

# Does Rere have vowel harmony?

Yaqian Huang

University of California San Diego

ACAL 51-52



Glottolog, 2020

## Rere (Koalib)

- Heiban group of Kordofanian language spoken in the Nuba Mountains of southern Sudan
- Estimated population of 100,000 (Quint, 2009)

# Vowel system

- Quint (2009)

VOWELS	Front	Central	Back
High	i		u
Mid	e	ɐ	o
Low	ɛ	a	ɔ

# Vowel harmony

- Vowels divided into two height classes: high vs. low

VOWELS	Front	Central	Back
High	i	e	u
Low	e	a	o
	ɛ		ɔ

- Pervasive phenomenon including loanwords
  - kérgè ‘hand’; kwóàe ‘slave’; kwêrrí ‘he will make’; kî:ɾu ‘small antelope’; ami [ɛ’mi] ‘friend’ (French)
- Within words
- **Goal:** to provide an acoustic analysis of the vowel system and attest vowel harmony

# Methods

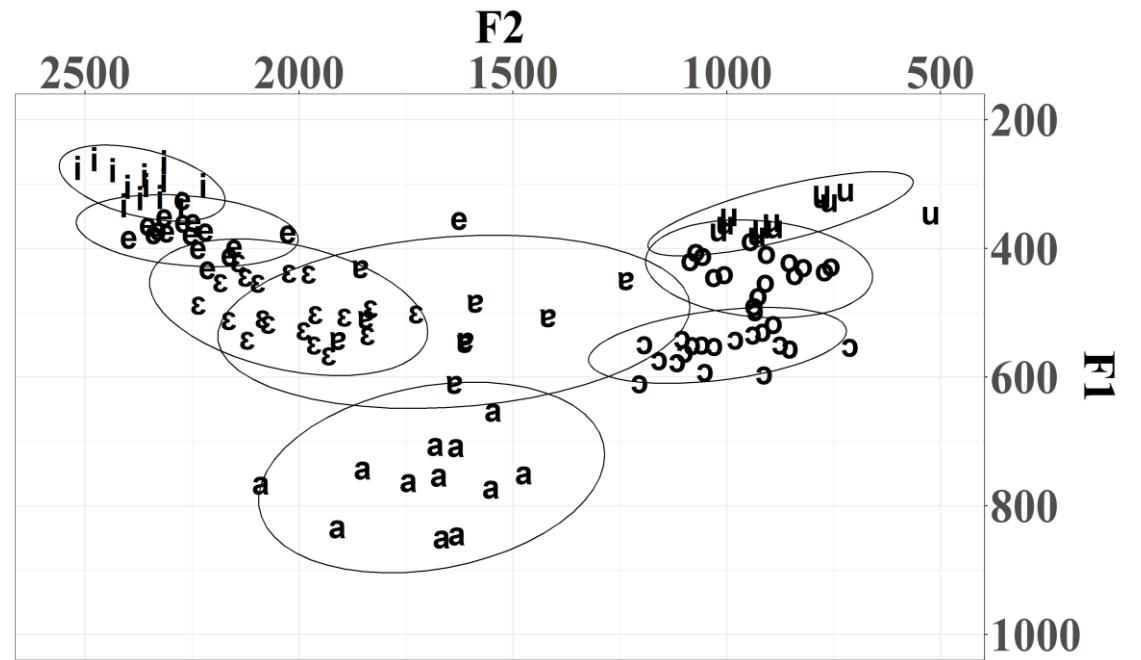
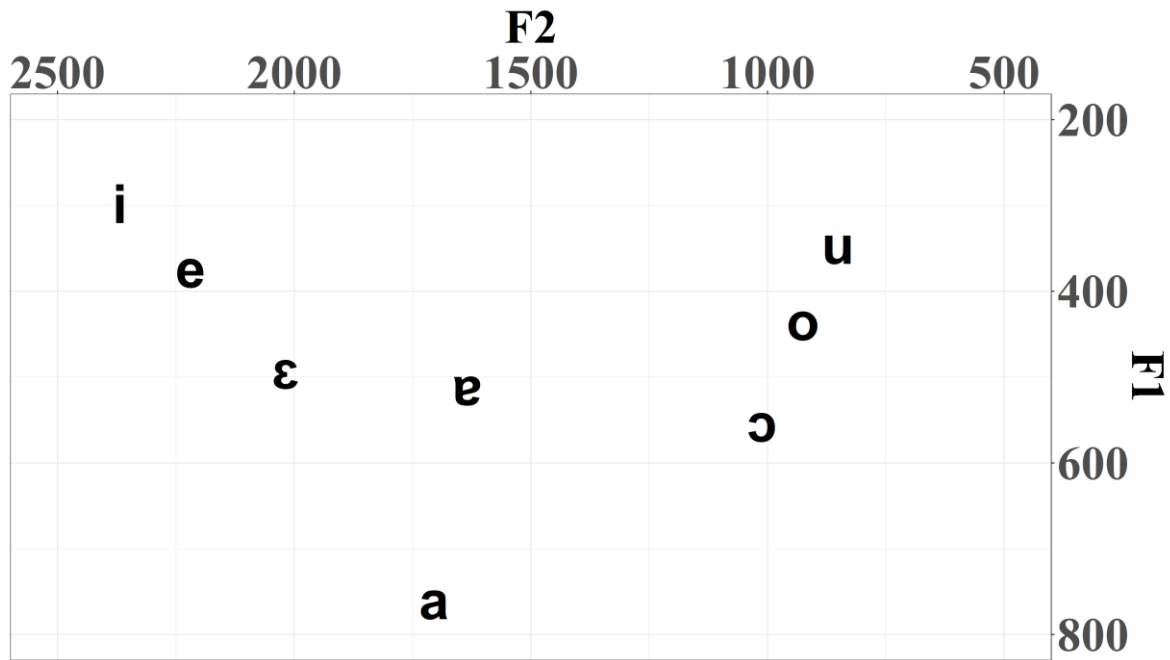
- Speaker
  - Taitas Kanda: male, born and raised in Sudan
- Elicitation
  - Weekly sessions during a graduate Fieldwork class
  - January – May, 2019
- Acoustic analysis
  - Annotation in Elan (Kwaras Rere corpus: [rere.ucsd.edu](http://rere.ucsd.edu))
  - Segmentation in Praat (Boersma & Weenink, 2017)
  - Processing in VoiceSauce (Shue et al., 2011)

# Counterexamples to vowel height harmony

- Disharmonic word examples (from elicitation)

já:rì	‘ash’	frijàr	‘flash of light’
kɾítçã	‘wine’	çúndàŋ	‘lion’
ô:rì	‘red’	ʦìt̪ərə́	‘cup’
dùkka	‘stick’	fóri	‘light’
kòkòrèŋ	‘few’	jé:nì	‘ear’
lùbòn	‘tree-hole’	kímòw	‘snake’

- The problem with /e/: “considerably higher than cardinal [e] and its point of articulation is only a little lower than /i/” (Quint, 2009)



# Vowel space

- Based on monosyllabic/disyllabic words containing clear articulations of the vowel
- Ten to twenty words for each vowel

# Vowel harmony in grammatical processes

- Noun suffixation with instrumental construction: with X
  - Instrumental suffix: *-Ci* vs. *-Ce*
  - C conditioned by the noun class; [i,e] conditioned by the vowel height of the stem vowels
- Valence-changing structures: conjugated verbs in passives & causatives
  - Passive suffix: *-ni*
  - Causative suffix: *-ənni*
  - Raising vowels



High V	With + X		With + X		With + X
wùrúṭ-ṭì	'larger antelope'	kû: ú-γî	'smoke'	kú:rí-γî	'mouse'
ηè úη-ηì	'lie'	ṭúrùm-ðî	'government'	é:mù-wî	'rat'
kéηdèη-γî	'knife'	gúrùjî-γî	'money'	kí:ríη-γî	'warthog'
kímìjî-kî	'kitchen knife'	jí:ðì-jì	'meat'	εùkú î-γî	'edible gourd'
ηúr-ηì	'fruit'	ṭíηì-rî	'rabbit'	ùbùη- î	'ground-hole'
ùr- ì	'manure'	ì:gé-wî	'fire'	ṭú -ðì	'giraffe'
kî:rù-kì	'small antelope'				

Low V	With + X		With + X		With + X
ṭóηór-ðè	'elephant'	ṭór-rê	'child'	lèbléṭ- è	'cloud'
ṭò:ròm-ðê	'star'	ṭóηòr-rè	'boy'	é:ré- è	'sky'
óm- è	'fish'	kwórtò-gè	'blacksmith'	è:dèr- ê	'bowl'
kwór-γê	'man'	ṭór-rê	'hammer'		
dòη- ê	'group'	òr ò ó- è	'beetle'		

## Instrumental suffix: with X

- -Ci vs. -Ce

Depending on the vowel height class of the vowels in the word stem

kwá:rá|gè 'with the antelope'

kwè|ùηgì 'with the liar'

Consistent with Quint's findings

# Instrumental suffix: with X – *counterexamples*

-Ci		-Ce	
lè-lì	'with eye'	ké -kè	'with seed-hole'
ɲè:ɾè-ɲî	'with goat'	lè:ðè- ê	'with pine tree'
		lè: è- ê	'with termite'

- Words containing /e/ can end with different suffixes

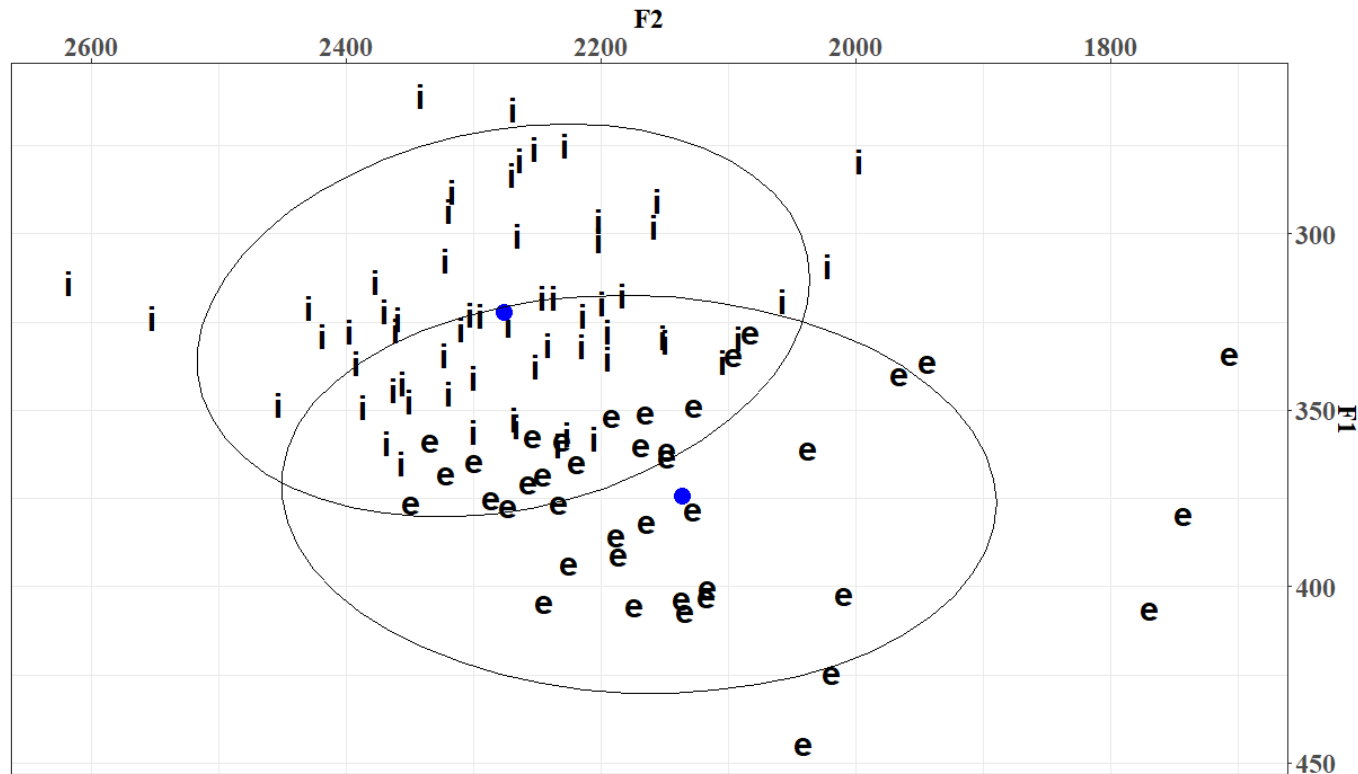
ɲèà-ɲî	'with poison'
kwórtò-ɣì	'with rich person'
kâ -ɣì	'with stone'

- Words containing low vowels take -*Ci*

kwóàj-ɣî/ê	'with slave'	kéɲ-ɣî/ê	'with salad'
kwá:rá -ɣì/è	'with antelope'	ám à-wî/ê	'with trap'
tù ùɲ-rî/ê	'with silo'	té-ðì/è	'with arm'
tù -kì/è	'with porridge'	tè:rà-ɾî/ê	'with girl'

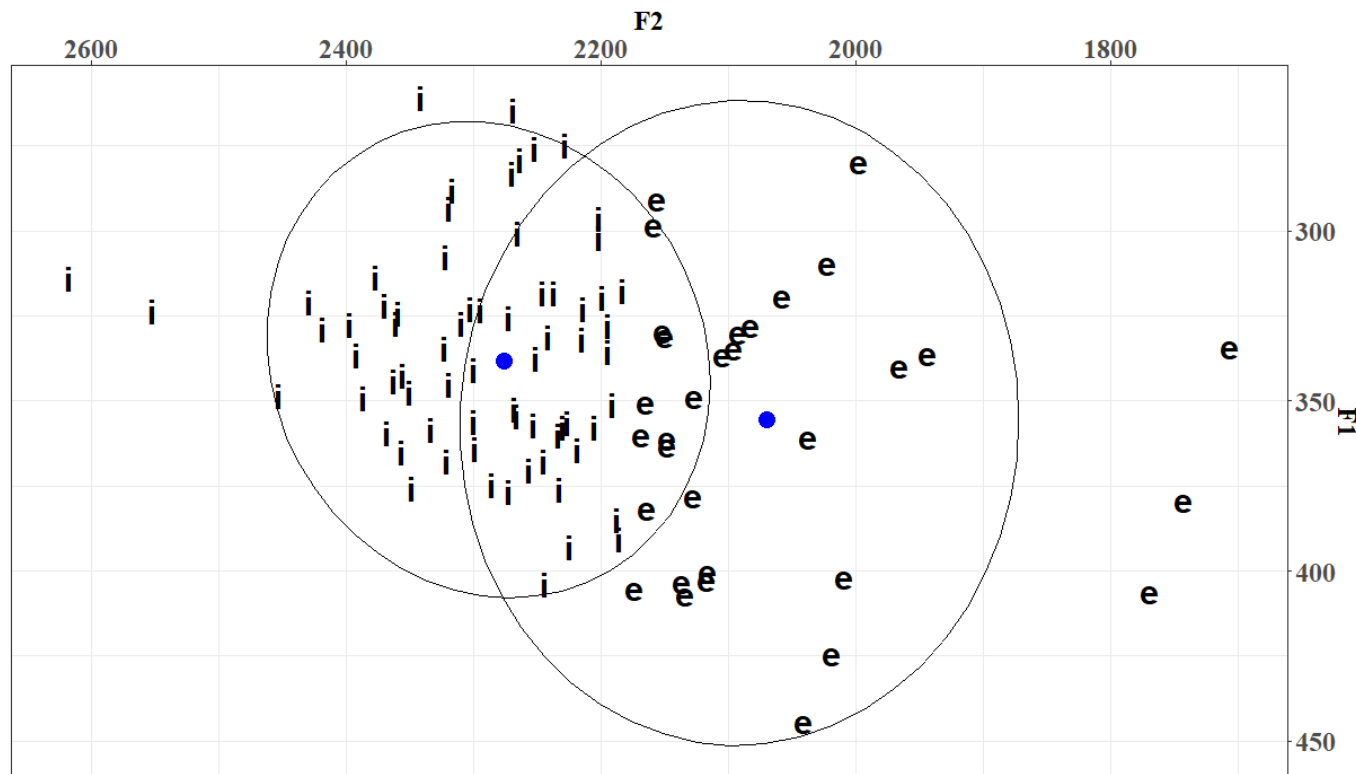
- Words can take both -*Ci* and -*Ce*

# Classification of [i,e] in *-Ci*, *-Ce* clusters – transcription



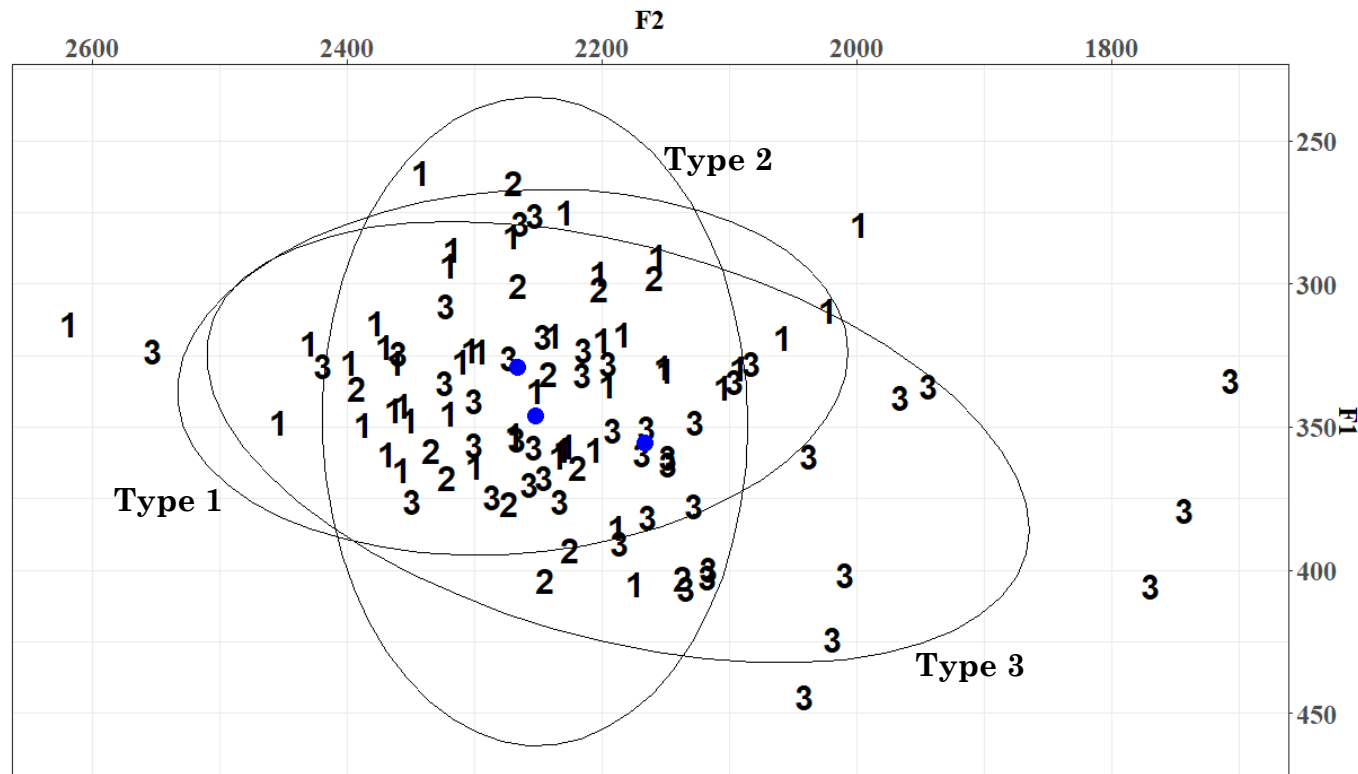
	mean F1	mean F2	mean F3	mean F2-F1
<b>i</b>	<b>322.17</b>	<b>2276.07</b>	<b>2828.24</b>	<b>1953.90</b>
<b>e</b>	<b>374.35</b>	<b>2136.40</b>	<b>2725.71</b>	<b>1762.05</b>

# Classification of [i,e] in *-Ci, -Ce* clusters – kmeans (Stehr, 2018)



	mean F1	mean F2	mean F3	mean F2-F1
<b>i</b>	338.15	<b>2275.85</b>	2869.08	1937.70
<b>e</b>	355.67	<b>2069.75</b>	2564.42	1714.08

# Classification of [i,e] in *-Ci*, *-Ce* clusters – *a priori* label (Hellwig and Schneider-Blum, 2014)



- Type 1: clearly high vowel; more variable along F2
- Type 3: clearly low vowel; more variable; lower F2
- Type 2: more variable along F1

Type 1: /i, u, ʊ/; Type 2: /e/; Type 3: /ɛ, a, ɔ/

# Valence-changing vowel raising

- Low vowels in derived causative forms (Quint, 2009):
  - /a/ → [æ]
  - /o, ɔ/ → [u]
  - /e, ε/ → [i]
- Three patterns:
  - causative suffix *-ni*
  - passive suffix *-ənni* (cf. Moro: Strabone & Rose, 2012)
  - vowel raised

# /a/ → [e] (causatives -ní)

- (1) a. ní-gw-ṭ-émjǰí                      n̄è:rà      ṭè-ɾ-àngri  
1SG-CL-HAB-make                      girl.PL      HAB-PL-draw water
- b. ní-gw-ṭ-èngri-ní                                      n̄è:rà  
1SG-CL-HAB-draw water-CAUS                      girl.PL

'I make the girls draw water.'

- (2) a. ní-gw-ṭ-émjǰí                                      n̄è:rà      ṭè-ɾ-mà:nì  
1SG-CL-HAB-make                                      girl.PL      HAB-PL-cook
- b. ní-gw-ṭ-è-mè:ní-ní                                      n̄è:rà  
1SG-CL-HAB-cook-CAUS                                      girl.PL

'I make the girls cook.'

# /o/ → [u] (passives -ənnì)

- (3) a. jìréd̃ clothes.PL jí-ɛ̀rò CL-be clean  
'Clothes are clean.'
- b. jìréd̃ clothes.PL jì-ṭì-ɛ̀ṛ-ənnì CL-HAB-clean.PASS  
'Clothes are cleaned.'
- (4) a. jírèt clothes.PL gíjò DEM j-òndò CL-be dry  
'The clothes are dry.'
- b. jìréd̃ clothes.PL jì-ṭ-ùnd-ənnì CL-HAB-dry.PASS  
'Clothes are dried.'



# /ɔ/ → [u (ʊ)] (causatives -ní)

[ʊ]: a centralized /u/ with a much higher F2 of 1450 Hz

(5) a. kw-ó||ɔ̀  
CL.3SG-insult.IPFV

‘He will insult.’

b. ní-gw-ù||ùð-ní                      ʔòŋór-ó    gwò:r-ò  
1SG-CL-insult.IPFV-CAUS    boy-ACC man-ACC

‘I will make the boy insult the man.’

(6) a. ní-gw-ómjé                      ʔòŋór-ó    àð-óró                      gw-ómné  
1SG-CL-make.PST                      boy-ACC INF-become                      CL-something

‘I made boy be something.’

b. ní-gw-ùrùð-ní                      ʔòŋór-á    kímòw  
1SG-CL-become.IPFV-CAUS                      boy-ACC snake

‘I will make the boy become snake.’

# /ɛ/ → [i,ɪ] (causatives -ni)

(7) a. kw-t-é|ɛ  
CL.3SG-HAB-go

‘He goes.’

b. nu-gw-t-í|i (No trigger)  
1SG-CL.3SG-HAB-go.CAUS

‘I make him (sb.) go.’

(8) a. kw-m-pèrté tida-η-ò|ù  
CL.3SG-REC-wipe surface-ACC-on

‘He has just wiped the surface.’

b. kw-t-βirtí-n:í tònór-ó tida-η-ò|ù  
CL.3SG-HAB-wipe-CAUS boy-ACC surface-ACC-on

‘He makes the boy wipe the surface.’

[ɪ]: a centralized /i/ with a much lower F2; in closed syllables

# /ɛ/ → [i,ɪ] (causatives -ni)

(9) a. kw-èrtɛ̀  
CL.3SG-hit lightly.IPFV  
'He will hit lightly.'

[ɪ]: a centralized /i/ with a much lower F2; in closed syllables

b. kw-t-írɪ́-n:í                      tònɔ́r-á      gwò:r-ò  
CL.3SG-HAB-hit lightly-CAUS boy-ACC man-ACC  
'He makes the boy hit the man lightly.'

(10) a. kw-érnɛ́                      t̀ù|-è                      ǹèrpò  
CL.3SG-finish.IPFV              porridge-ACC              tomorrow  
'He will finish porridge tomorrow.'

b. kw-ù-t-írní-n:í                      tònɔ́r-á      t̀ù|-è  
CL.3SG-HAB-finish-CAUS      boy-ACC porridge-ACC  
'He makes the boy finish porridge.'

# /e/ → [e]; /ɛ/ → [ɛ] (causatives -*ni*)

- (11) a.       $\eta\acute{i}$ -gw- $\underset{\text{HAB}}{\text{t}}\text{-}\acute{e}\text{m}\eta\text{j}\acute{i}$                        $\text{t}\grave{o}$ -ó                       $\text{t}\grave{o}$ - $\eta$ - $\grave{e}\text{nd}\acute{e}\text{r}\acute{e}$   
                  1SG-CL-HAB-make                      child-ACC                      HAB-3SG-sleep
- b.       $\eta\acute{i}$ -gw- $\underset{\text{HAB}}{\text{t}}\text{-}\acute{e}\text{nd}\acute{e}\text{r}\acute{e}$                        $\text{t}\grave{o}$ -ò  
                  1SG-CL-HAB-sleep.CAUS                      child-ACC

‘I make the child sleep.’

- (12) a.       $k\acute{w}$ -**w** $\acute{e}$                        $\eta\grave{e}\text{d}\grave{a}$                        $\eta\grave{e}\text{r}\text{p}\acute{o}$   
                  CL.3SG-milk                      cow                      tomorrow

‘He will milk cow tomorrow.’

- b.       $\eta\acute{i}$ -gw-**w** $\grave{e}\delta\grave{i}\text{n-}\acute{n}\acute{i}$                        $\text{t}\grave{o}\eta\acute{o}\text{r-}\grave{a}$        $\eta\grave{e}\text{d}\grave{a}$   
                  1SG-CL-milk.IPFV-CAUS                      boy-ACC cow

‘I will make the boy milk the cow.’

- The low vowel /e/ does not raise to [i] (/èndèré/ → [ìndìrí]); without the causative -*ni*
- Could pattern as a high vowel, compare with /ɛ/, which does not raise

# Vowel raising summary

- /a/ → [ə]
- /o/ → [u]
- /ɔ/ → [u,ʊ]
- /ɛ/ → [i,ɪ]
- Confirming Quint (2009) with the exception of /e/ raising to [i]

<b>Simple verb</b>	èndèrè 'sleep'	é è 'go'	mà:nì 'cook'	órò 'become'	òndò 'be dry'
<b>Derived verb</b>	èndèrè 'make sleep'	í ì 'make go'	mè:nì 'make cook'	úrù 'make become'	ùndù 'be dried'

# Current vowel system proposed

		-back		+back
+high	+ATR	i	(ə)	u
	-ATR	e→ɪ		(ʊ)
-high	+ATR		e	o
	-ATR	ɛ	a	ɔ

i	[i: 'they will drink']	a	kâ  'stone'
ɪ	kɪ  'seed-hole'	u	ṭúrùm 'government'
e	lèj 'eye'	o	ṭôr 'child'
ɛ	[ɛ:rè 'sky']	ɔ	ṭôr 'hammer'
ə	ɲərpò 'tomorrow'	ʊ	ṭú  'giraffe'
e	kɛ  'sheath'		

# Counterexamples explained

Based on the current vowel system:

- /e/ could pattern as a high vowel
- Instrumental suffix:
  - -*Ci* appears after words with [e]
  - [e] co-occurs with other high vowels /i, ɤ, u/ within a word
- Causatives:
  - Verb stem with /e/ (èndèrè 'sleep') does not raise

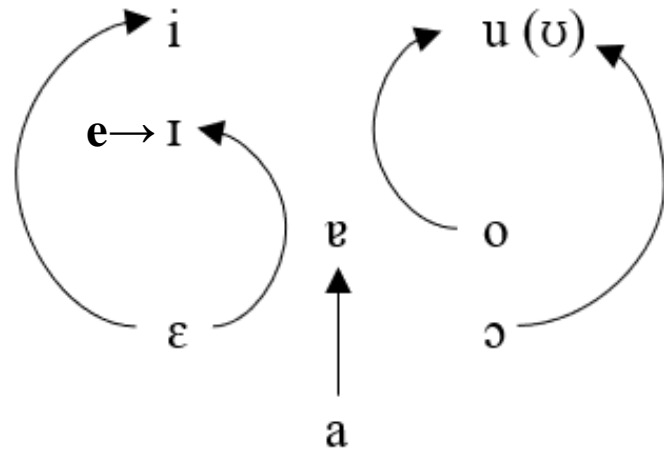
# Discussion

- Vowel harmony is not as categorical as Quint (2009) suggests
- Variations seen in disharmonic words and with instrumental suffix
- Height harmony system appears to be in flux (cf. Tabaq, another Nuba Mountains language; Hellwig & Schneider-Blum, 2014)
- /e/, which appears to be shifting to a higher /ɪ/ with its shifting phonological properties
- Data with ONE speaker; Taitas and the primary consultant with Quint from the same region but different villages



# Discussion

- Raising patterns



Height harmony: /o/ → [u]

Height/ATR harmony: /a/ → [ɶ], /ɛ ɔ/ → [i ʊ]

Height harmony: /ɛ ɔ/ → [ɪ ʊ], also conditioned by syllable structure.

- Rere displays more of a height harmony rather than ATR harmony
- Also attested in Moro: height harmony system (Richart & Rose, 2017)

# Implications

- Neighbor languages with /i, ɪ, u, ʊ, ε, ɔ, ə, a/ + [ATR] harmony
  - Heiban (Laru): /ε ɔ/ → [i u]
  - Talodi languages (Lumun, Dagik, Acheron, Tocho): /ε ɔ/ → [e o]
    - Lumun: ATR contrasts were only seen in the high vowels in minimal pairs; compare with Rere ([kwĩ:] ‘he will drink’ vs. [kwî:] ‘he will wash’)
- Status of language sustainability and preservation
  - Tabaq, another Nuba Mountains language, due to language contact (Hellwig & Schneider-Blum, 2014)
  - Vowel system and harmony in flux: individual and word variation
  - Height assimilations in Tabaq → ad-hoc or local; not remnants of an earlier vowel harmony system
  - Stronger vowel raising process in Rere → disrupted vowel harmony system

# Future work

- Articulatory differences of [ATR] vowels
- Frequency distribution of [ATR] vowels
- The role of syllable structure in vowel harmony
- Work with more speakers to see if this pattern is idiolectal or widespread

# References

- Abdalla Kuku, N. (2012). Laru vowel harmony. *Occasional Papers in the Study of Sudanese Languages*, 10, 17-34.
- Alaki, T. K. & Norton, R. (2013). Tocho phonology and orthography. In Schadeberg & Blench (Eds.). *Nuba Mountain Language Studies*. Cologne: Rüdiger Köppe, 177–194.
- Hellwig, B. & Schneider-Blum, G. (2014). Tabaq: In a State of Flux. *Dotawo: A Journal of Nubian Studies*, 1(1).
- Norton, R. (2013). The Acheron vowel system: a participatory approach. In Schadeberg & Blench (Eds.). *Nuba Mountain Language Studies*. Cologne: Rüdiger Köppe, 195-217.
- Quint, N. (2009). *The phonology of Koalib: a Kordofanian language of the Nuba mountains (Sudan)*. Cologne: Rüdiger Köppe.
- Ritchart, A., & Rose, S. (2017). Moro vowel harmony: implications for transparency and representations. *Phonology*, 34(1), 163-200.
- Smits, H. J. (2017). *A grammar of Lumun: a Kordofanian language of Sudan* (Doctoral dissertation, LOT).
- Stehr, D. (2018, January 19). *A Tutorial on Recent Methods for Estimating Working Vowel Space from Connected Speech*.
- Strabone, A., & Rose, S. (2012). Morphophonological properties of Moro causatives. In *Selected Proceedings of the 41st Annual Conference on African Linguistics: African Languages in Contact*, pp. 92-103.
- Vanderelst, J. (2016). *A grammar of Dagik: a Kordofanian language of Sudan*. Cologne: Rüdiger Köppe.

Many thanks to Taitas Kanda, Sharon Rose, the 2019 Fieldwork class, Marc Garellek

# Thank you!

Yaqian Huang

University of California San Diego

yah101@ucsd.edu

Extra slides

# Vowel class based on the proposal

- Main difference: /e/ patterns as a high vowel, instead of a low vowel

VOWELS	Front	Central	Back
High	i		u
	<b>ɪ</b>	e	
Low	ɛ		o
		a	ɔ