Linguistic Seminars

Department of Linguistics and Languages

The University of Nairobi

The Element Structure of Kenyan English Monophthongs

By

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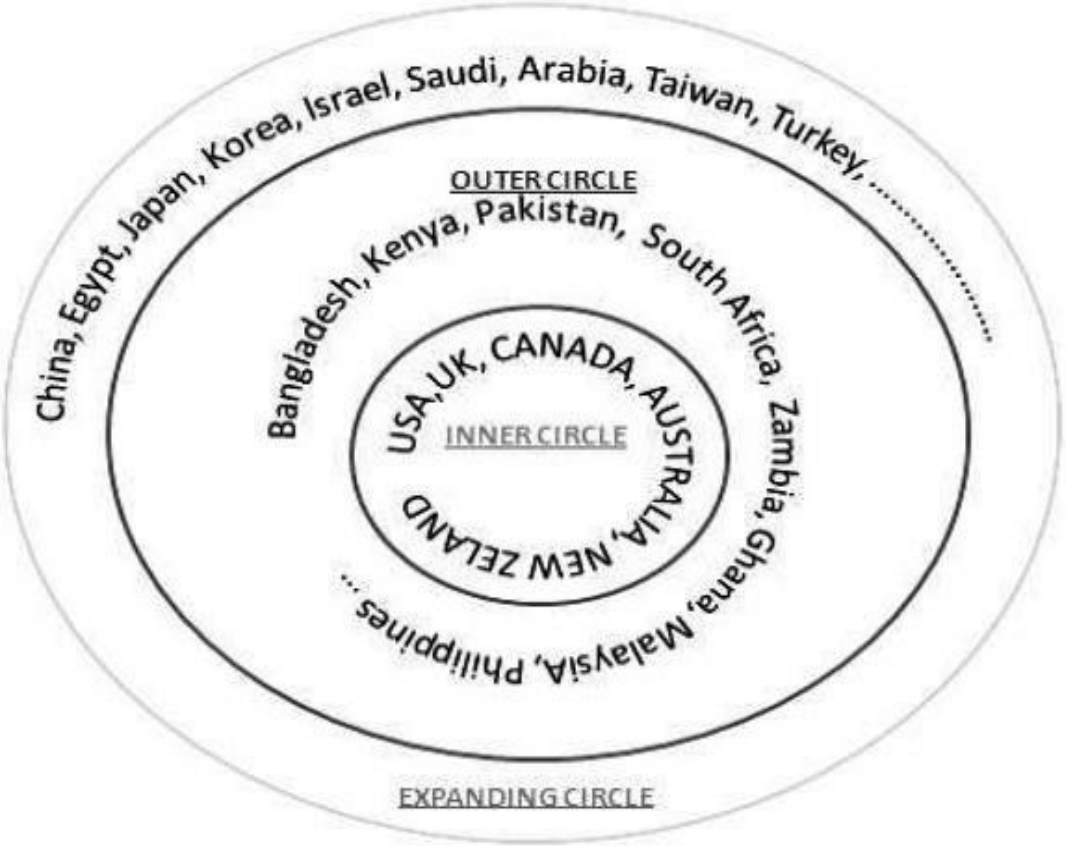
Presentation at 2pm on Wednesday 23rd- 5-2018 at ED 210

Presentation Outline

- Contextualizing KenE (5 Min)
- Element Theory (10 Min)
- Methodology (5 Min)
- KenE vs RP Monophthongs (10 Min)

KENYAN ENGLISH- THE PHENOMENON

- KenE contextualized within Kachru's (1982, 1985) World Englishes



Source: Schneider, 2007, p.13

- Development of KenE accounted for within Schneider's (2007) model for Post-Colonial Englishes (PCE's) which has 5 stages:
    1. *Foundation*
    2. *Exornormative Stabilization*
    3. *Nativisation*
    4. *Endonormative Stabilization*
    5. *Differentiation*
- Schneider(2007) places Kenya in the Nativisation stage

The Phenomenon

- Kioko and Muthwii (2004) describe the non-E-marked KenE as "a recognisable variety of English that could justifiably be called standard Kenyan English" (p.36).
- Buregeya (2001) notes that Kenya is, "at least developing and even 'standardising' its own variety of English" (p. 1)
- Njoroge (2006, 2011); Mutonya (2008); Budohoska (2014); Karia (2014); and, Itumo, Maroko, Nandelenga (2017) have also acknowledged the existence of this variety.
- Hoffmann (2011) also describes the vowels of this variety (which he calls the **acrolectal Black Indigenous Kenyan English(BIKE))** among University of Nairobi students

RP MONOPHTHONGS

RP segments used as the independent variable

- **RP** has total of 20 vowels which comprise 12 Monophthongs and 8 Diphthongs.
- The 12 RP vowels comprise the following:

seven short monophthongs, /ɪ, e, æ, ɒ, ʌ, ʊ, ə /; and, five long monophthongs, / iː, uː, ɔː, ɑː, ɜː/;

(Roach, 2009, Backley, 2009).

ACOUSTIC DESCRIPTION OF MONOPHTHONGS

- Ladefoged and Disner (2012) : vowels “can always be accurately described in terms of the frequencies of the first three formants (p. 47)

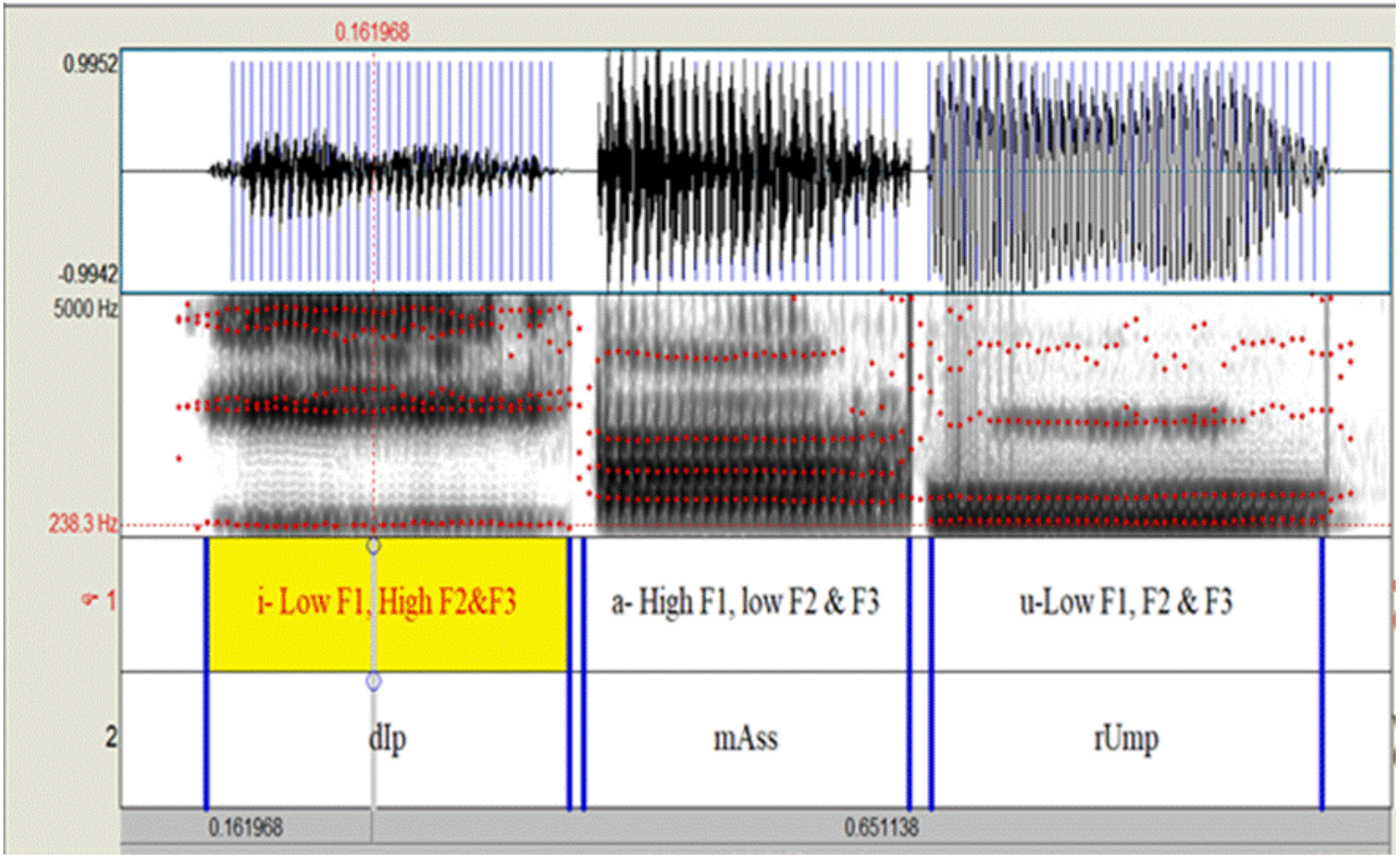
- We are also interested in relative duration (which is measured in seconds or milliseconds) so as to distinguish between ‘long’ and ‘short’ monophtongs

ACOUSTIC DESCRIPTION OF MONOPHTHONGS

- Raphael, Borden and Harris (2011) define formants as "vocal tract resonances" (p. 95). On the spectrogram, they are seen as dark concentration of acoustic energy.

- *Praat* (Boersma & Weenink, 2016) maps formant tracks with red dotted lines as shown in the next slide.

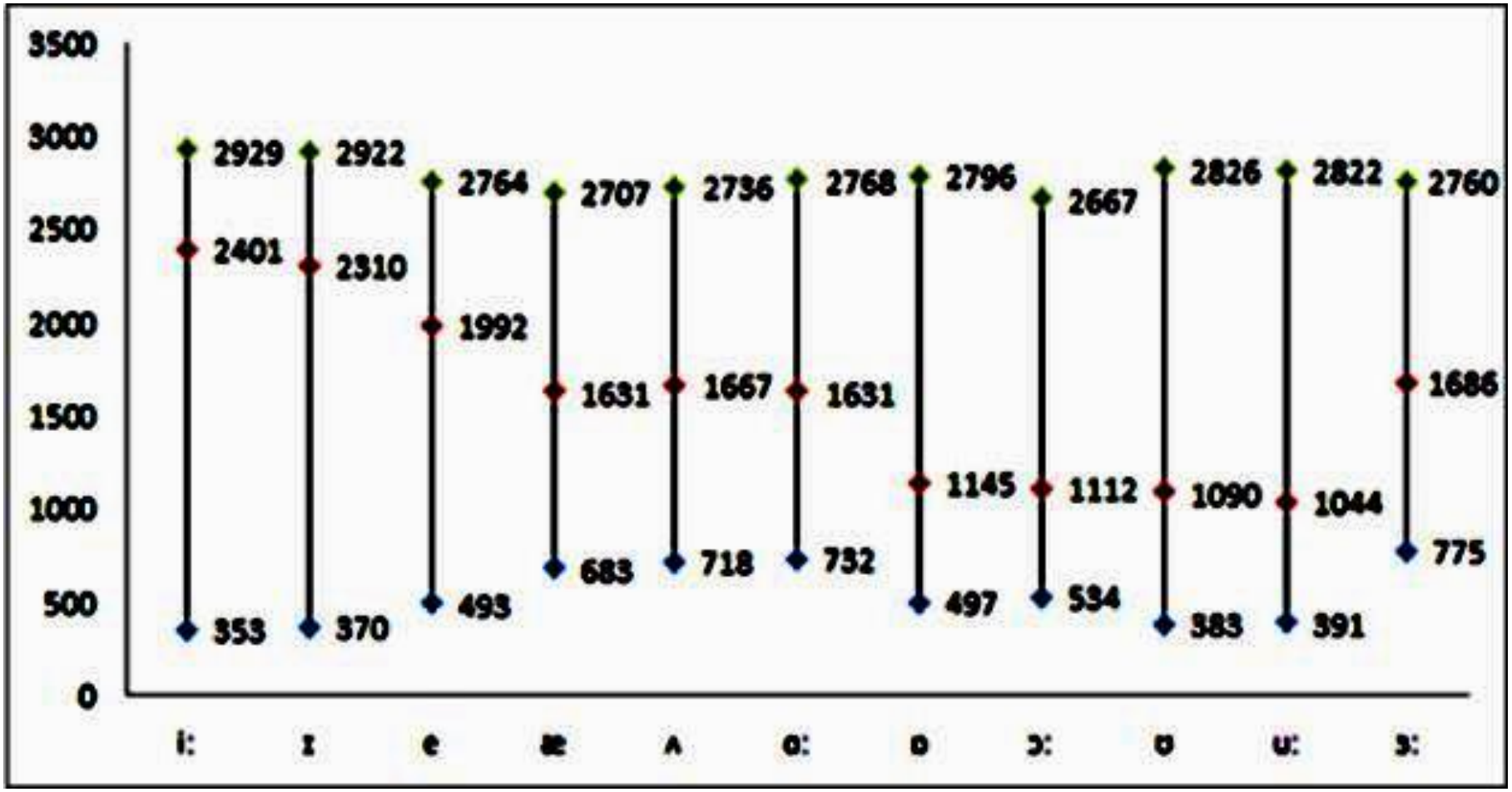
LET'S TALK OF FORMANTS ALONE; WE SHALL REVISIT!



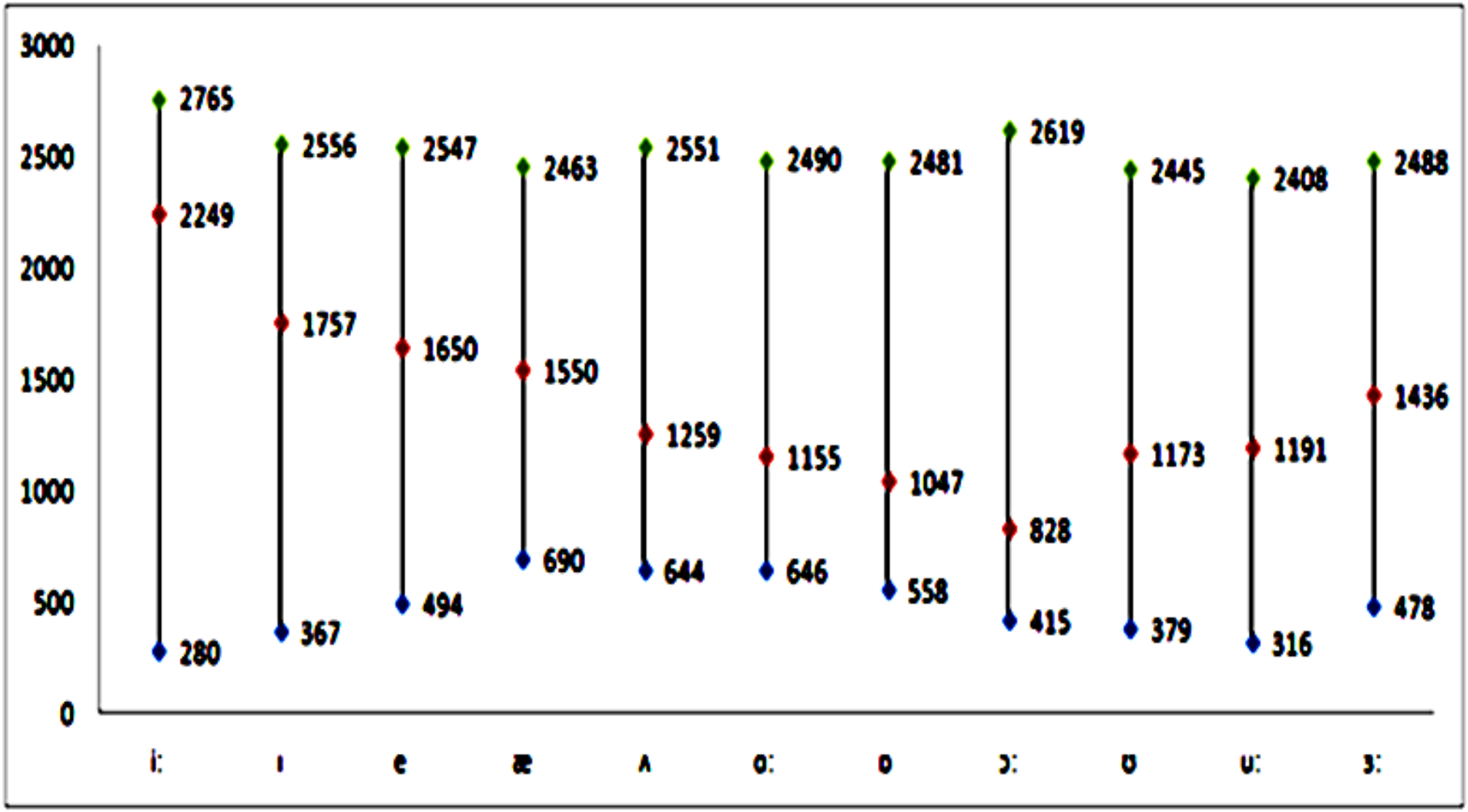
Average F1, F2 and F3 Frequency Values for RP Speakers (Source: Deterding, 1997)

		FEMALE			MALE		
VOWEL	**CONTEXT**	**F1**	**F2**	**F3**	**F1**	**F2**	**F3**
iː	BEEN	303	2654	3203	280	2249	2765
ɪ	SIN	384	2174	2962	367	1757	2556
e	BED	719	2063	2997	494	1650	2547
æ	MAN	1018	1799	2869	690	1550	2463
ʌ	CUT	914	1459	2831	644	1259	2551
ɑː	CARD	910	1316	2841	646	1155	2490
ɒ	COT	751	1215	2790	558	1047	2481
ɔː	LAW	389	888	2796	415	828	2619
ʊ	BOOK	410	1340	2697	379	1173	2445
uː	BOOM	328	1437	2674	316	1191	2408
ɜː	BIRD	606	1695	2839	478	1436	2488

RP- Female Subjects: Adapted from Deterding 1997



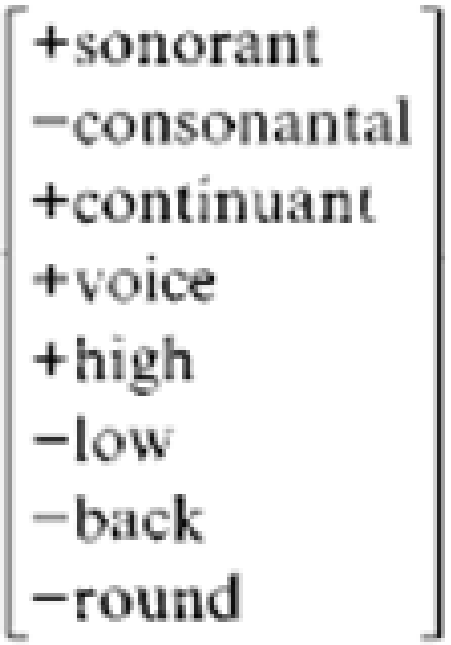
RP Male Subjects: Adapted from Deterding (1997)



Description of Vowels Within SPE

- Articulatory based- e.g high, front, spread, etc.
- Binary- + or – a feature
- Matrix of Features: All these constitute a segment
- 'linear', in the sense that segments are viewed as comprising of an unordered bundle of binary features.

Feature Matrix for /i/



Element Theory (ET)

- ET is anticipated in Kaye, Lowenstamm & Vergnaud's (1985, 1990) broader Government Phonology framework.
- ET has also been developed in Harris and Lindsey (2000); Cyran, (1997, 2010); Botma (2003); Nasukawa and Backley (2008); Backley (2009); Backley (2011); Nasukawa and Backley (2014); Backley and Nasukawa (2016) among others
- In Kenya; Itumo, Maroko and Nandelenga (2017); and Itumo (2018) are aboard the ET plane

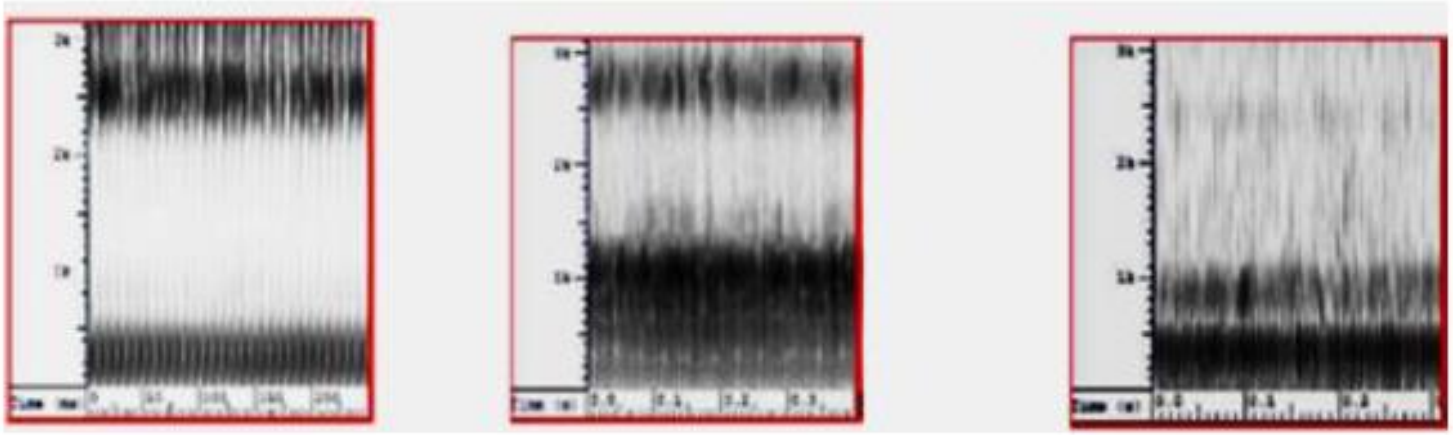
Element Theory (ET)

Phonological Element: The smallest unit of segmental structure present in mental representations (Backley, 2009, p. 9).

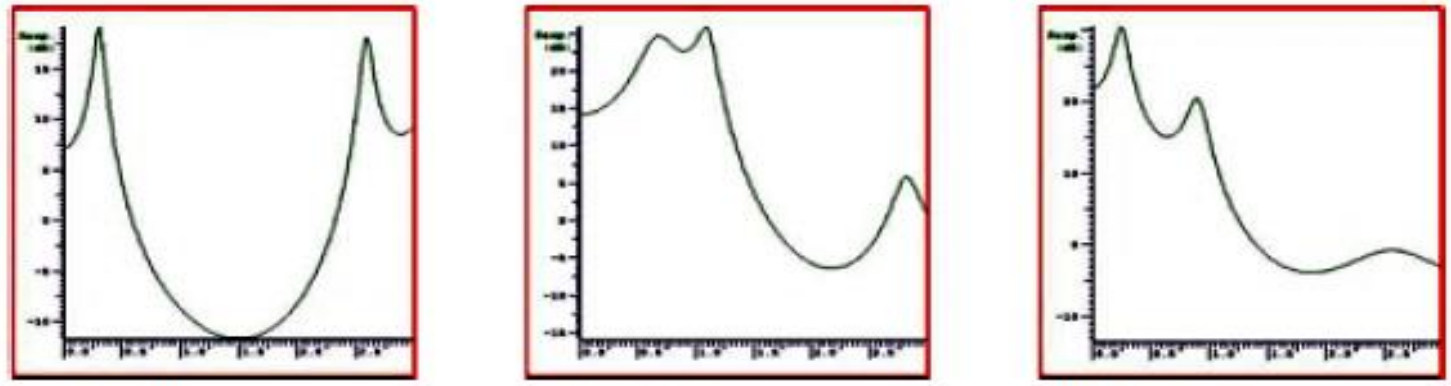
ET is based on 6 phonological elements

- (a) Resonance elements
  - | I | (DIP) low F1 with high spectral peak (F2--F3 convergence)
  - **|A|** (MASS) energy mass, central frequency range (F1-F2 convergence)
  - **|U|** (RUMP) low spectral peak (lowering of all formants)
- (b) Source/laryngeal elements
  - **|H|** (High) aperiodicity, noise
  - **|ʔ|** (Stop) abrupt and sustained drop in energy
  - **|L|** (Low) periodicity, murmur

|IAU| Spectrograms and Spectra



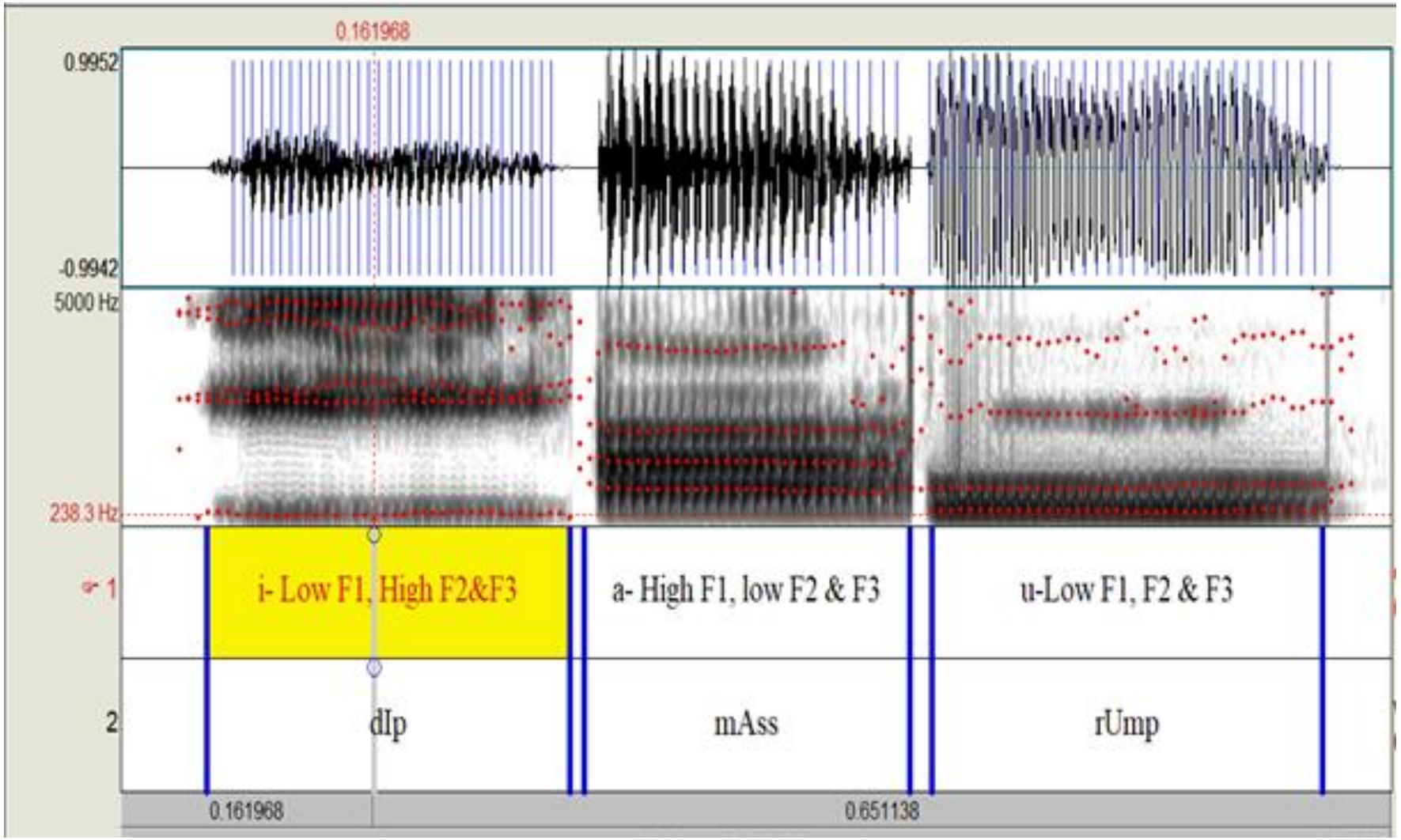
|I| Spectrogram |A| Spectrogram |U| Spectrogram



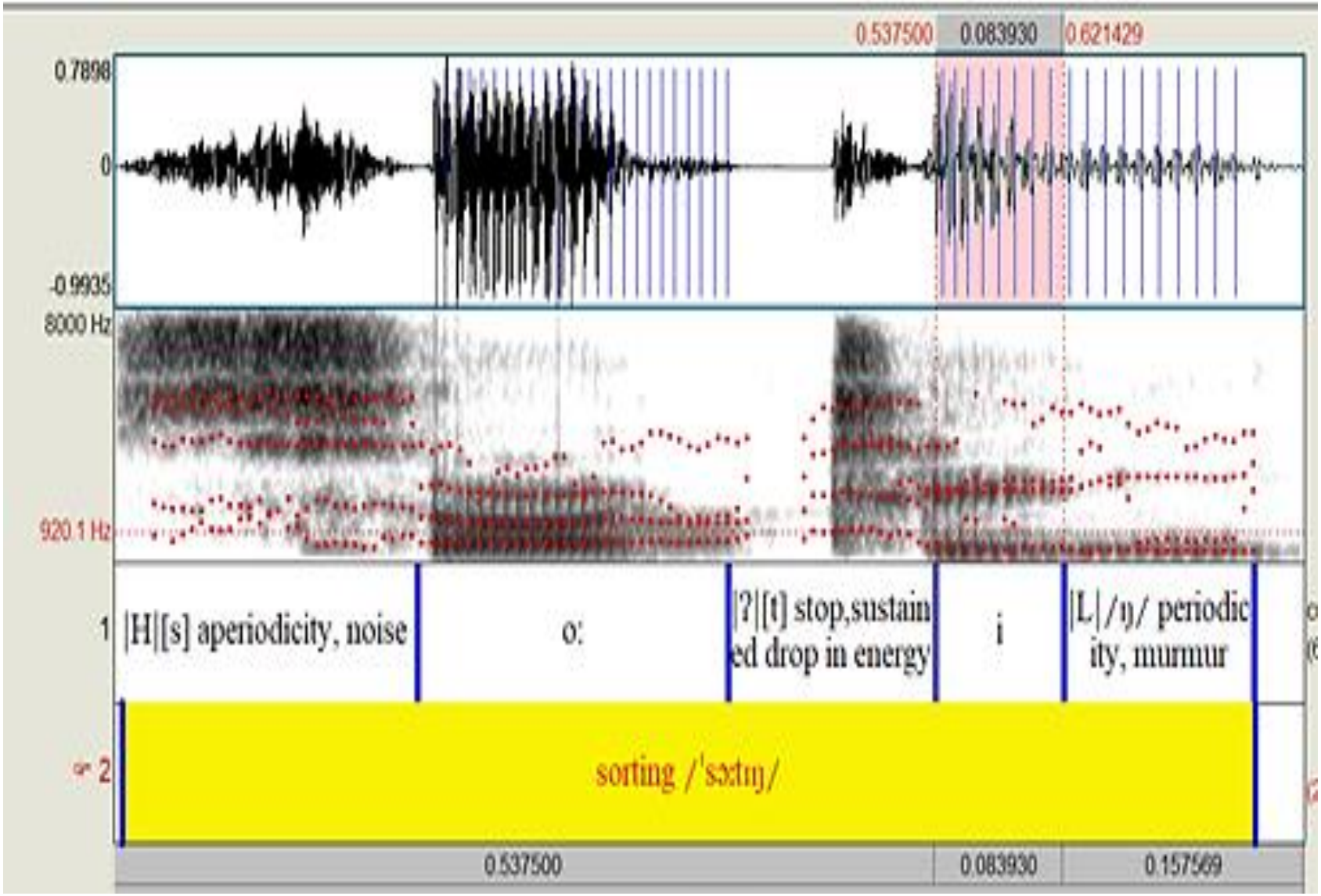
|I| Spectrum |A| Spectrum |U| Spectrum

(Source: Backley, 2009, p. 26)

Segments with |I| , |A| and |U| Elements



Segments with |H|, |ʔ| and |L| Elements



Understanding ET

- A principal tenet of ET is that the speech signal is seen as a channel through which "speakers transmit and monitor… [linguistic] information and listeners receive it" (Harris & Lindsey, 2000, p. 185).
- The speech wave has patterns which we associate with linguistic (phonological) information.
- Elements are described using acoustic correlates rather than articulation, which is the case with SPE (Chomsky and Halle 1968) tradition.

It's not about articulation but the patterns in the acoustic signal.

While making reference to vowels, Cruttenden (2014) (and he's not in ET!) says:

> *…it has been shown that it is possible to articulate vowel qualities without the exact tongue and lip positions which this diagram [of the cardinal vowel spaces] seems to postulate as necessary. It is, for instance, possible to produce a sound of the Cardinal 7* ([o]) *type without the lip-tongue relationship suggested (p. 38).*

Characterizing Elements Further

- Unlike features, elements can be pronounced on their own.
- E.g , When the dIp element |I| forms a syllable nucleus (N), it is realised [i]. In an onset (O) it is pronounced as the glide [j]. Hence Elements have **phonetic interpretability.**
- Similarly, the rUmp element |U| is realized as [u] at N and as [w] at O position
- Therefore, in it is possible, at least in principle, for any element to appear in any syllabic position

Phonological Categories of the Prime Phonological Elements

	Element	Nuclear	Non-nuclear
Resonance elements	|I|	front vowels	coronal: dental, palatal place
	|U|	rounded vowels	dorsal: labial, velar place
	|A|	non-high vowels	guttural: uvular, pharyngeal place
Source /laryngeal elements	|ʔ|	creaky voice (laryngeal vowels)	oral/glottal occlusion
	|H|	high tone	aspiration, voiceless
	|L|	nasality, low tone	nasality, obstruent voicing

(Source: Backley & Nasukawa, 2016, p. 272)

Vowel-Consonant Unity

- By allowing vowel elements in consonants, ET easily captures some familiar natural classes. “For example; the |I|- class unites front vowels, palatals and coronals while the |U|- class brings together rounded vowels, labials and velars” (Backley & Nasukawa, 2009, p. 3).
- SPE separates the consonant and vowel classes; and therefore misses out on accounting for features that are shared by the two main classes.

Characterizing Elements Further

- Since elements can occur alone, they "are 'big' enough to function as segment-sized units" and "they are also 'small' enough to combine with one another within a single segment"
- In line with the broader Government Phonology (GP) framework, ET uses head dependency relations to account for how elements may enter into asymmetrical relations to form 'complex representations' (Cyran, 2010). Segments are therefore, realized as either 'simplex' or 'complex' representations
- Elements are UNARY (SINGLE VALUED not BINARY

Dimensions of Structural Elements

(a) **Dimensions of segmental structure**

i. the presence vs the absence of an element

ii. dependency relations between elements

(b) **Dimensions of prosodic structure**

i. the presence vs the absence of a position (C/V)

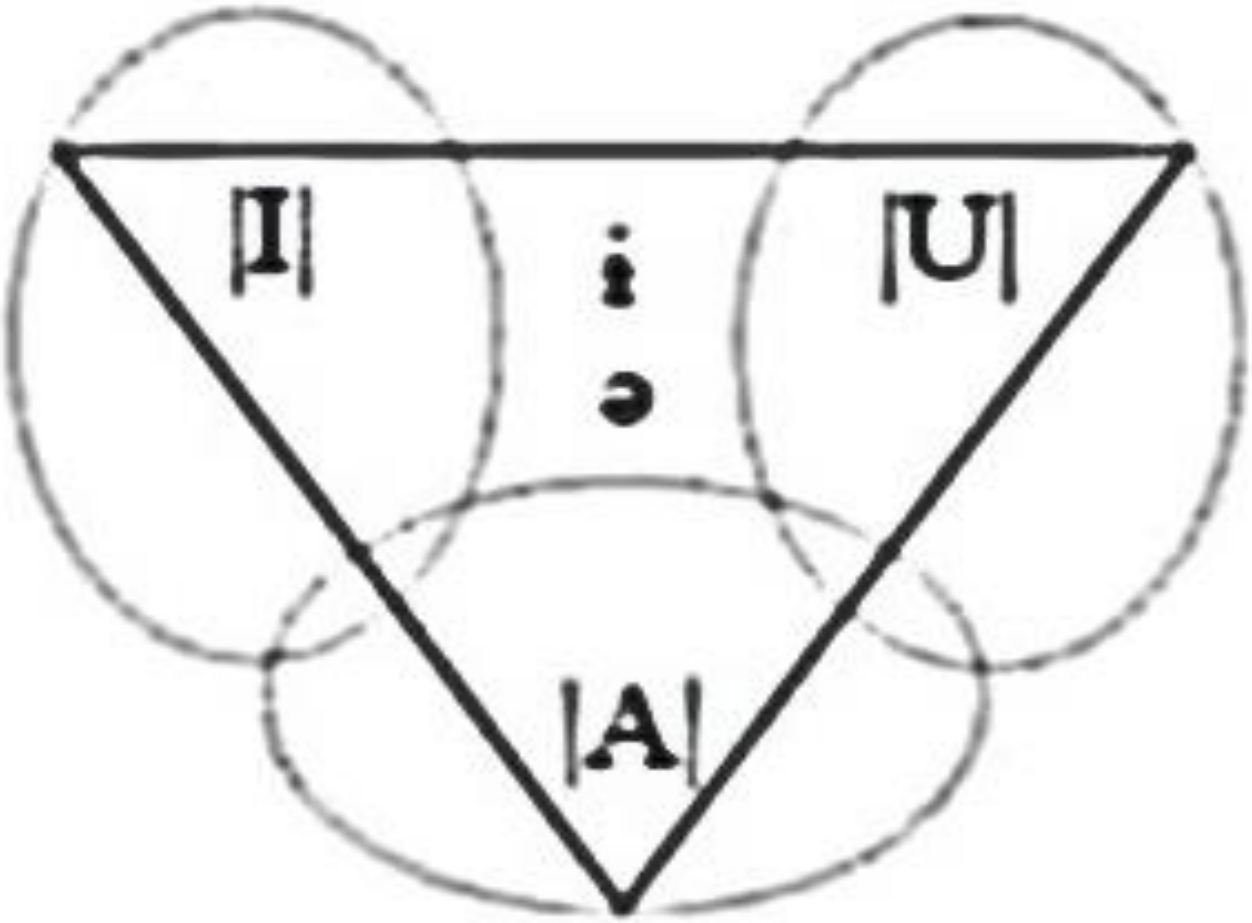
ii. dependency relations between positions

(Source: Nasukawa & Backley, 2014, p. 9)

Vowel Acoustic Space

- In SPE, the two features [±high] and [±back] define the limits of the vowel space. Feature theories therefore, mark out a vowel space approximating to a square.
- However, as Backley (2009) notes, "a vowel square fails to capture the special status of the basic vowels [**i, a, u**], thereby missing an important generalization concerning typological markedness" (p. 28).
- Element Theory (Harris & Lindsey, 1995; Backley, 2011) on the other hand, has a triangular shape as the default pattern as shown in the Figure in the next slide.

AIU Areas of the Vowel Space (Source: Backley, 2009, p. 40)



METHODOLOGY

- Adopted **descriptive** research design and integrated both **quantitative** and **qualitative** procedures
- Purposively sampled 7 female and 7 male university lecturers using Social Network approach
- 7 Quotas defined by ethnicity and sex
- BANTU- (Central2; Western2;Coastal2)=6
- NILOTIC (Highland 2; Plain 2; Lake2)=6
- CUSHITIC (2)=2
- Harrington (2010) recommendation concerning studies in acoustic phonetics is that "a speaker size within the range of 10 to 20 is usual" (p. 7).

Data Collection Tools and Methods

Instruments

- Digital audio recorder
- Biodata Questionnaire and Vetting Questionnaires
- 'Wolf Passage'- a passage used for phonological analysis

Data Collection

- Audio recording as subjects read Wolf Passage twice
- Phonemic transcription done using *Phonetizer**
- Cross-checked using Oxford Advanced Learners Dictionary
- At least four token words were used for 12 Standard Lexical Sets associated with RP Monophthongs

Data Analysis

- **Quantitative** data relates to segment duration and formant frequency
- Vowel data on formant frequency was handled separately because of the physiological differences between men and women
- The obtained formant values were further normalized using Fabricius, Watt, and Johnson (2009) procedure
- **Qualitative data:** Figures of vowel space (Vowel Triangle), text grids showing spectrograms and oscillograms and spectral patterns (both FFT and LPC)

DATA ANALYSIS (Let's skip this. We may come to the details during our discussion)

- IN PRAAT: The first three formants of each of the vowels were identified using *Praat* by clicking the *'Show Formants'* command and selecting the first three formants.

- IN PRAAT: To ensure consistency and avoid possible human error, the researcher created the Praat script log file: *'t1:0''tab$''t2:0''tab$''f1:0''tab$' 'f2:0''tab$''f3:0'*. This customized Praat log file enabled the researcher to accurately generate the first three formants at the point of the selected segment.

- As Ladefoged and Disner (2012) observe, "in order to represent the vowels of a language, we need to show the relative values of the formants" (p.39). The mean value of the formants in each lexical set is obtained by determining the sum of the formant frequencies and dividing this sum with the number of token words. As Kent (1993) suggests, vowel means "define the approximate formant frequencies of a neutral vowel for each group" (p. 103).

Vowel Normalization (Let's skip this too)

- Speakers have different sizes of the oral cavity due to sex, age and other physiological factors which may result to "differing formant values for 'the same vowel' uttered by different speakers" (Thomas, 2008, p.174). Vowel normalization is a procedure that aims at reducing interspeaker variance, while at the same time preserving "linguistic (and by implication) dialectal differences" (Thomas, 2008, p.182).

- Normalized vowel data using the Fabricius, Watt, and Johnson (2009) procedure. This is a vowel-extrinsic method which uses a grand mean value to derive normalized values which are based on points that represent the three corners of a vowel triangle.

- The procedure is also easily accessible since it can be computed using the *NORM: Vowel Normalization and Plotting Suite* which is freely provided online by Thomas and Kendall (2007-2017) at: *http://lingtools.uoregon.edu/norm/norm1.php*

KenE Vowel Mean Duration (Secs) KenE

LEXICAL SET	RP	CLASS	KenEF	KenEM
FLEECE	iː	I	0.07	0.08
KIT	ɪ		0.07	0.07
DRESS	e	AI	0.07	0.07
NURSE	ɜː		0.09	0.09
STRUT	ʌ		0.09	0.09
START	ɑː		0.07	0.08
TRAP	æ	A	0.07	0.07
LOT	ɒ		0.07	0.07
THOUGHT	ɔː	AU	0.08	0.08
FOOT	ʊ		0.09	0.09
GOOSE	uː	U	0.1	0.1

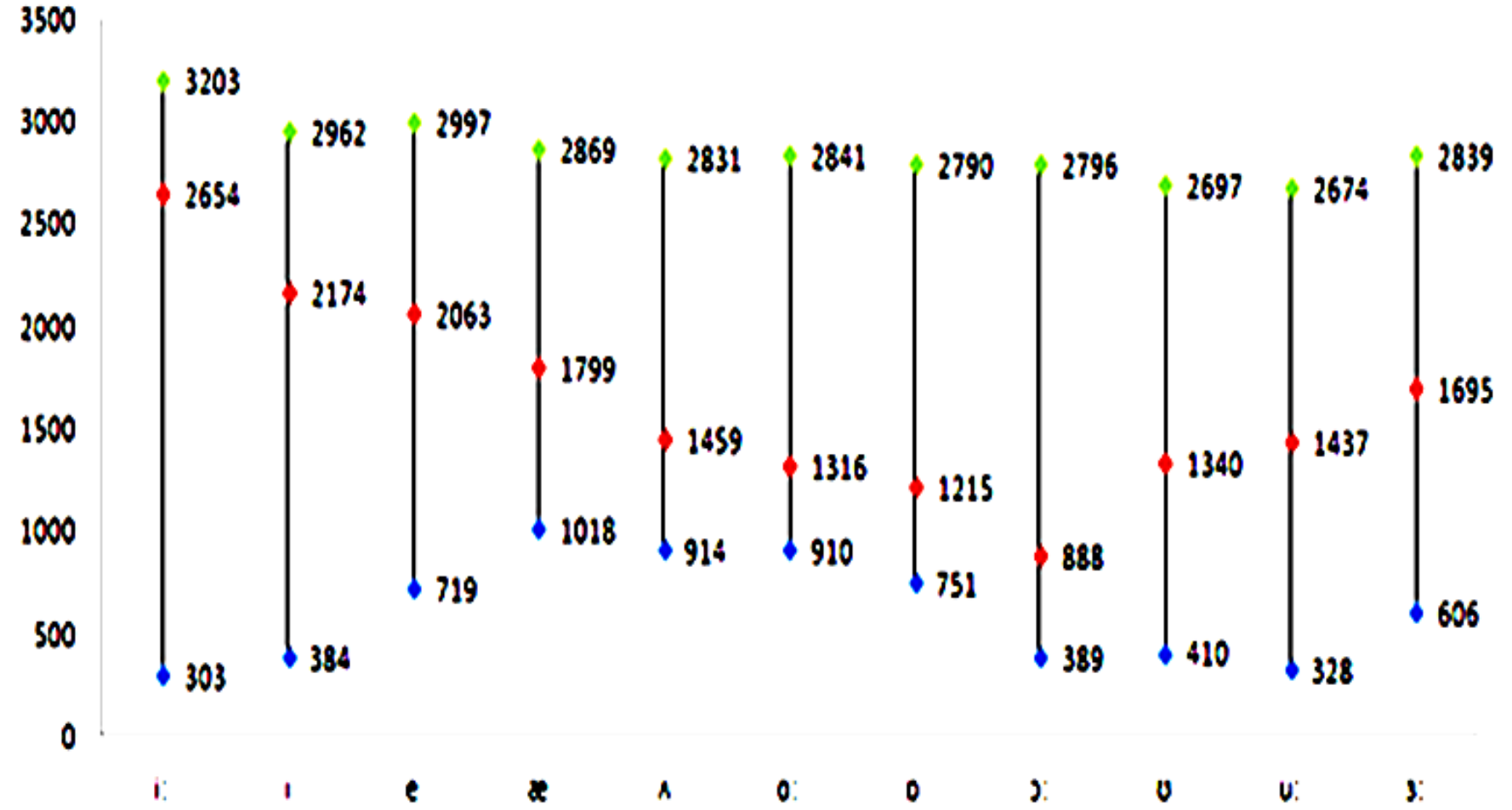
ANOVA SIG. FOR VOWEL CLASSES

	Female					Male				
CLASS	Sum of Squares	df	Mean Square	F	Sig.	Sum of Squares	df	Mean Square	F	Sig.
|I|	0.001	1	0.001	0.025	0.876	0.001	1	0.001	1.155	0.287
|A|	0.007	3	0.002	8.576	0.001	0.004	3	0.001	3.251	0.025
|AU|	0.001	1	0.001	2.562	0.115	0.003	1	0.003	6.386	0.014
|U|	0.005	1	0.005	4.482	0.039	0.001	1	0.001	0.577	0.451

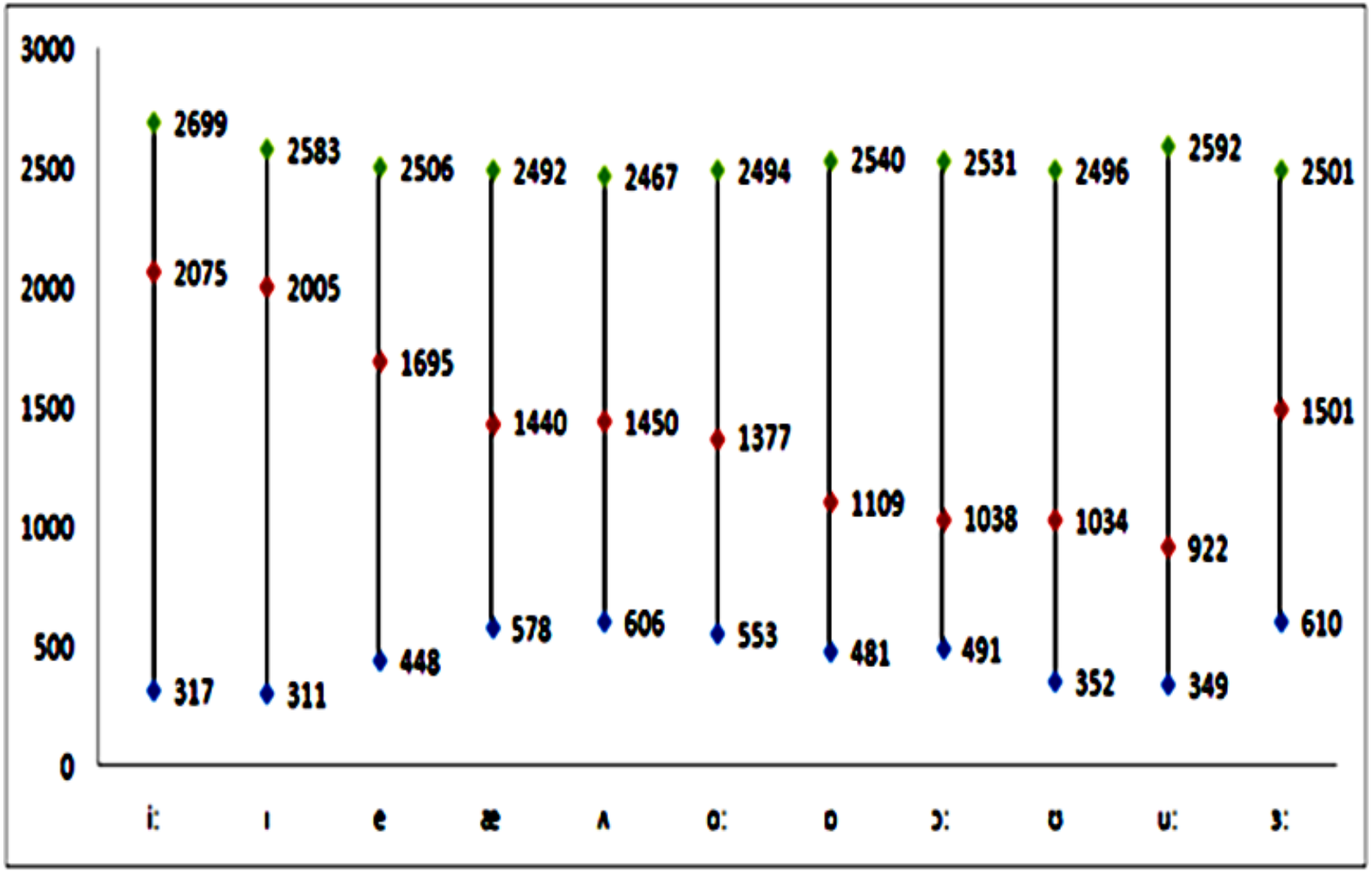
TUKEY'S POST HOC FOR |A| VOWELS

Tukey HSD-Female Subjects				Tukey HSD-Male Subjects		
VOWEL CODE	N	Subset for alpha = 0.05		VOWEL CODE	N	Subset for alpha = 0.05
		1	2			1
START	28	0.0743		TRAP	28	0.0729
TRAP	28	0.0754		START	28	0.0775
NURSE	28		0.0893	STRUT	28	0.0868
STRUT	28		0.0907	NURSE	28	0.0868
Sig.		0.995	0.989	Sig.		0.058
Means for groups in homogeneous subsets are displayed.				Means for groups in homogeneous subsets are displayed.		
a. Uses Harmonic Mean Sample Size = 28.000.				a. Uses Harmonic Mean Sample Size = 28.000.		

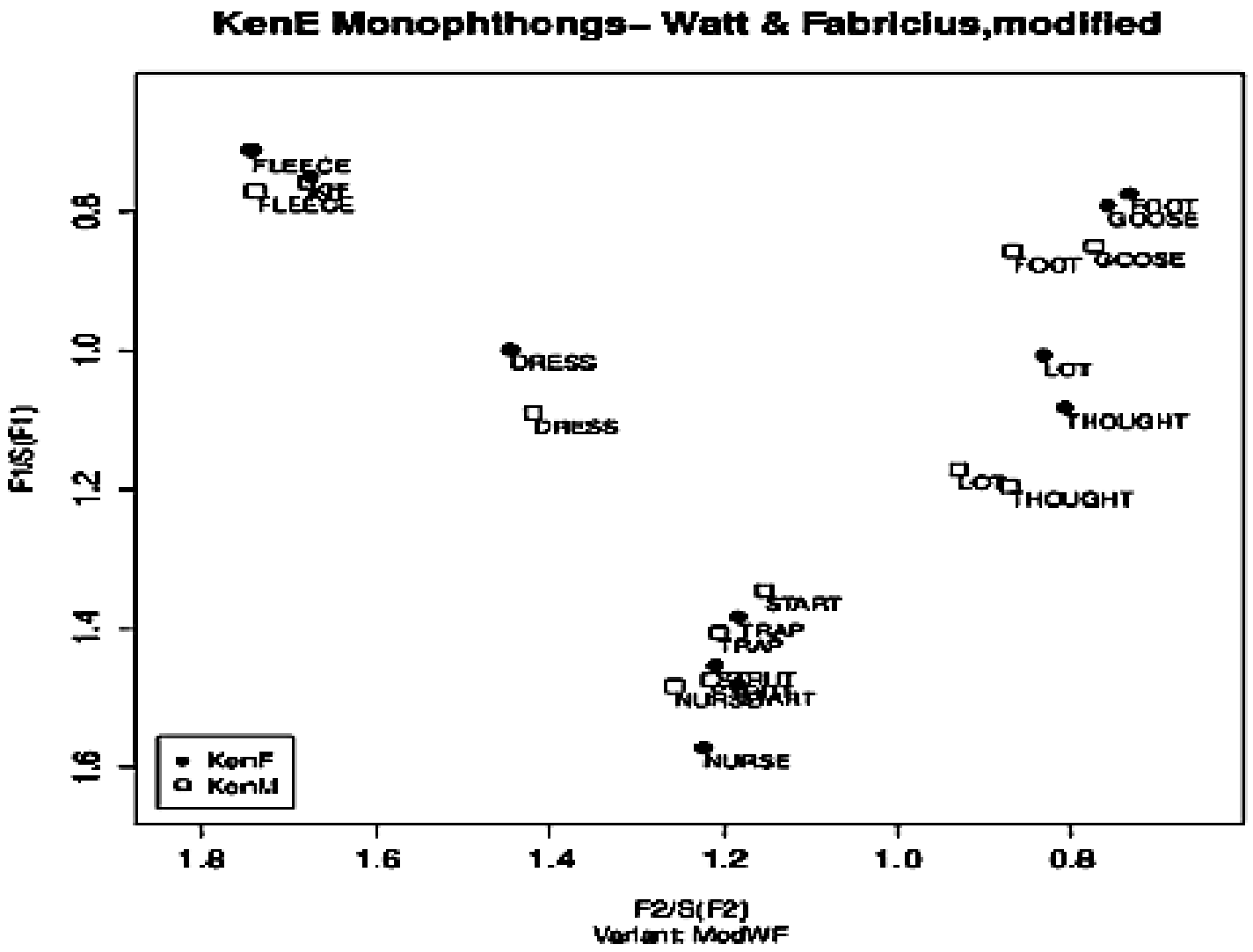
Mean Formant Values for KenE Monophthongs - Female Subjects



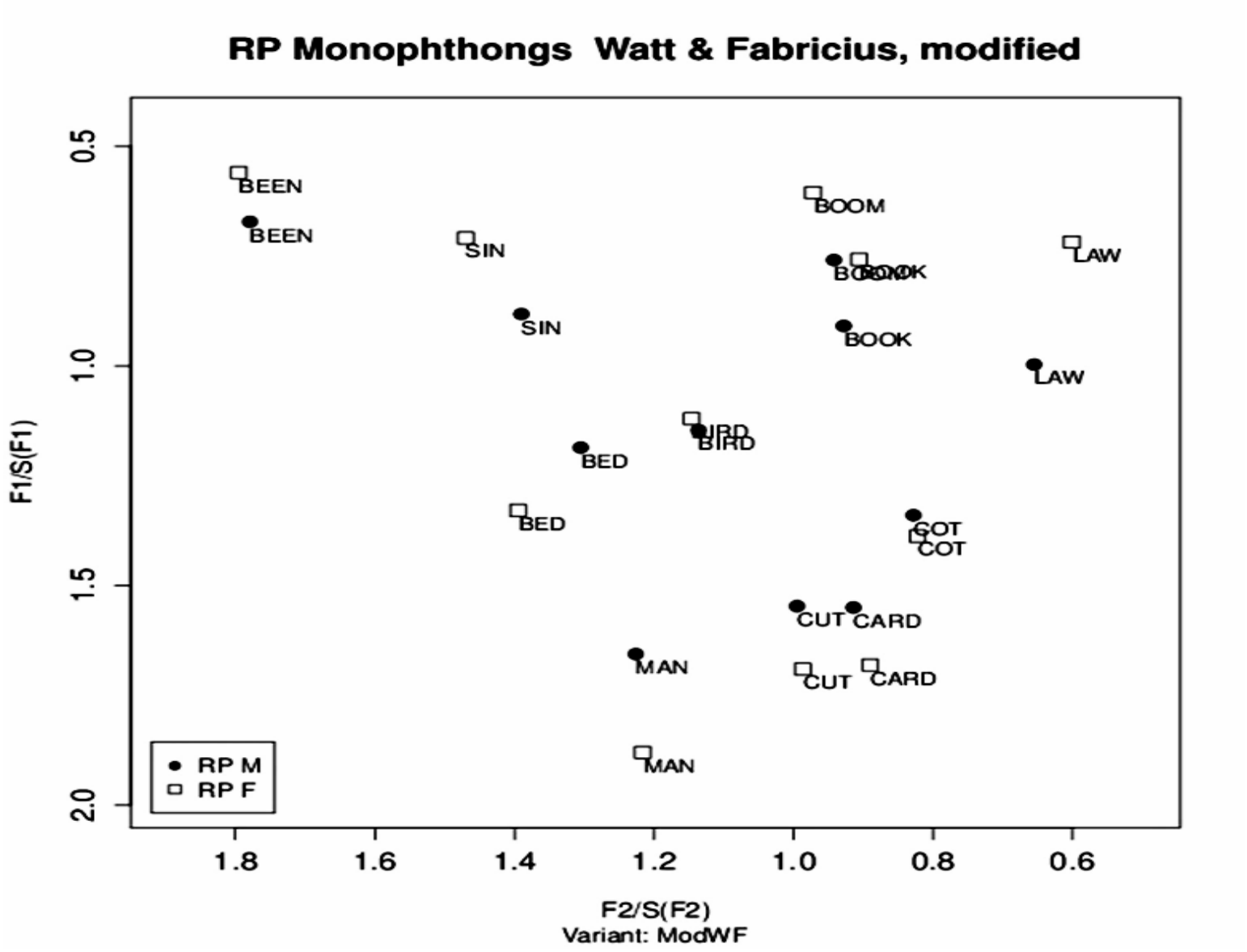
Mean Formant Values for KenE Monophthongs - Male Subjects



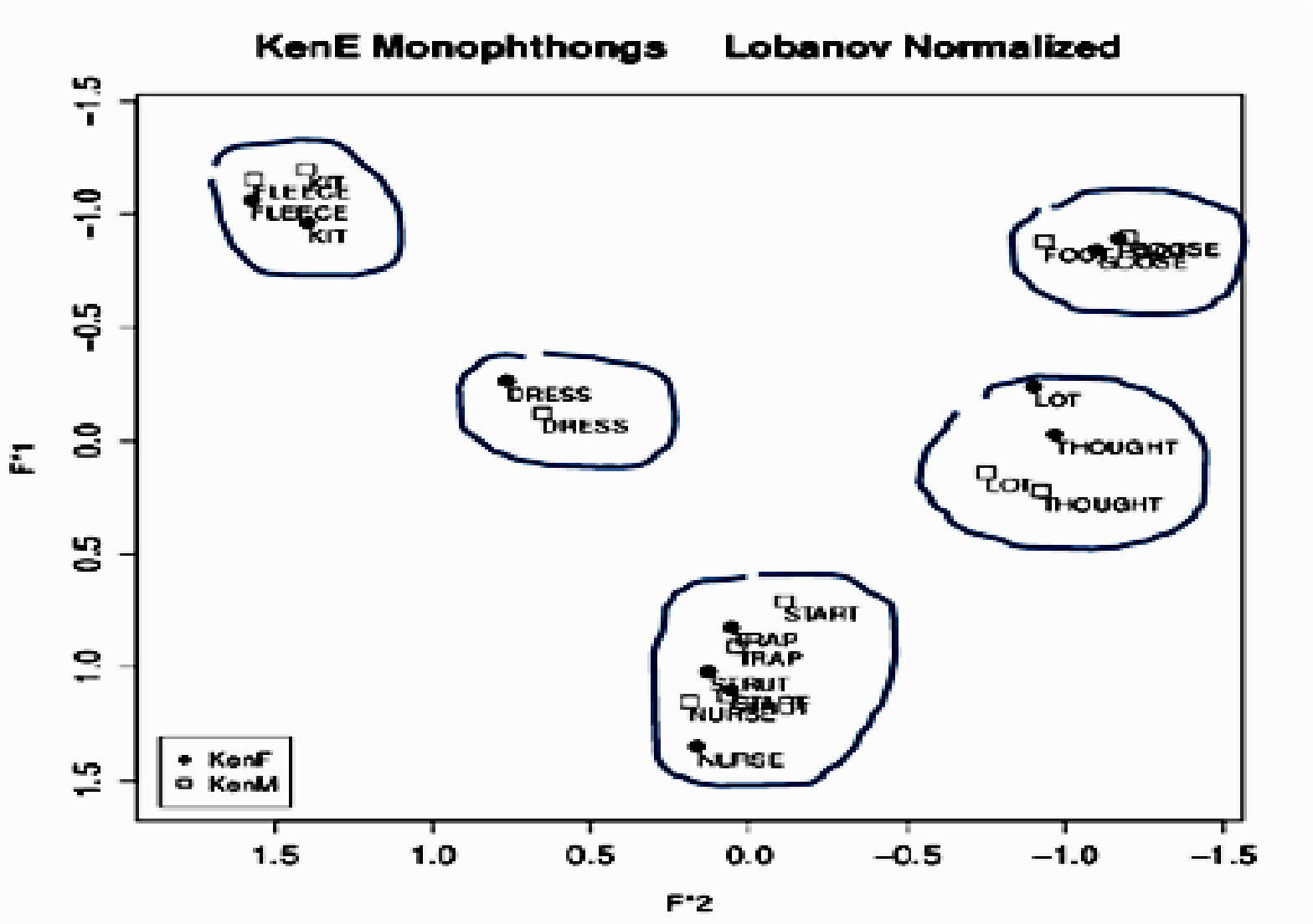
KenE Monophthongs: Acoustic Space



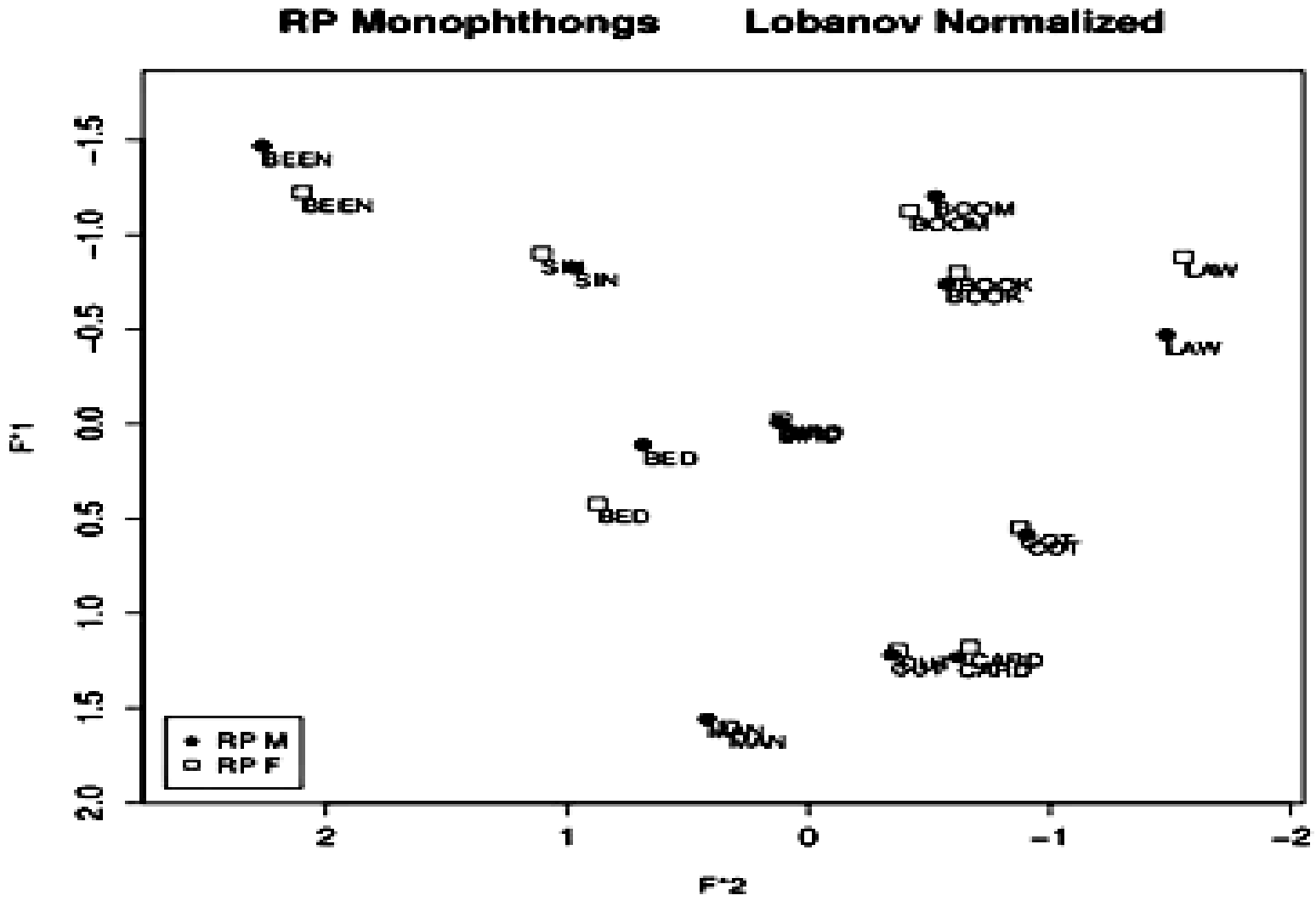
Vowel Spaces of RP Monophthongs for Female (RP F) and Male (RP M) Subjects (Adapted from Deterding, 1997)



Just for comparison Using Lobanov sic SPE approach (From Itumo and Buregeya (Forthcoming))

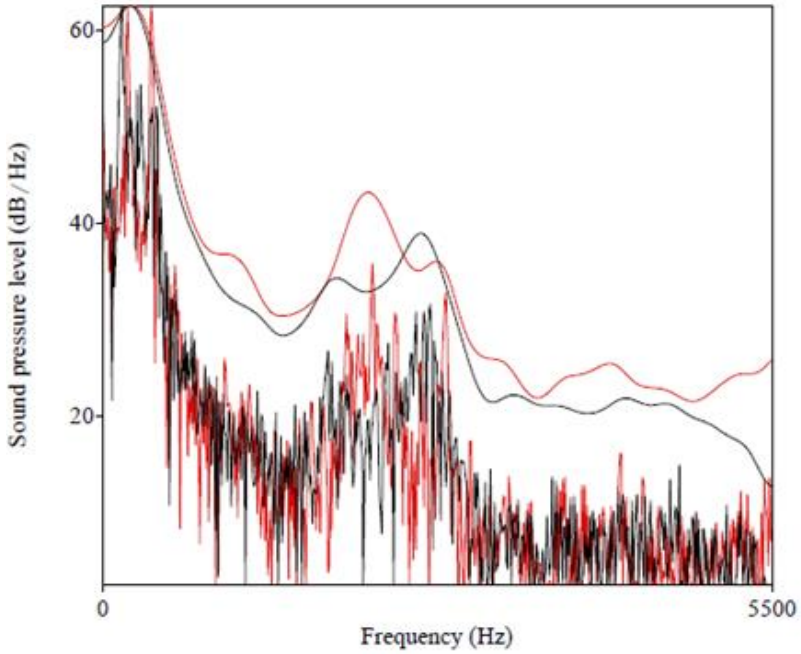


The Vowel Space of RP Monophthongs



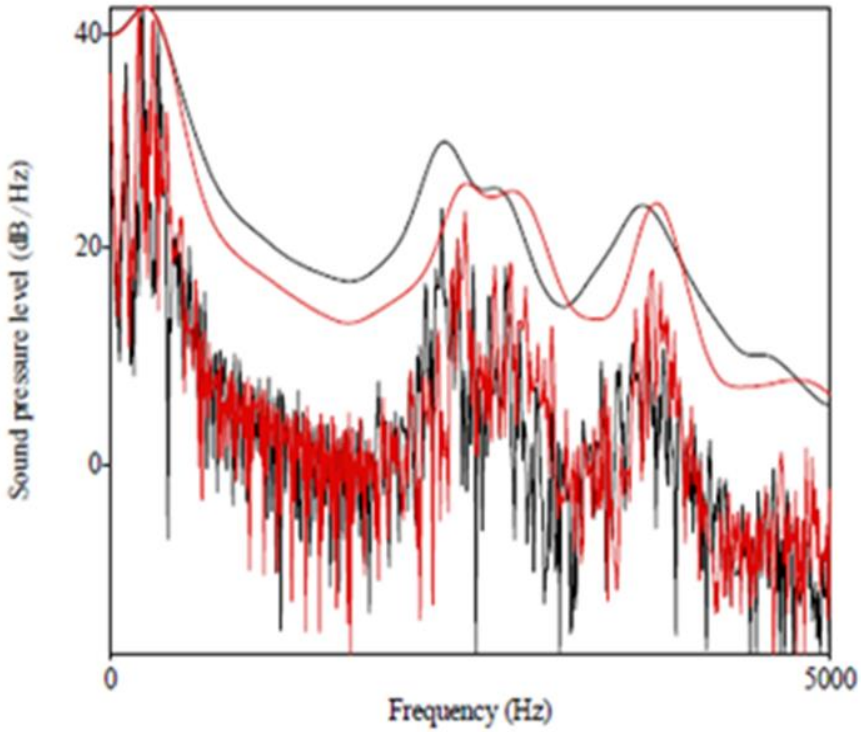
The |I| Vowels (KIT and FLEECE)

Female



Spectra for FLEECE (red) and KIT (black) by FHN

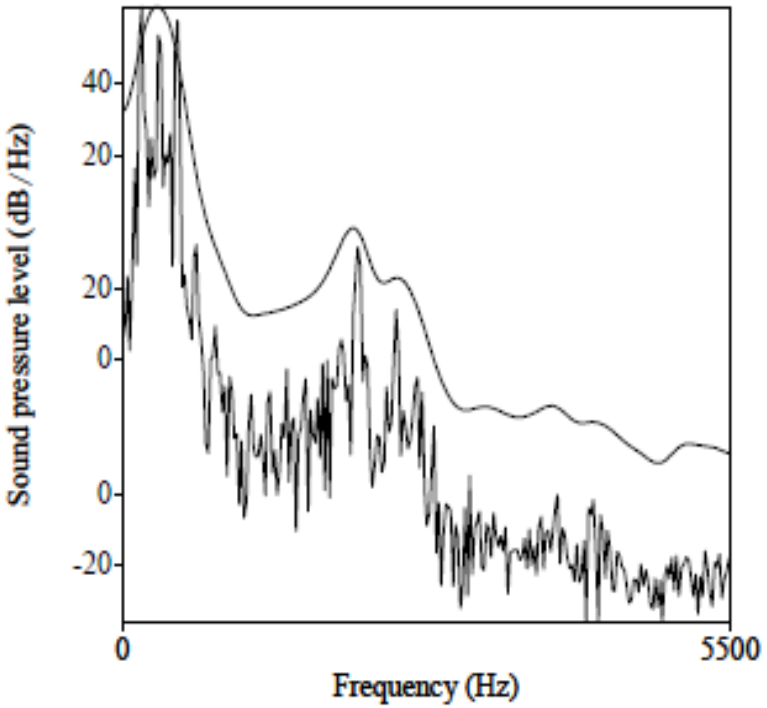
Male



Spectra for FLEECE (red) and KIT (black) by MCB

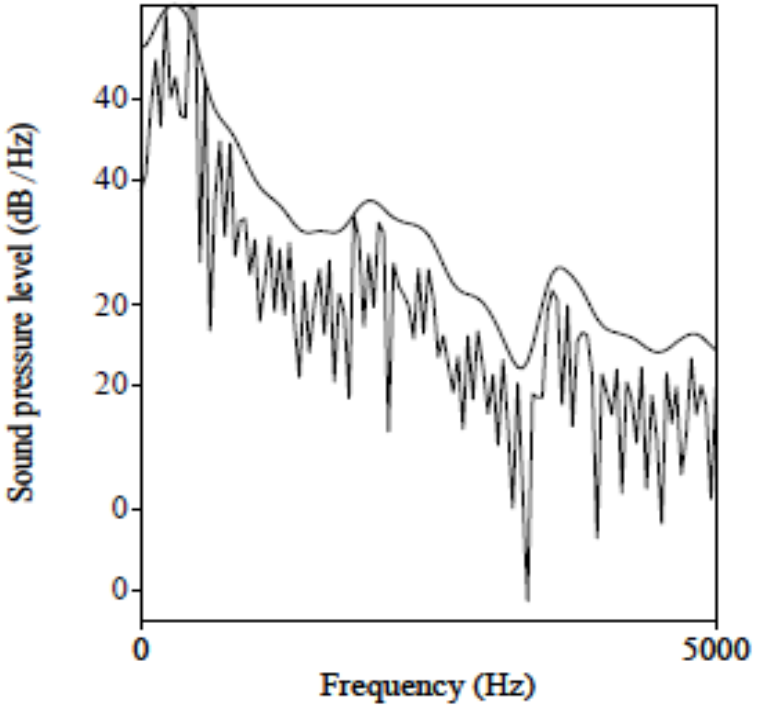
The |IA| DRESS VOWEL

Female



Spectra of DRESS by FHN

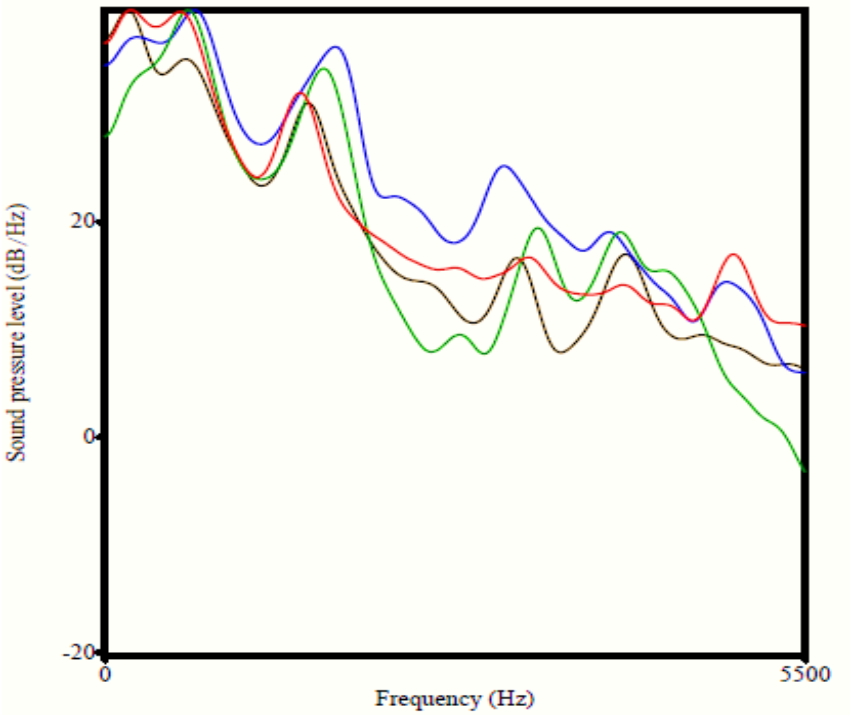
Male



Spectra of DRESS by MEB

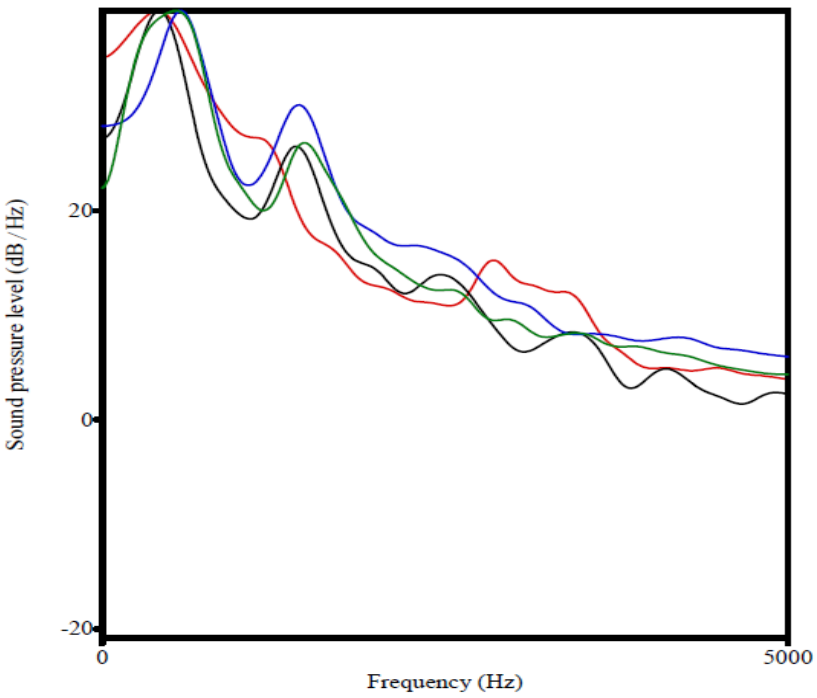
The |A| Vowels:NURSE, START, STRUT and TRAP

Female



Spectra for NURSE (blue), START (red), STRUT (green) and TRAP (black) by FCB

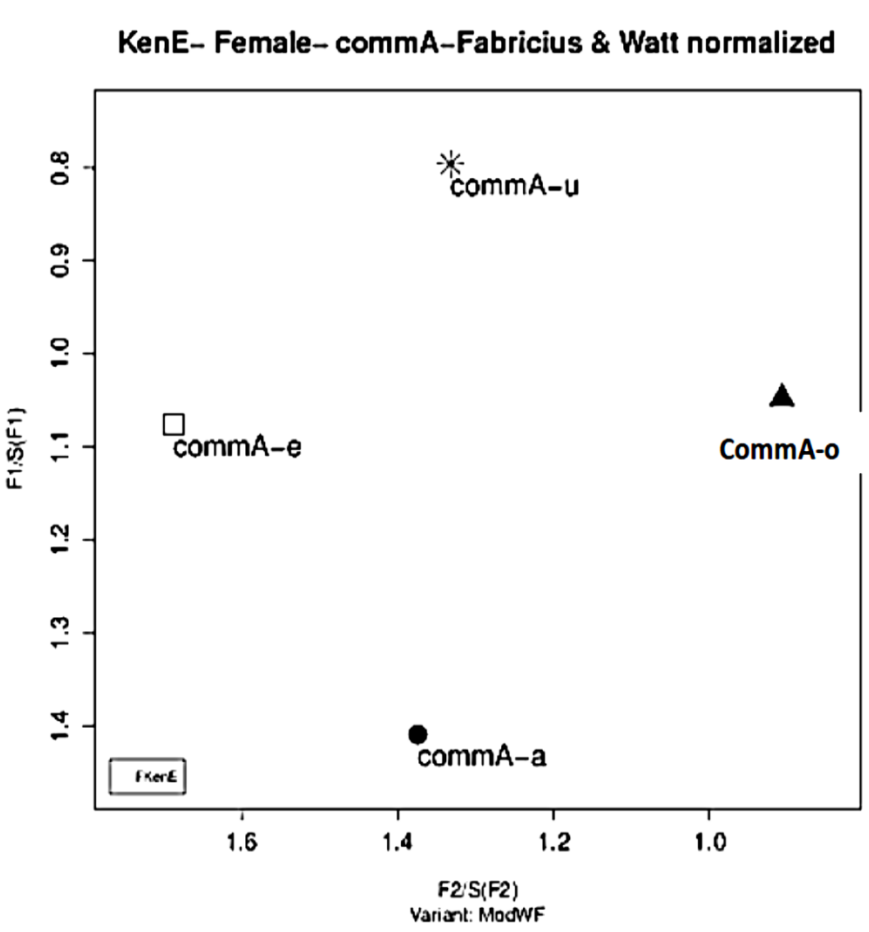
Male



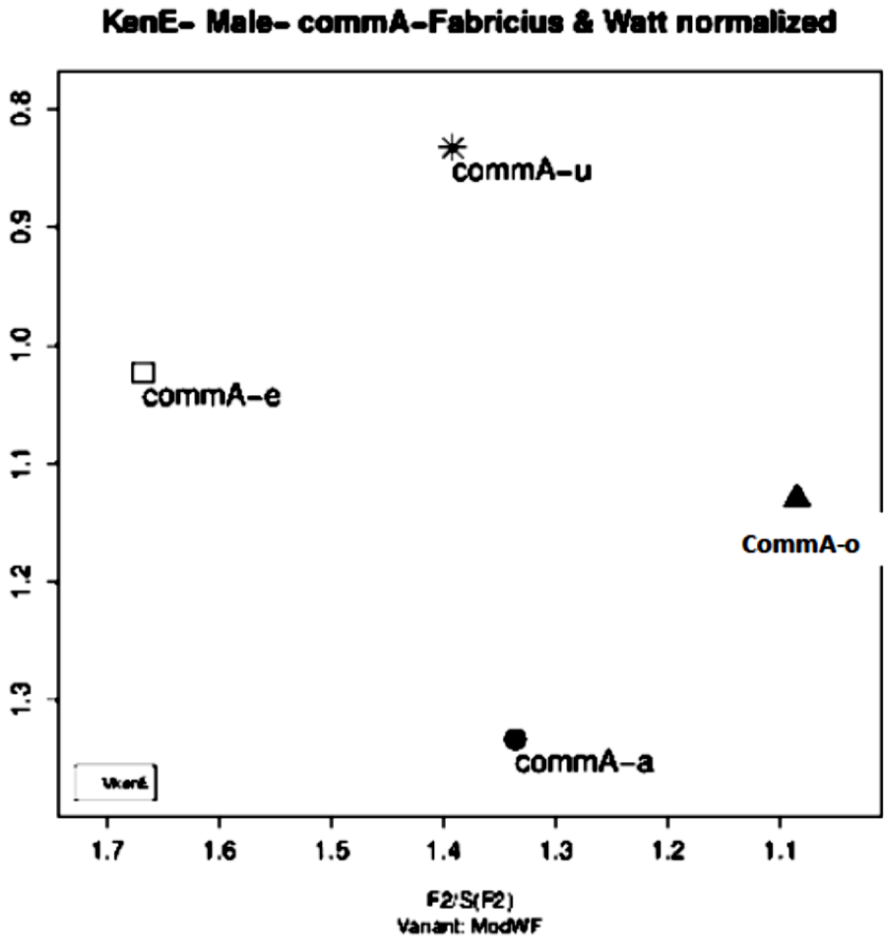
Spectra for NURSE (blue), START (red), STRUT (green) and TRAP (black) by MHN

Spaces for the|A| commA Vowel

Female

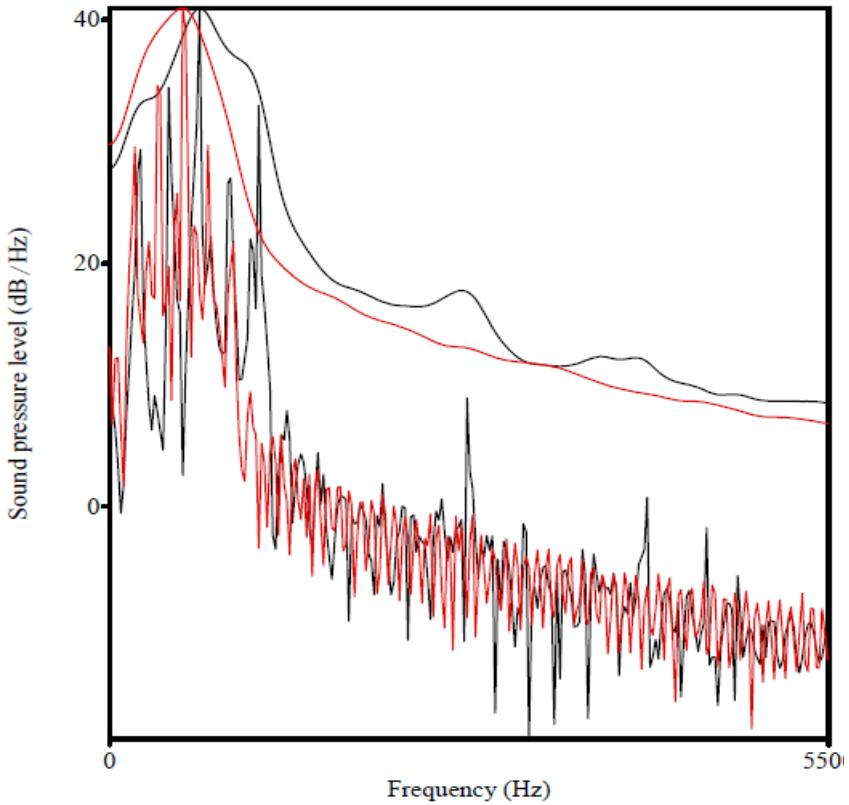


Male



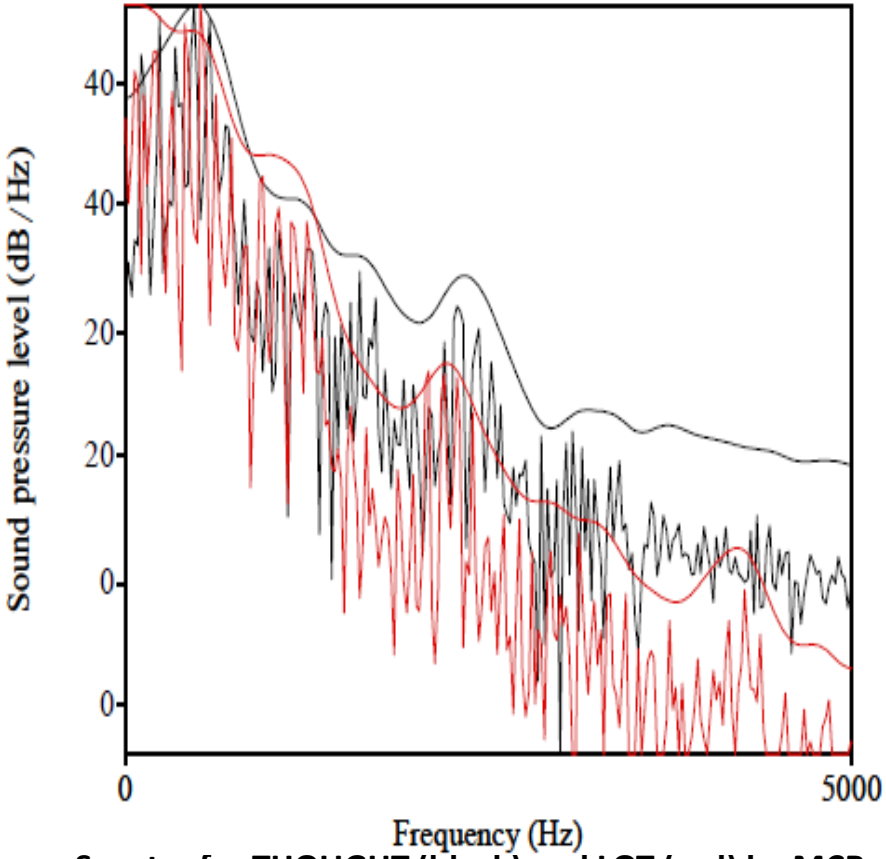
The |AU| THOUGHT and LOT Vowels

Female



Spectra for THOUGHT (black) and LOT (red) by FC

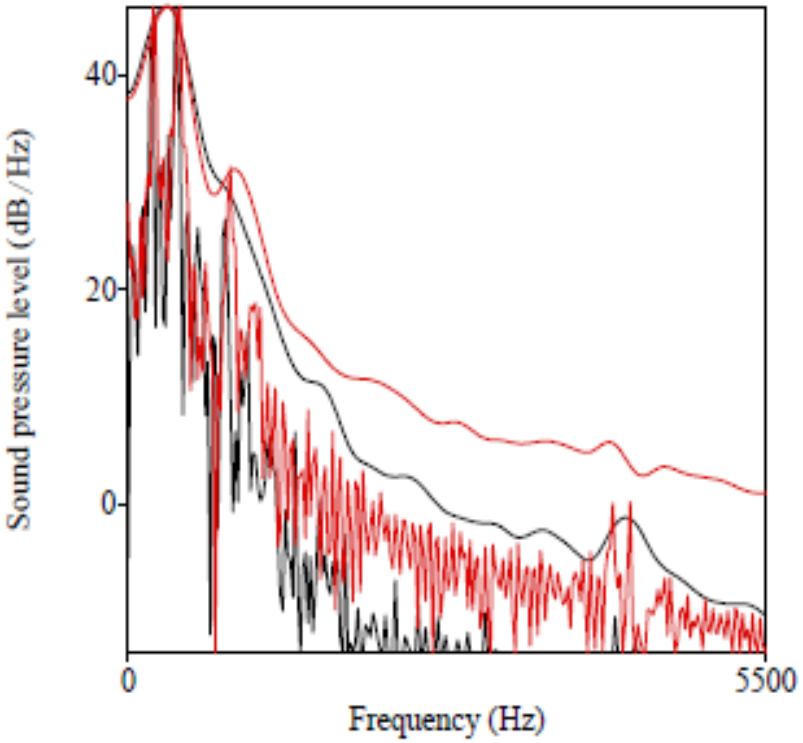
Male



Spectra for THOUGHT (black) and LOT (red) by MCB

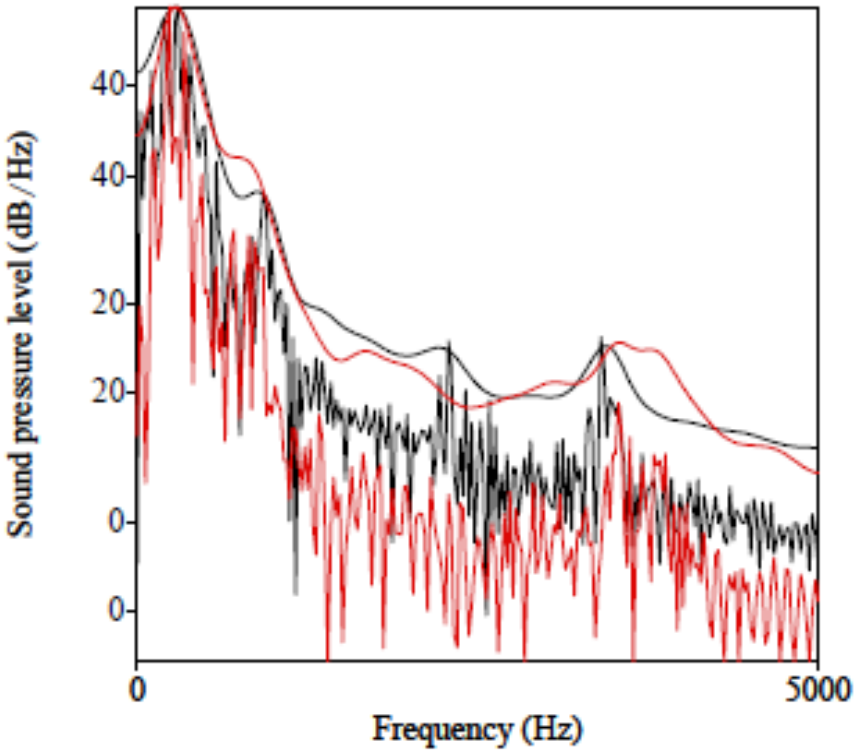
The |U| FOOT and GOOSE Vowels

Female



Spectra for FOOT (black) and GOOSE (red) by FEB

Male



Spectra for FOOT (black) and GOOSE (red) by MLN

SUMMARY

KenE has eight monophthongs (RP has 12)

1. KIT [ɪ] |I| and FLEECE [i:] |I| merge to [i] |I| (**six/seeks**)
2. DRESS [e] |IA| same realization [e] |IA| (get)
3. TRAP [æ] |A| and START[a:] |A| merge to [a] |A| (**had/hard**)
4. STRUT [ʌ] |A| and NURSE [ɜ:] |A| realised as [a:]|A| (**cut/curt**)
5. CommA [ə] |A|, the schwa, is not in KenE . Token sounds were realized as [a] |A|, [e] |IA|, , [o] |UA| and [ʉ] |U| (lexically conditioned) **(a, the, for, to)**
6. LOT [ɒ] |UA| is realized as [o] |UA| THOUGHT [ɔ:] |UA| is long [o:] |UA|(**cod/cord)**
7. FOOT [ʊ] |U| is realized as [u] |U|.GOOSE [u:] |U| is realized as [u:] |U| **(good/goose)**

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