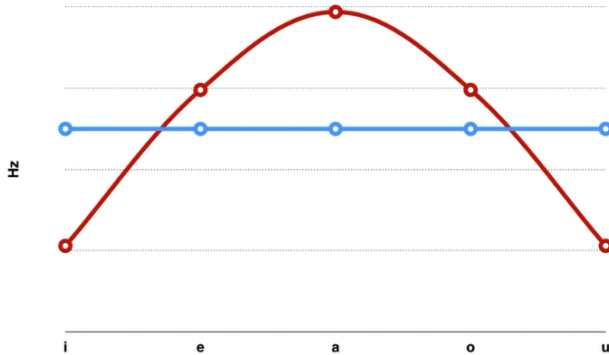


# Intrinsic pitch





# Intrinsic pitch





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## Diachronic effect of vowel quality on tone

- ▶ Tonogenesis:
  - ▶ U (Angkuic; Svantesson 1988, 1989)
  - ▶ **Limburgian Dutch** (Germanic; Boersma 2017)
  - ▶ **Cèmuhî** (Oceanic; Rivierre 2001)
  
- ▶ Tone splits:
  - ▶ **Bench'** (Omotic; Tesfaye and Wedekind 1994)
  - ▶ **Lugbara** (Moru-Madi; Andersen 1986)
  - ▶ **Yerisiam** (SHWNG; Kamholz 2014)
  - ▶ **Ma'ya** (SHWNG; Arnold 2018c)
  - ▶ **Ambel** (SHWNG; Arnold 2020)



## Tone and vowel height in eastern Austronesian

- ▶ Unexpected sound changes may be due to “the continued operation of an inherited structural pressure after the separation of the daughter languages from a common ancestor” (Blust 2017: 342)
  
- ▶ ‘Synchronic and diachronic investigations in Raja Ampat-South Halmahera’
  1. Phonological analyses of the word-prosodic systems of undocumented RA languages
  2. Phonetic investigations into IF0 in RA
  3. Subclassification of RASH and reconstruction of proto-RASH



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Thanks for listening!

