

Change and Variation in a Dimensional Phonology of Vowels in African Englishes



F1.C GLAC-SHEL Sound Change and Methods

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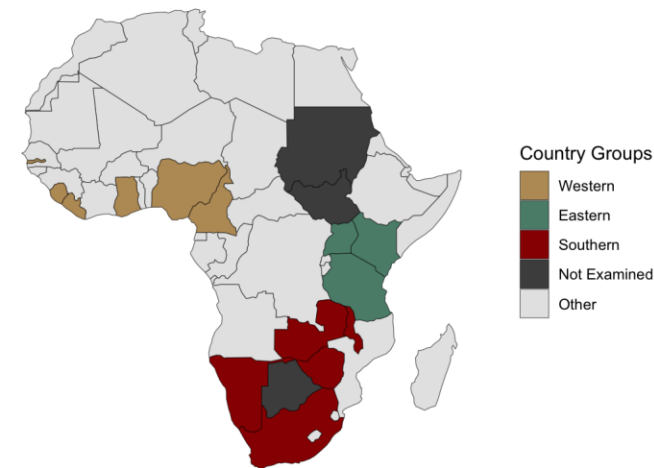
Issue

- [General] What representational phonology is required to model the variation and change in English vowels?
- [Specific] Can the sound patterns observed and reported in the literature on African Englishes be accounted for by phonological theory?

(Sub-Saharan) African Englishes

- Three regions (most Br. colonial administrative situations)
 - Western: Nigeria, Cameroon, Ghana, The Gambia, Liberia, Sierra Leone
 - Eastern: Kenya, Uganda, Tanzania
 - Southern: Malawi, Namibia, South Africa (SAfE), Zimbabwe, Zambia
- Multilingual region + English education
- Contact with Colonial Languages
 - British English
 - American English
 - French
 - Portuguese
 - German
- Different post-colonial experiences

African countries examined with de jure English education



Source data for map:
https://en.wikipedia.org/wiki/List_of_countries_and_territories_where_English_is_an_official_language



Generalized African English Patterns

- Core vowels: FLEECE (/i/), FACE (/e/), GOOSE (/u/), GOAT (/o/), PALM (/a/)
- Long-short/tense-lax distinction for high and mid vowels not present or mixed
- Diphthongs
- Low vowels



Goal

- With a blind eye to education, literacy, social class, the fact that nation boundaries and linguistic boundaries don't always align, that histories are different, that the data collection varies across source, etc. ...
- The goal of the paper is: **What might the (messy) data reveal to us about the hierarchies of African Englishes in light of a general English hierarchy (pseudo-Modern Am/Br one)?**
 - Could there be one hierarchy for all Global Englishes with different phonetic implementations?
 - Could there be different hierarchies for Englishes that still permit communication?



Realistic Theory of Vowels



Phonology is the guardrail of phonetic implementation



Theoretical Framework

- Realism (Honeybone 2005; Iverson & Salmons 1995 *et seq.*)
 - **Phonological boundaries on the vowel space restrict and permit variation**
- **Dimensional Phonology** (Avery & Idsardi 2001)
 - Paired privative, oppositional Dimensions
 - Complete Dimensions with distinctive features
 - Enhancements
- Contrastive Hierarchy (Hall 2007; Dresher 2009 *inter alia*)
 - Acquisition: Successive Division Algorithm (SDA) builds a featural hierarchy
 - Contrastive Underspecification



Vowel Dimensions

- Relevant dimensions

- Dimensions have pairs of Gestures
- Phonology operates over Dimensions
- Completed by Gestures

- Tongue Root (TR), [ATR]

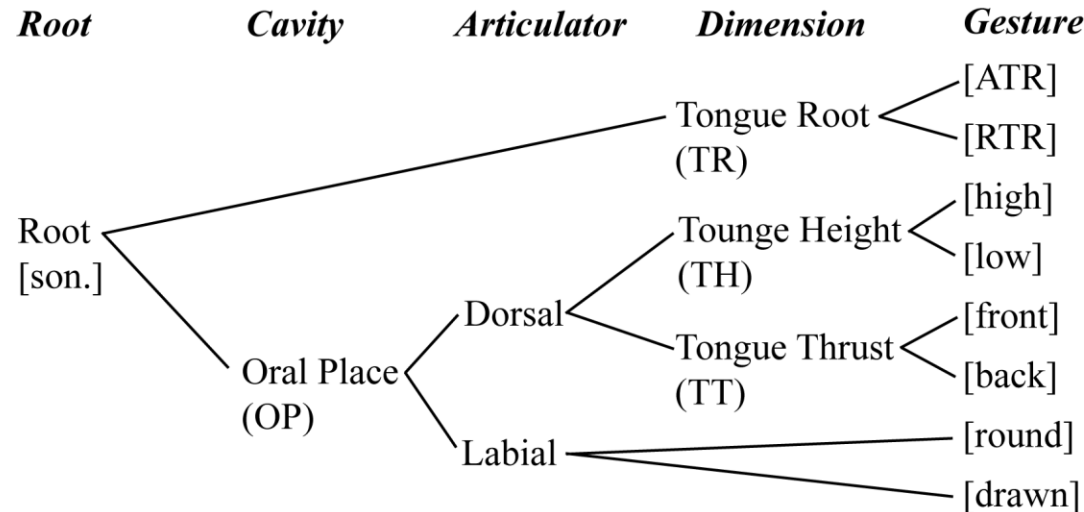
- Tongue Height (TH), [high]

- Tongue Thrust (TT), [front]

- Labial (LAB), [round]

- *Superordination* (=“null”)

- /o:/ and /ʌ/ are unmarked—but contrastive—based on hierarchy (ROOT^{TR}, DORTH, DOR^{TT})
 - ROOT^{TR}: “unmarked with respect to Tongue Root”
- A vowel without a contrast is “empty”
 - In a 5-vowel system, /a/ is marked for TONGUE ROOT and nothing else; no subordination marks





Theoretical Framework

- Realism (Honeybone 2005; Iverson & Salmons 1995 *et seq.*)
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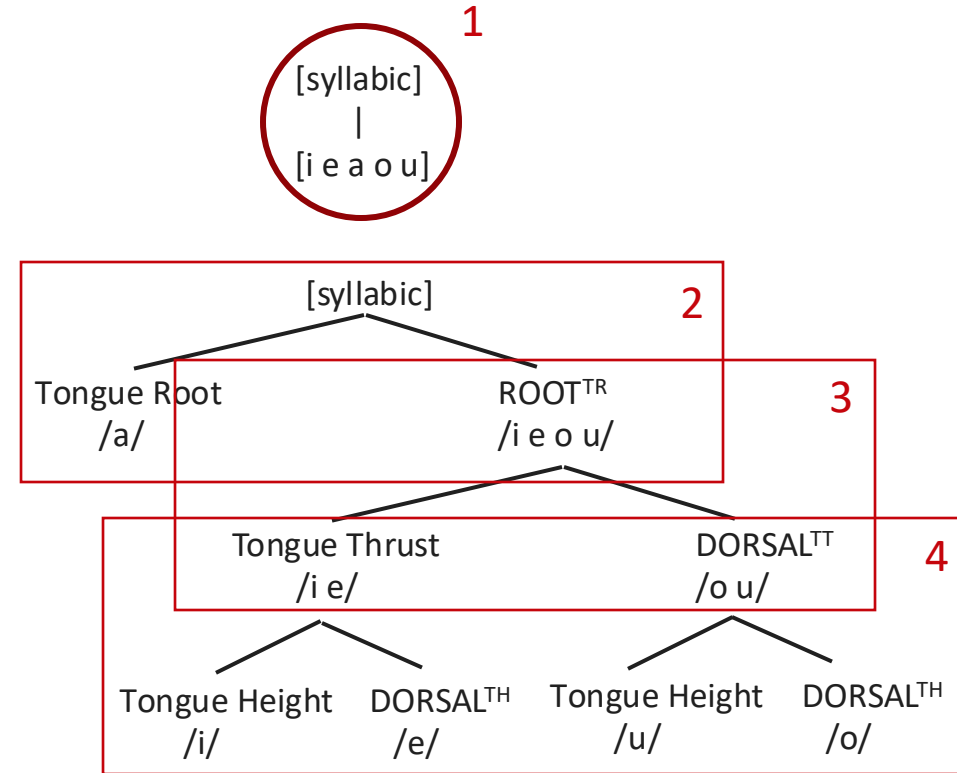


Acquisition of five vowel system (e.g., Swahili)

- Five vowels: /i e a o u/ (TUKI online dictionary)
- *-pita* “pass, proceed, exceed”
- *-peta* “winnow grain, bend”
- *-pata* “attain, get, happen to”
- *-pota* “twist, ruin”
- *-puta* “thrash”

1. Assume all vowels are same category
2. Notice /a/ different than others > assign TR while the other vowels are not TR
3. Notice, of the remaining gestures, /i, e/ are different from /u, o/ > assign TT
4. Notice, within pairs, /i/ different than /e/ and /u/ different than /o/ > assign TH

Hierarchy: TR > TT > TH



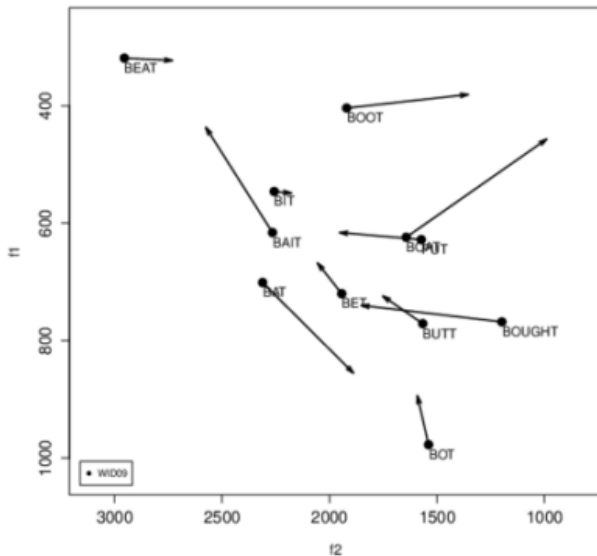
	/a/	/i/	/e/	/u/	/o/
2	TR	ROOT ^{TR}	ROOT ^{TR}	ROOT ^{TR}	ROOT ^{TR}
3		TT	TT	DORSAL ^{TT}	DORSAL ^{TT}
4		TH	DORSAL TH	TH	DORSAL TH

Movement in Vowel Space

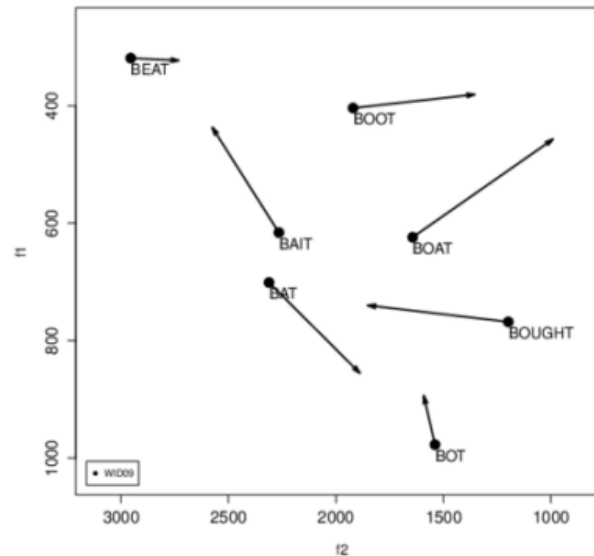


Vowels spoken in [s_d] frame by a female speaker, b. 1990, Columbus, WI, in 2006. Plotted using NORM (Thomas & Kendall 2007).

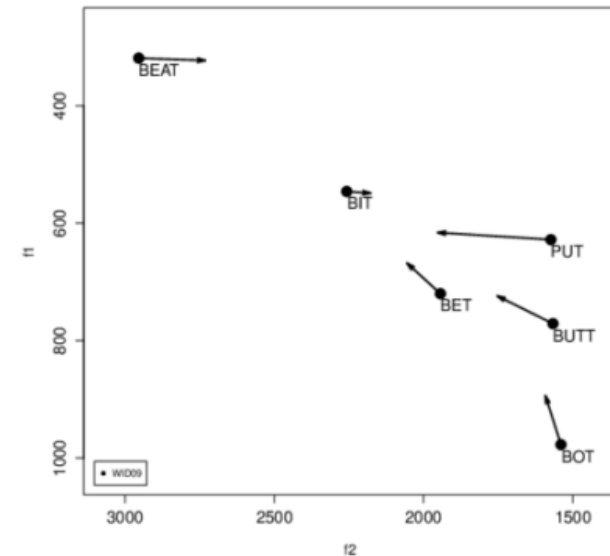
(a)



(b)



(c)



All vowels

Long vowels

Short vowels

(reference vowels shown to compare vowel space plots)



Caution to interpreting Dialect Variation in a Vowel Space

- The tongue moves with fluidity, but speech perception recovers category identity
- Problems with many analyses is that they treat all vowels as equal competitors (Laver 1994; Ladefoged & Maddieson 1996; Ladefoged 2005)
 - Influence of lip rounding
 - Influence of nasalization
 - Influence of pharyngelization
- Coming up, pay attention to separating vowels on vowel space, take placement on in 2D space with important skepticism
 - TRAP (AmE) movement is based on group affiliation not phonological substance
 - Northern Cities
 - Canadian
 - Californian
 - Elsewhere



A Modest Theory of English(es)



A four-attribute model

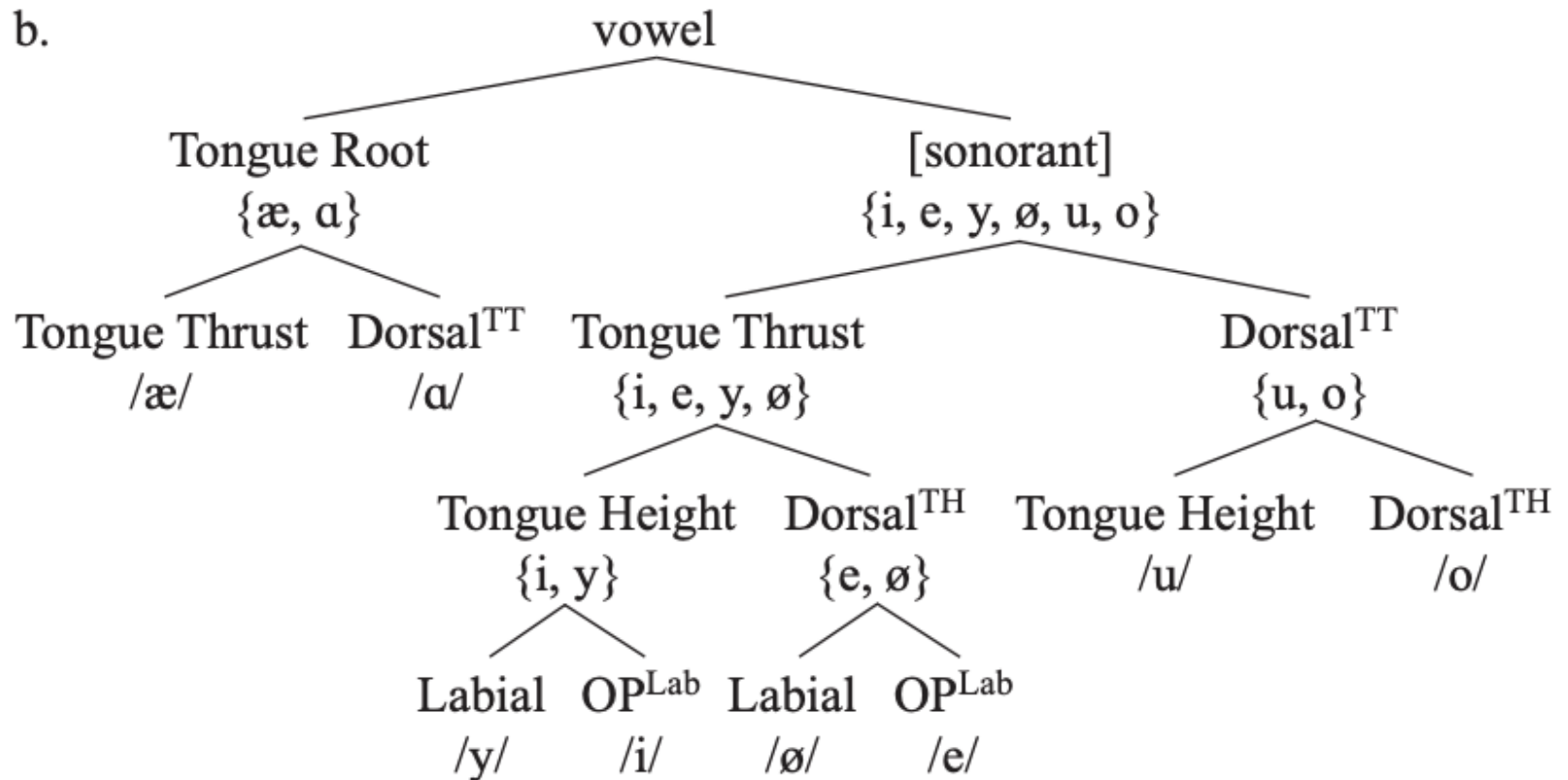


Old English (Purnell, Raimy, & Salmons 2019: e466)

(24) OE with superordinate marking

a. Tongue Root > Tongue Thrust > Tongue Height > Labial

b.

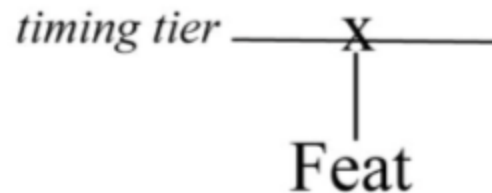




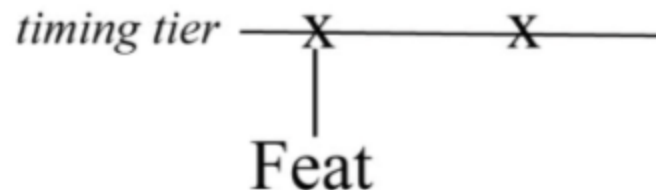
Long and short versions

- Existence of short and long versions (Quirk & Wrenn 1957:12)
 - OE *hamm* 'pasture' [ɑ]
 - OE *hām* 'farmstead' [ɑ:]
- Structural, not featural

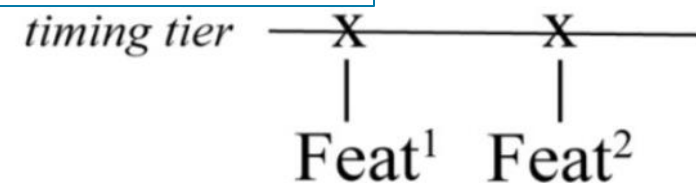
Short vowel



Long vowel

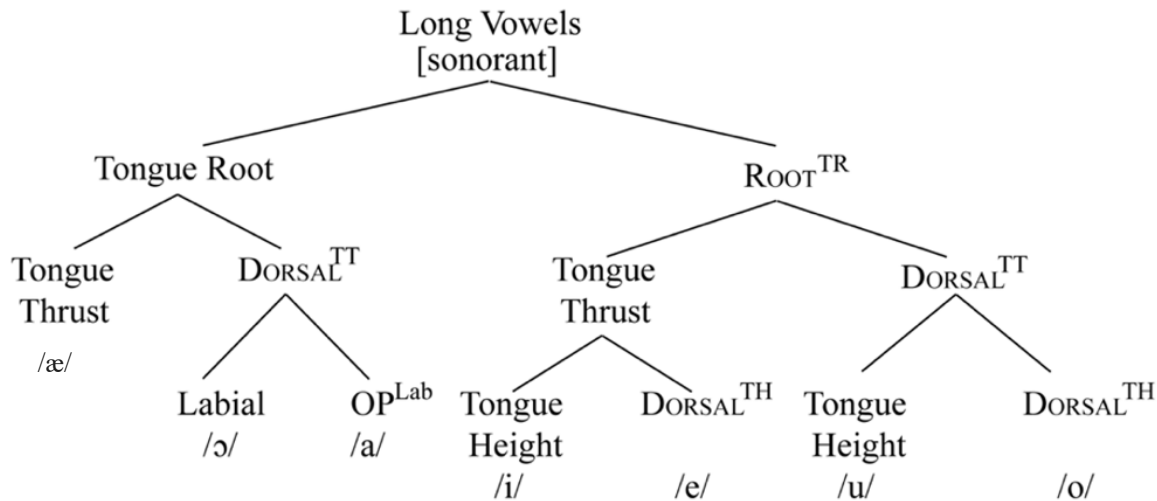


(Long) Diphthong





- (a) American English Long Vowel Hierarchy: TONGUE ROOT > TONGUE THRUST > TONGUE HEIGHT > LABIAL



- (b) American English Short Vowel Hierarchy: TONGUE THRUST > TONGUE HEIGHT

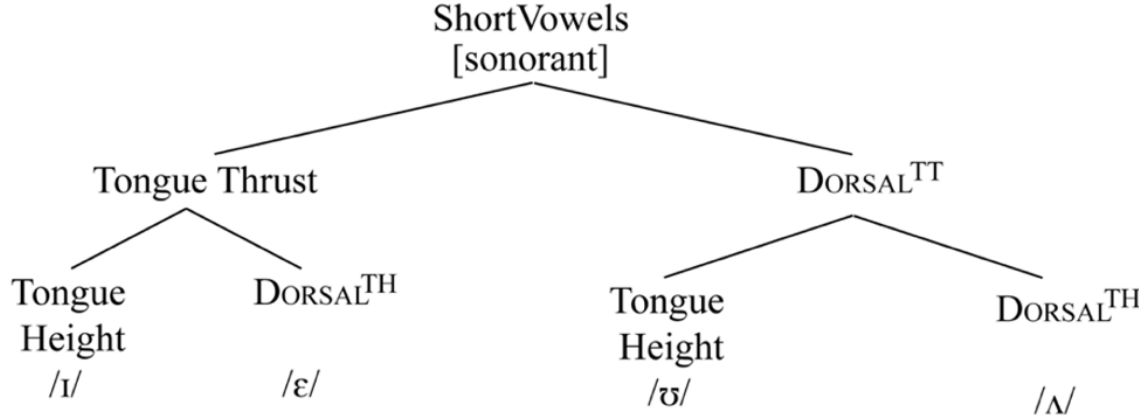


Figure 5. Long (a) and short (b) vowels and their dimensions for American English, based on Purnell, Raimy & Salmons (2019).



Groups of Modern AmE Vowels

- IPA groups and symbols

- Long monophthongs: [i u e o æ a ɔ]
- Short monophthongs: [ɪ ʊ ɛ ʌ]
- Diphthongs: [ai au oi]

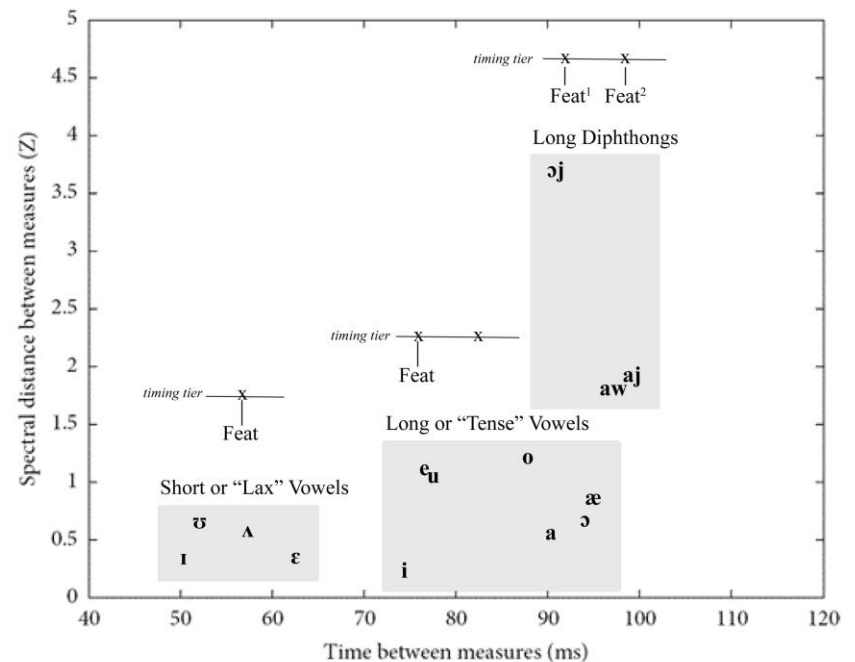
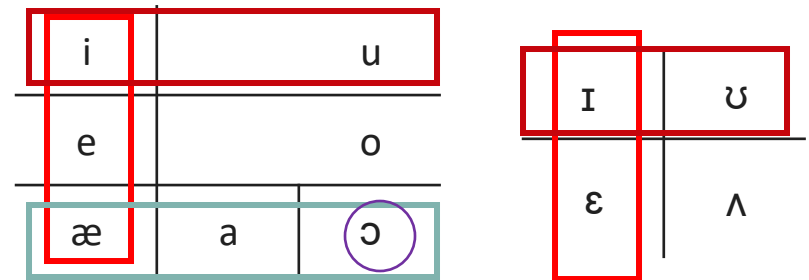
- Long hierarchy

- TR > TT > TH > LAB

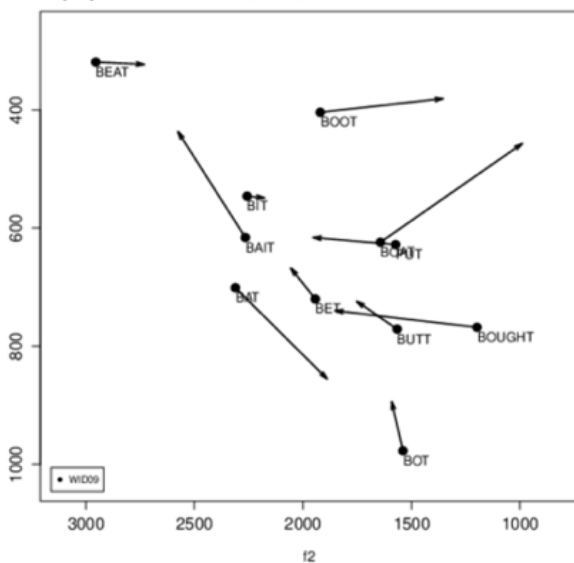
- Short hierarchy: TT > TH

- Short vowel dimensional specification

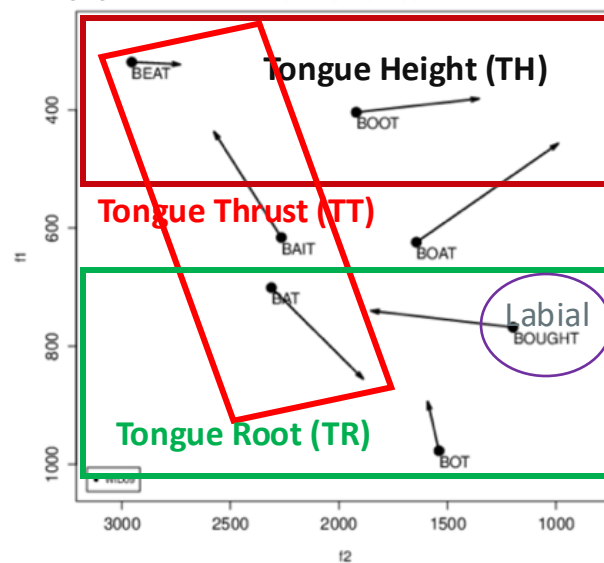
- KIT: specified for TONGUE THRUST and TONGUE HEIGHT
- DRESS: specified for TONGUE THRUST
- FOOT: specified for TONGUE HEIGHT
- STRUT: not specified for either dimension



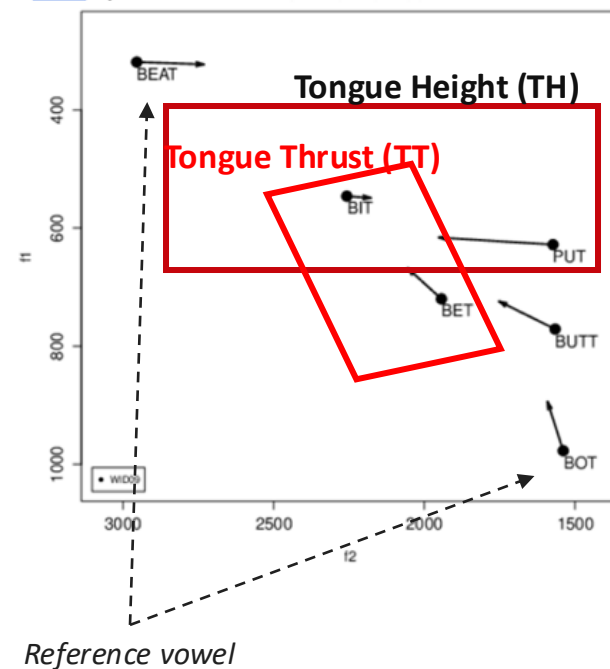
(a)



(b) Long vowels



(c) Short vowels



/æ/

/ɔ/

/a/

/i/

/e/

/u/

/o/

TR

TR

TR

ROOT^{TR}ROOT^{TR}ROOT^{TR}ROOT^{TR}

TT

DORSAL^{TT}DORSAL^{TT}

TT

TT

DORSAL^{TT}DORSAL^{TT}

TH

DORSALTH

TH

DORSALTH

LAB

OP^{LAB}

LAB

LAB

/ɪ/

/ɛ/

/ʊ/

/ʌ/

TT

TT

DORSAL^{TT}DORSAL^{TT}

TH

DORSALTH

TH

DORSALTH

LAB

TR

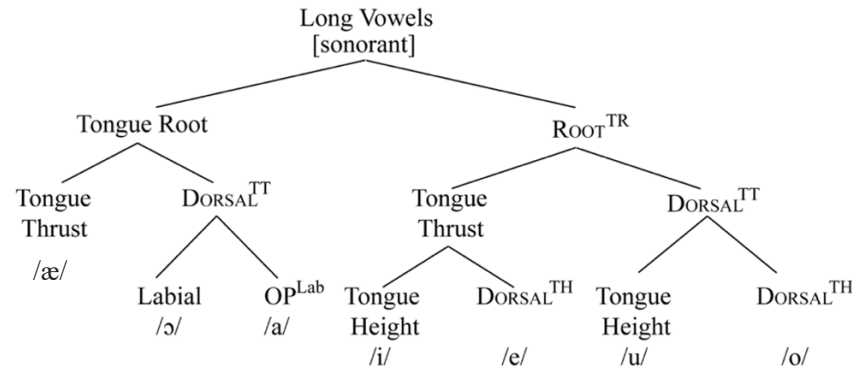
Possible
Enhancement



Four attributes of (Am)E vowel system

1. 5 vowel core: TR > TT > TH;
specifically: [i e a o u]
2. In high + mid, length/tenseness
distinction: one or two timing slots
3. Mono-/di-phthongs (3 di-): Feature
indexed to timing slots
4. Low vowels (TR)
 - Only level with front-to-back 3
(or 4) items
 - Any historical long-short lost
 - Mod AmE appears to have 3
low ([æ a ɔ]) with vague
lengths
 - Many /æ/ rise
suggesting long while
others back suggesting
short
 - Low back vowels merge
suggesting both of same
length

(a) American English Long Vowel Hierarchy: TONGUE ROOT > TONGUE THRUST > TONGUE HEIGHT > LABIAL



(b) American English Short Vowel Hierarchy: TONGUE THRUST > TONGUE HEIGHT

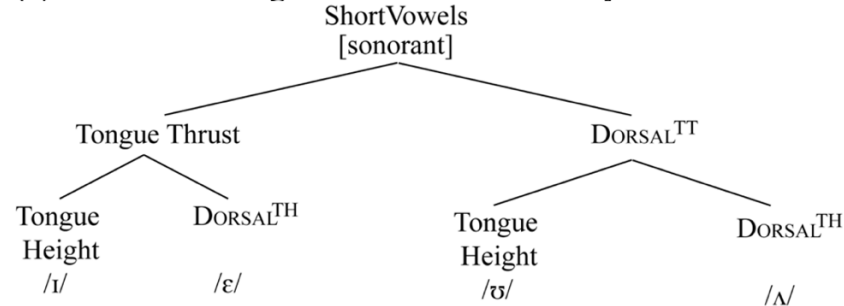


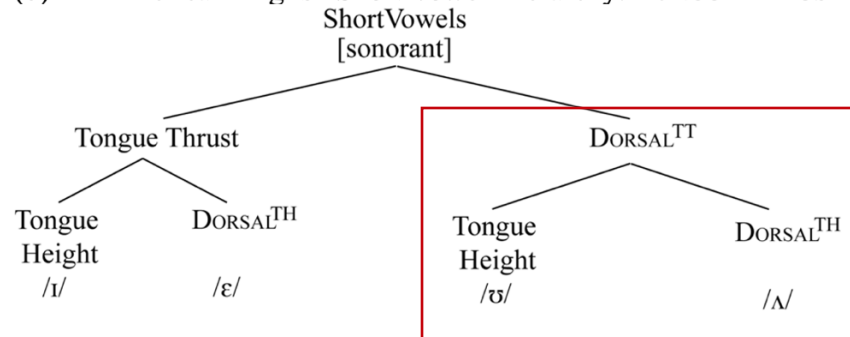
Figure 5. Long (a) and short (b) vowels and their dimensions for American English, based on Purnell, Raimy & Salmons (2019).



BrE Vowels

- Outside of low back vowels and potential length contrasts in low vowels, the Br and Am systems are similar in terms of Dimensions and the hierarchy
- Even long-standing dialect differences within BrE can be accounted for in depiction given
 - STRUT difference: older [ʊ] instead of [ʌ] (Foulkes & Docherty 2010, citing Britain 2001)
 - Sisterhood for mergers (see Oxford 2015)

(b) American English Short Vowel Hierarchy: TONGUE THRUST > TONGUE HEIGHT





African Englishes

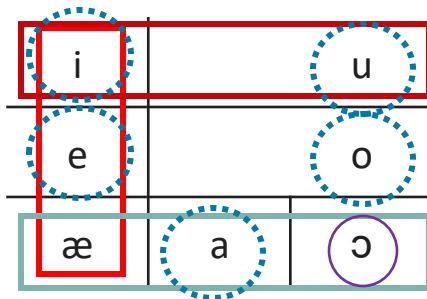


Patterns

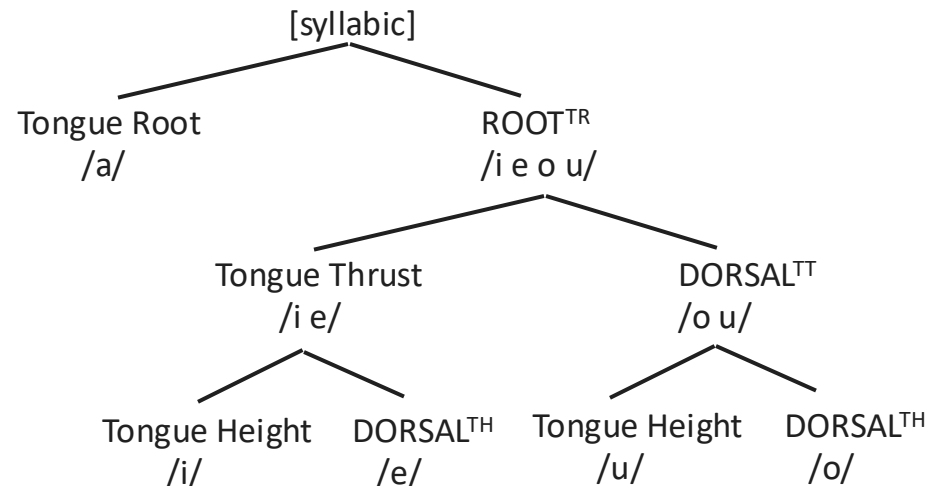


Core 5 vowels: Long/Tense + [a]

- FLEECE, FACE: front, most where expected
 - Variation is within front, maintaining TT
- GOOSE, GOAT: most where expected
 - Variation is front to back, maintaining TH for [u] and not TH and not TR for [o]
- PALM: not high or mid
 - Some front-back variation and length variation



Western: Josiah & Babatunde 2011
 Eastern: Schmeid 2008
 Southern: Kadenge 2009





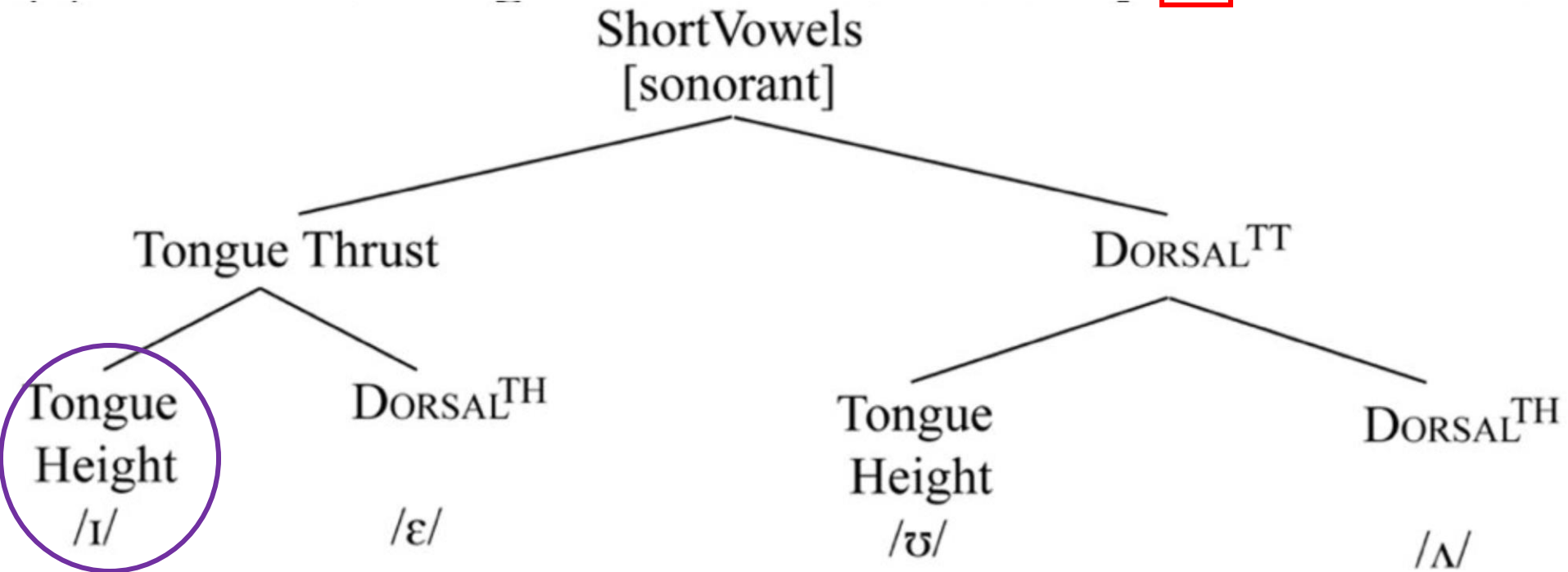
Diphthongs

- Mixture of Indigenous languages with and without diphthongs
 - For reference, Shona (Bantu language important for Southern) and Swahili (Bantu language important for Eastern) are 5-vowel systems
 - Swahili: No native diphthongs but pronounce each quality distinctly, even if adjacent; no hiatus repair (Swahili *eau* 'purify'); permit in loanwords
 - Shona: also has coalescence which functions like monophthongization
 - Luganda (Bantu language important for Eastern) is 5-vowel
 - No diphthongs, but uses glide insertion
 - Bemba (Bantu language important for Zambia) is 5-vowel
 - No diphthongs, but uses fusion, glide formation, lengthening to repair
- Three patterns:
 - **Diphthongs retained** (all Eastern; most Western and Southern locations incl. **Nigeria**, **Cameroon**, **Namibia**, most **SAfE**)
 - Variation of nucleus and offglide as expected
 - **Monophthongize** (some **Ghana**, **Liberia**; some **WSAfE** PRICE and MOUTH, some acrolectal **BSAfE**)
 - **Epenthesis** (some **Zambia** *aji*, *oji*, *awu*)



KIT Vowel patterns

I	ʊ
ε	ʌ



[i]: most, except

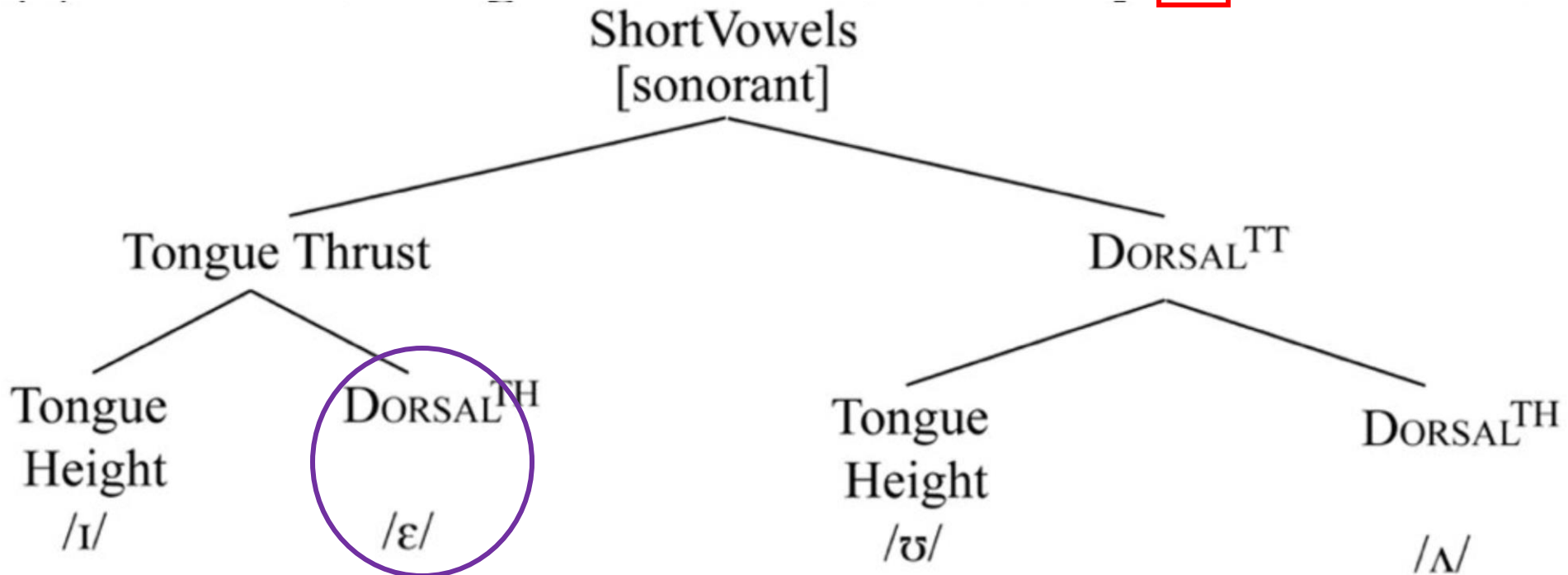
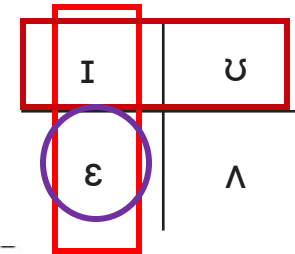
[e]: some **Tanzania**, **Liberia**

[ɪ]: **Ghana**, **The Gambia**, **BSAfE**, some **WSAfE**

[ə]: **Namibia**, some **WSAfE**



DRESS Vowel patterns



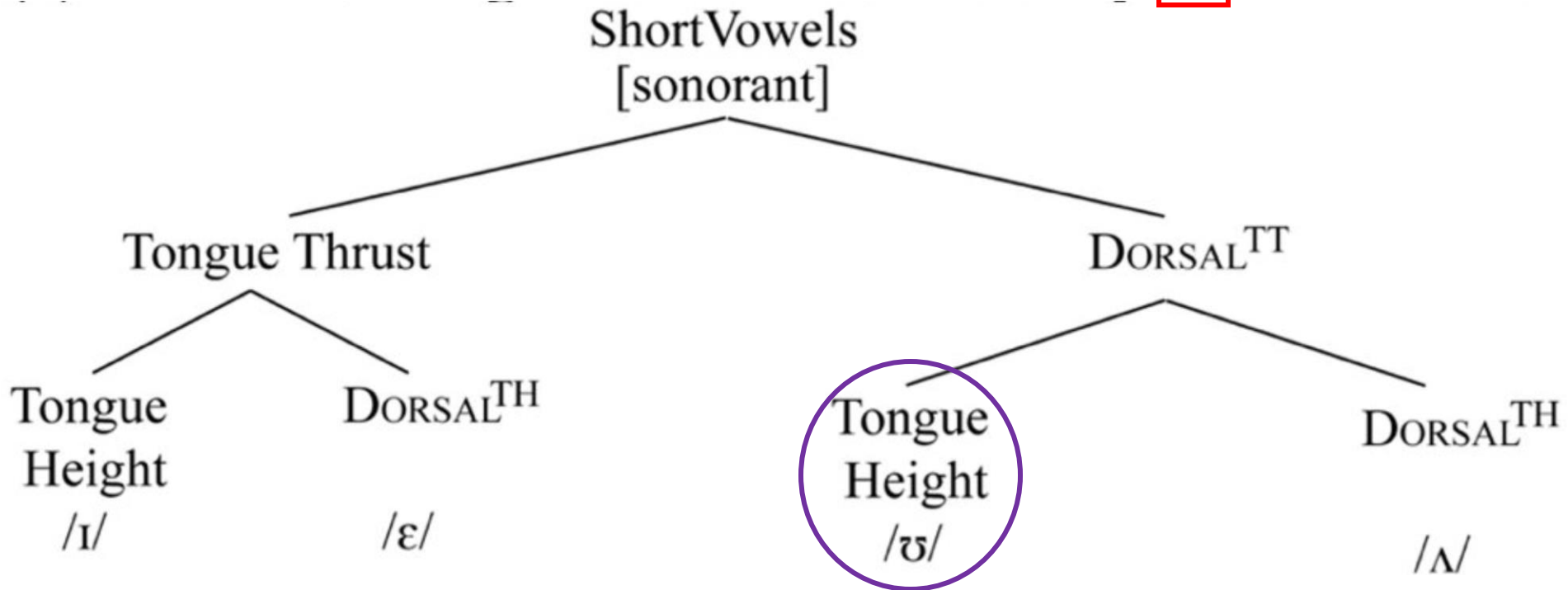
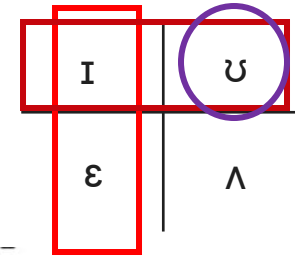
[e]: all E, most W and S, except

[ɛ]: some Cameroon, Ghana, Liberia, Namibia, most S AfE

[æ]: some W S AfE



FOOT Vowel patterns

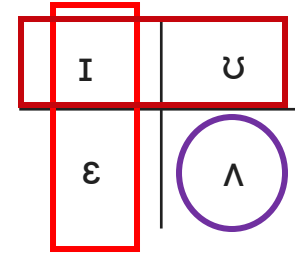


[u]: most, except

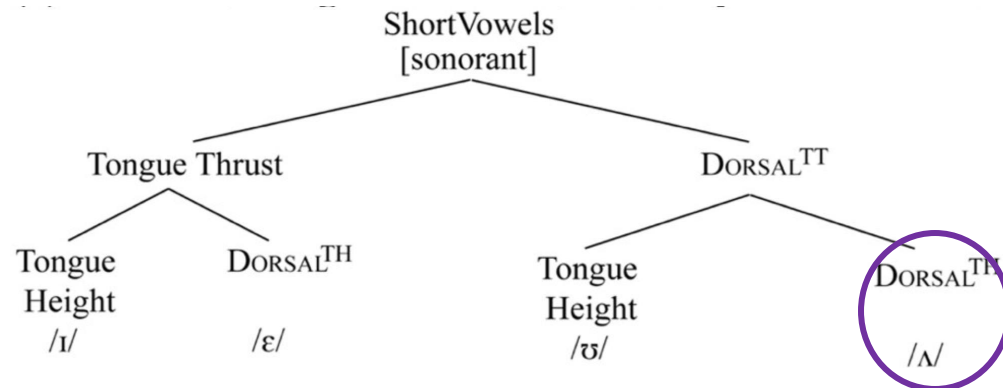
[ʊ]: Ghana, The Gambia, Liberia, some BSAfE, WSAfE



STRUT



- STRUT (/ʌ/: NULL, one timing slot)
 - Eastern: [a] everywhere
 - Western:
 - [ɔ] Cameroon
 - [ɔ, a, ɒ] Nigeria (note that LOT, THOUGHT, STRUT vary with the same three sounds, Ghana varies between [ɔ a])
 - [ʌ] Liberia
 - Southern:
 - [a] everywhere, except
 - [ʌ] some in Namibia and BSAfE acrolect
 - [ɒ] some in WSAfE
 - [ä] in WSAfE and BSAfE mesolect and acrolect





Retention of short distinction

Country	Dom. Infl.	/ɪ/	/ɛ/	/ʊ/	/ʌ/
Ghana	Akan	Yes	Yes	Yes	No
The Gambia	Mandinka	Yes	No?	Yes	No?
Liberia	English/ Kpelle	No ?	Yes	Yes	Yes
Cameroon	Kamtok	No	Yes	No	No?
BSAfE		Yes	Yes	Some	Some
WSAfE		Some	Yes	Yes	No?
*Namibia	English/African s/Kwanyama	No?	Yes?	No?	Yes?

Indigenous vowel length (e.g., Mandinka)

Indigenous Mid-type ATR or mid vowels (e.g., Yoruba)

Indigenous High-type ATR (e.g., Kinande)

Indigenous High+Mid-type ATR (e.g., Akan)



The four ATR systems (Tabain et al. 2024)

a. Yoruba type

i	u	[+ATR]
e	o	[+ATR]
ɛ	ɔ	[-ATR]
a		[-ATR]

b. Kinande type

i	u	[+ATR]
ɪ	ʊ	[-ATR]
ɛ	ɔ	[-ATR]
a		[-ATR]

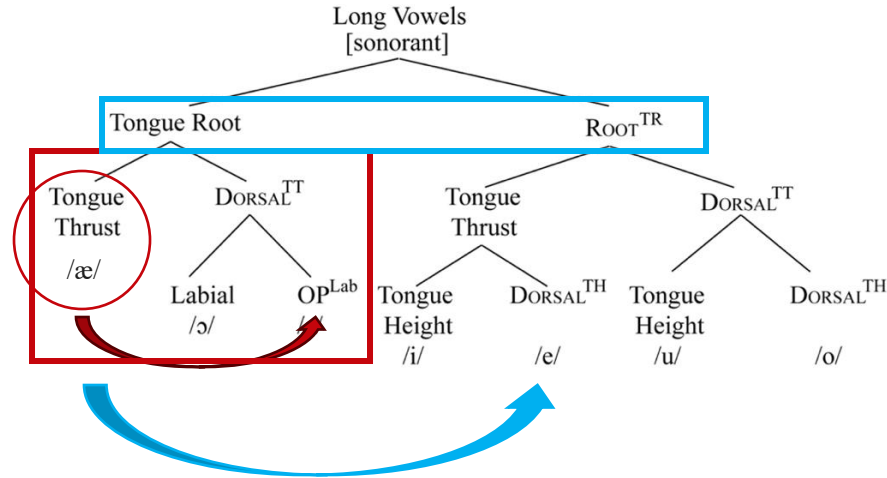
c. Akan type

i	u	[+ATR]
ɪ	ʊ	[-ATR]
e	o	[+ATR]
ɛ	ɔ	[-ATR]
a		[-ATR]

d. Tima (repeated from (1))

i	ɨ	u	[+ATR]
ɪ	ə	ʊ	[-ATR]
e	o		[+ATR]
ɛ	ɔ		[-ATR]
ʌ			[+ATR]
a			[-ATR]

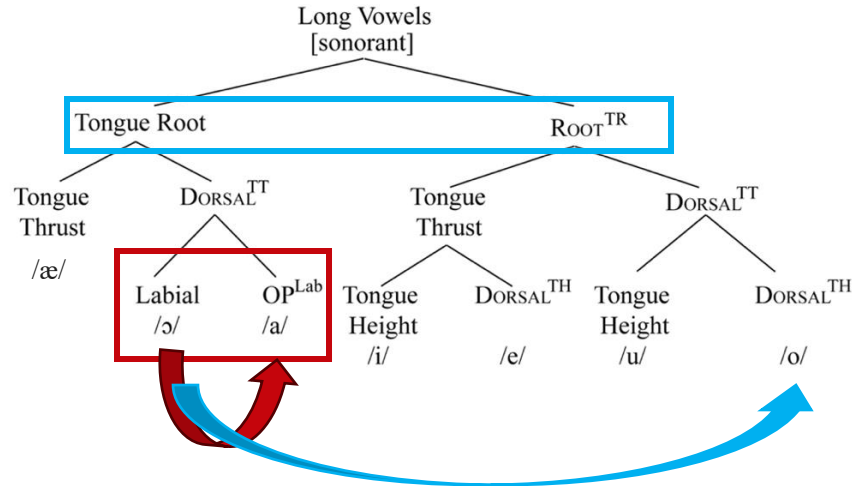
(a) American English Long Vowel Hierarchy: TONGUE ROOT > TONGUE THRUST > TONGUE HEIGHT > LABIAL



TRAP/BATH

- TRAP/BATH (/æ/: TR, two timing slots)
 - Western:
 - [æ]: The Gambia, Liberia
 - **[a]: Nigeria, Cameroon, some Ghana**
 - [ɛ]: occasionally The Gambia
 - Eastern: **[a] everywhere**
 - Southern:
 - [æ] some in WSAFE, BSAFE acrolect
 - **[a] in Malawi and some in Namibia**
 - [e] in Zimbabwe and Zambia
 - [ɛ] in Namibia, WSAFE, BSAFE mesolect and acrolect

(a) American English Long Vowel Hierarchy: TONGUE ROOT > TONGUE THRUST > TONGUE HEIGHT > LABIAL



THOUGHT

- THOUGHT (/ɔ/: TR, Labial, two timing slots)
 - Western:
 - [ɔ] Cameroon, Ghana
 - [ɔ, a, ɒ] Nigeria (note that LOT, THOUGHT, STRUT vary with the same three sounds; Liberia varies between [ɔ a])
 - Eastern:
 - [ɔ] everywhere, except
 - [ɔ] some alternation in Kenya
 - Southern:
 - [ɔ] everywhere, except
 - [ɒ] some in Namibia
 - [ɔ] some in WSAFE and everywhere in BSAFE mesolect and acrolect

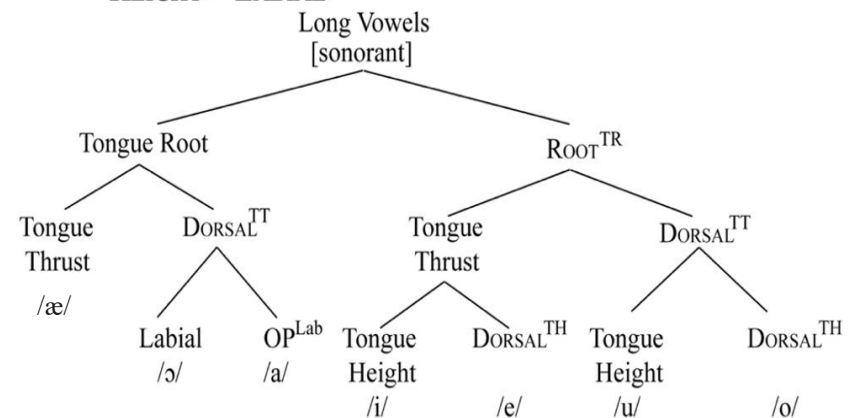
i	u	
e	o	
æ	a	ɔ



LOT

- LOT (/a/: TR, two timing slots) - *in SAE, commonly non-rhotic words spelled with checked <o>, merged with PALM*; BrE mostly <o> checked words; few <a> (*wash*) (Kurath 1964)
 - Western:
 - [ɔ] Cameroon, Ghana
 - [ɔ, a, ɒ] Nigeria (note that LOT, THOUGHT, STRUT vary with the same three sounds)
 - Eastern: [o] everywhere
 - Southern:
 - [o] in Malawi, Zimbabwe, Zambia
 - [ɒ] in Namibia
 - [ɔ] in SAFE all varieties
 - [ɒ] some in BSAFE acrolect
 - [ä ʌ] some in WSAFE

(a) American English Long Vowel Hierarchy: TONGUE ROOT > TONGUE HEIGHT > LABIAL





Summary of Data Patterns

- FLEECE (/i/), FACE (/e/), GOOSE (/u/), GOAT (/o/), PALM (/a/) basically stay
 - TR > TT > TH; LAB differing roles
- Loss of long-short/tense-lax distinction for a set of high and mid vowels
 - Timing structure
- Diphthongs
 - Timing structure
- Low vowels
 - TRAP/BATH:
 - Staying low: lose TT (keep setting for TR)
 - Upward: losing TR (keep setting for TT)
 - THOUGHT: lose TR
 - LOT: effect of reading



Conclusions

- Phonological machinery provides some account for variation in African Englishes
- The dimensional and contrastive underspecification theories allow us to relate variability across Englishes
 - Dimensions set internal boundaries within which there can be variation
 - Variation in African Englishes can stem from contact
- Contact effect: sometimes (all directions)
- Future work
 - See if recordings match reports
 - Connect dots from contact language to English patterns (esp. ATR systems)
 - Emphasize mismatched contact systems
 - Role of reading and education
 - Examine rest of world



Thank you!



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Select Theory Section References



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Short Monophthongs



Sometimes referred to as
"checked" because single nuclear
timing slot only followed by a coda
consonant



KIT

- KIT (/ɪ/: TH, TT, one timing slot) - Kurath 1964: 83-85 checked, “high-front monophthong” (p. 83); variation: can be in-gliding esp. before voiced C (*bid, rib, give*), and can be retracted to mid-central (*whip, crib, hill*). History: Middle English
 - Western:
 - [i] Nigeria, Cameroon
 - [ɪ] Ghana, The Gambia
 - [e] Liberia
 - Eastern:
 - [i] everywhere, except
 - [e] some alternation in Tanzania
 - Southern:
 - [i] everywhere, except
 - [ə] some in Namibia and WSAFE
 - [ɪ] some in WSAFE, and BSAFE acrolect



FOOT

- FOOT (/ʊ/: TH, one timing slot)
 - Western
 - [u] Nigeria, Cameroon
 - [ʊ] Ghana, The Gambia, Liberia
 - Eastern: [u] everywhere
 - Southern:
 - [u] everywhere, except
 - [ʊ] in WSAFE, and some in BSAFE acrolect



DRESS

- DRESS (/E/: TT, one timing slot) - Kurath 1964: 85-87 checked, “mid-front monophthong” (p. 85); variation: can be ingliding esp. before voiced C (*bid, rib, give*), and can be retracted to mid-central (*whip, crib, hill*)
 - Western:
 - [e] Nigeria, sometimes Liberia
 - [ɛ] Cameroon, Ghana, sometimes Liberia
 - Eastern: [e] everywhere
 - Southern:
 - [e] everywhere outside of Namibia and South Africa
 - [ɛ] some in Namibia, all SAFE dialects
 - [æ] some in WSAFE



STRUT

- STRUT (/ʌ/: NULL, one timing slot)
 - Western:
 - [ɔ] Cameroon
 - [ɔ, a, ɒ] Nigeria (note that LOT, THOUGHT, STRUT vary with the same three sounds, Ghana varies between [ɔ a])
 - [ʌ] Liberia
 - Eastern: [a] everywhere
 - Southern:
 - [a] everywhere, except
 - [ʌ] some in Namibia and BSAFE acrolect
 - [ɒ] some in WSAFE
 - [ä] in WSAFE and BSAFE mesolect and acrolect



Long Monophthongs



Sometimes referred to as
unchecked because can be long
and may or may not have a
following consonant



FLEECE

- FLEECE (/i/: TH, TT, two timing slots)
 - Western: [i] everywhere
 - Eastern:
 - [i] everywhere, except
 - [e] some alternation in Tanzania
 - Southern:
 - [i] everywhere, except
 - [ɪ] some in BSAFE acrolect



GOOSE

- GOOSE (/u/: TH, two timing slots)
 - Western: [u] everywhere
 - Eastern: [u] everywhere
 - Southern:
 - [u] everywhere, except
 - [ʊ] some in Namibia and WSAFE
 - [y] some in WSAFE
 - [ʊ] some in BSAFE acrolect



FACE

- FACE (/e/: TT, two timing slots)
 - Western: [e] everywhere
 - Eastern: [e] everywhere
 - Southern:
 - [e] or [ei] variant everywhere, except
 - [æi] some in WSAFE
 - [ʌi] some in WSAFE
 - [ɛi] some in BSAFE mesolect and acrolect
 - [ɛ] some in BSAFE mesolect



GOAT

- GOAT (/o/: NULL, two timing slots)
 - Western:
 - [o] everywhere, except
 - [ɔ] some alternation in Ghana
 - Eastern: [o] everywhere
 - Southern:
 - [o] everywhere, except
 - BR [əʊ] in Namibia, WSAFE
 - [ɔ] or [ɔʊ] in BSAFE mesolect and acrolect



TRAP/BATH

- TRAP/BATH (/æ/: TR, two timing slots)
 - Western:
 - [æ]: The Gambia, Liberia
 - [a]: Nigeria, Cameroon, some Ghana
 - [ɛ]: occasionally The Gambia
 - Eastern: [a] everywhere
 - Southern:
 - [æ] some in WSAFE, BSAFE acrolect
 - [a] in Malawi and some in Namibia
 - [e] in Zimbabwe and Zambia
 - [ɛ] in Namibia, WSAFE, BSAFE mesolect and acrolect



PALM

- PALM (/a/: TR, two timing slots) - words spelled with <a> [in SAE, pronounced as LOT without lateral; some variant with THOUGHT with lateral]
 - Western:
 - [a]: everywhere
 - [æ]: sometimes Liberia
 - Eastern: [a] everywhere
 - Southern:
 - [a] everywhere, except
 - [ʌ] some in BSAFE acrolect



LOT

- LOT (/a/: TR, two timing slots) - words spelled with <o> [in SAE, merged with PALM]
 - Western:
 - [ɔ] Cameroon, Ghana
 - [ɔ, a, ɒ] Nigeria (note that LOT, THOUGHT, STRUT vary with the same three sounds)
 - Eastern: [o] everywhere
 - Southern:
 - [o] in Malawi, Zimbabwe, Zambia
 - [ɒ] in Namibia
 - [ɔ] in SAFE all varieties
 - [ɒ] some in BSAFE acrolect
 - [ä ʌ] some in WSAFE



THOUGHT

- THOUGHT (/ɔ/: TR, Labial, two timing slots)
 - Western:
 - [ɔ] Cameroon, Ghana
 - [ɔ, a, ʊ] Nigeria (note that LOT, THOUGHT, STRUT vary with the same three sounds; Liberia varies between [ɔ a])
 - Eastern:
 - [o] everywhere, except
 - [ɔ] some alternation in Kenya
 - Southern:
 - [o] everywhere, except
 - [ʊ] some in Namibia
 - [ɔ] some in WSAFE and everywhere in BSAFE mesolect and acrolect



Diphthongs





PRICE

- PRICE (/ai/: TR + TT, TH, two timing slots)
 - Western: [ai] everywhere
 - Eastern: [ai] everywhere
 - Southern:
 - [ai] in Namibia, some in WSAFE
 - [a] Malawi, Zimbabwe, Zambia, and some in WSAFE
 - [äɪ] some in WSAFE
 - [ʌ] or [ʌɪ] in BSAFE acrolect; [ʌɪ] in BSAFE mesolect



MOUTH

- MOUTH (/au/: TR + TH, two timing slots)
 - Western: [au] everywhere
 - Eastern: [au] everywhere
 - Southern:
 - [au] or [aʊ] in Namibia
 - [a] or [o] in Malawi, Zimbabwe, Zambia
 - [äʊ, a:, æʊ] in WSAFE
 - [o] or [ɔʊ] in BSAFE mesolect
 - [aʊ] or [ɔ] in BSAFE acrolect



CHOICE

- CHOICE (/oi/: NULL + TT, TH, two timing slots)
 - Western:
 - [oi]: almost everywhere
 - [ʌ]: Liberia
 - Eastern: [ɔi] or [oi] everywhere
 - Southern:
 - [oi] and [ɔi] in Namibia
 - [o] Malawi, Zimbabwe, Zambia
 - [ɔɪ] in all SAFE varieties



R-flavored Vowels

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NURSE

- NURSE (/ʌ.ɪ.:/: NULL + [cons], two timing slots)
 - Western: ??
 - Eastern:
 - [a] everywhere, except
 - [e] for words like <girl> (spelled with front vowel) in Tanzania
 - [ɔ] for words like <turn> (spelled with back vowel) in Tanzania
 - Southern:
 - [e] in Malawi and some in Namibia
 - [a] in Zimbabwe, Zambia and some in Namibia
 - [ø:] or [ɜ:] in WSAFE
 - [ɛ] in BSAFE mesolect
 - [ɛ], [ɜ] and [ə] in BSAFE acrolect