VOWEL SYSTEMS OF KENYAN LANGUAGES

Francis Eshun
University of Nairobi

Abstract

This paper is an attempt at a phonological classification of all Kenyan languages, based on their vowel systems. It attempts to demonstrate that, by concentrating only on vowels, it is possible to show similarities as well as differences in the phonological structure of the different indigenous languages spoken in Kenya. This analysis will therefore serve as a basis for the description of the vowel system of any indigenous language spoken in Kenya. Traditionally, language classification has focused on different typologies to establish relationships between languages. The analysis in this paper is a departure from the traditional classification model of e.g. Welmers (1973: 1-19) where languages are classified according to language family groups: it demonstrates that by focusing only on the vowel system, it is possible to derive phonologically-based classificatory criteria for describing every indigenous Kenyan language.

The framework used in this analysis is based partly on that of Generative Phonology proposed by Chomsky and Halle (1968) and partly on that of Hooper (1976). By combining the two approaches, the advantage gained is twofold: descriptive adequacy is achieved while there is, as far as possible, a one-to-one correspondence of surface forms to underlying ones.

1. Introduction

In this paper, I have used the term "Kenyan Languages" loosely to refer only to the indigenous languages spoken in Kenya. This definition will therefore exclude such languages as English, Hindi or any other non-indigenous language of Kenya.

Based on their vowel systems, all indigenous Kenyan languages can be classified into three distinct categories: those with a five (5) vowel system, those with a seven (7) vowel system and those with a nine (9) vowel system. This categorization is patterned on Welmers (1973: 20-21). Table 1 below is a representative survey of the classification of

Kenyan languages based on their vowel systems. The languages in the table below are only a sample of all the languages in Kenya, but a sample representative enough. I would claim that any Kenyan language not included in the sample can be slotted into one of the four slots[1]. According to the SIL International (2000-2005), the number of languages spoken in Kenya is put between sixty-one languages. To quote Skandera (2003), although

> the number of indigenous languages spoken in Kenya today
> …varies from author to author … one could probably count
> as many as 70 depending on the categorization (p.17).

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[1] The data for this paper has been collected from projects and assignments done by MA students in the Department of Linguistics of the University of Nairobi. Therefore I have not been able to collect data from such languages as Maasai or any Cushitic languages because I have not had any students from those language groups yet.

**Table 1: Survey of vowel systems of Kenyan languages**

	Language	5-vowel system-1 i, u, e, o, a	5-vowel system-2 i, u, ɛ, ɔ, a	7-vowel system i, u, e, ɛ, o, ɔ, a	9-vowel system i, ɪ, u, ʊ, e, ɛ, o, ɔ, a
1	Dholuo				X
2	Ekegusii			X	
3	Igikuria			X	
4	Kalenjin				X
5	Kiembu			X	
6	Kigiriyama			X	
7	Kikamba			X	
8	Kikuyu			X	
9	Kimbeere			X	
10	Kimeru			X	
11	Kisa		X		
12	Kiswahili		X		
13	Logooli			X	
14	Lubukusu	X			
15	Lunyore			X	
16	Luwanga	X			
17	Lwitakho	X			
18	Nandi				X
19	Olusamia	X			

Source: Projects and term papers of Linguistics students at the University of Nairobi, Kenya,
who are native speakers of the various languages.
The data was collected between the years 2000 and 2007

It can be noticed from the table that three vowels are common to all Kenyan languages. They are /i, u, a/, which are often referred to as the 'diametrically opposed' vowels because they combine the qualities of being the highest most front, the highest most back and the lowest possible vowels. They form a triangle of vowels as shown below in Figure 1**.**

Figure 1:   The three vowels shared by all Kenyan languages
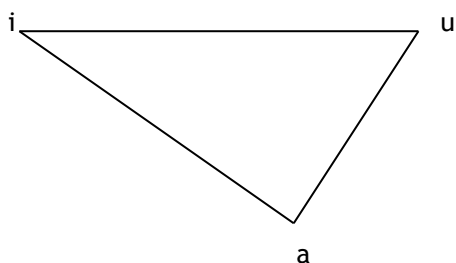
The data from Table 1 above suggests that the majority of the indigenous languages spoken in Kenya belong to the seven vowel system. As can be seen from the table, ten of the nineteen language in the sample belong to this category. Of the five vowel system languages represented, those with the mid vowels /e ,o/ dominate the ones with the other subset of mid vowels / , ɔ/. On the whole, there are fewer languages belonging to the nine vowel system than there are belonging to either the five-vowel system or the seven-vowel one.

2. Characteristics of five (5) vowel system languages

We have seen above that the vowels /i u, a/ are common to all the languages in Kenya. The five-vowel languages in Kenya therefore combine the above three vowels with another pair of vowel. The choice of the other pair of vowels is based on what Welmers (1973) has termed "vowel symmetry". Loos et al. (2003) define symmetry as

"the even distribution of phonemes throughout the articulatory possibilities of a given language". The principle of vowel symmetry implies that 5-vowel languages in Kenya can choose from only one of two pairs of mid-vowels. The available pairs are:

either   the mid-high vowels /e, o/

or   the mid-low vowels /ɛ, ɔ/

Any five-vowel language in Kenya can choose from either subset but cannot mix and match the elements in both subsets. Languages consistently choose from either a set of only mid-high vowels or only mid-low vowels. The choice of only one of the two available subsets implies that any language that has /e/ must also have /o/, and a language that has /ɛ/ must also have /ɔ/ but, none can have either the pair */e, ɔ/ or the pair */ɛ, o/ in their phonemic inventory of vowels. This would violate the principle of vowel symmetry illustrated above.

   We can therefore state with certainty that any five-vowel language in Kenya will have one of the following sets in its phonemic inventory for vowels:

Set (i)   /**i, u, a, e, o**/ or

Set (ii) /**i, u, a, ɛ, ɔ**/

From the sample in Table 1, languages that belong to set (i) are Lubukusu, Luwanga, Lwitakho and Samia, while those that belong to set (ii) are Kisa and Kiswahili. However, both sets can be described with the same set of features because the set of mid-vowels /e o/ and /ɛ, ɔ/ do not contrast in any given language.

2.1. Two examples of five-vowel languages

Let me focus, for the purpose of further illustration, on two languages that represent the two types of the five-vowel system languages in Kenya. Luwanga represents the set of mid-high vowels, while Maragoli represents the set of mid-low vowels.

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Table 2: Data from a language with the mid-high vowels
         Sample Language: Luwanga

	Orthography	**Transcription**	**Gloss**
/i/	*sinya*	/siɲa/	'to bore'
	fimba	/fimba/	'to cover'
/e/	*era*	/era/	'enough'
	shera	/ʃera/	'milk'
/o/	*bola*	/βola/	'to rot'
	khola	/xola/	' to do'
/u/	*luma*	/luma/	'to bite'
	kula	/kula/	'to buy'
/a/	*mala*	/mala/	'to finish'
	wina	/wina/	'who'

Table 3: Data from a language with the mid-low vowels
         Sample Language: Maragoli

	Orthography	**Transcription**	**Gloss**
/i/	*mina*	/mina/	'teeth'
	niha	/niha/	'smart'
/ɛ/	*mɛngu*	/mɛŋu/	'bananas'
	yengo	/jɛŋɔ/	'home'
/ɔ/	*noga*	/nɔga/	'to pluck'
	mufugo	/mufugɔ/	'bag'
/u/	*mulu*	/mulu/	'five'
	fuya	/fuja/	'to wash'
/a/	*funya*	/fuɲa/	'to smell'
	sinza	/sinza/	'to slaughter'

The two languages above have exactly five vowels each. The only difference between them is the subset of mid-vowels chosen from either /e, o/ or / , /

2.2. Set of features required to describe the five vowel system

The theory of natural generative phonology, which forms the basis of this paper, dictates that all the vowels in a language should be presented in a distinctive features matrix using the binary notation. This means that each slot in the grid should be marked with either a plus (+) or a minus (-). The theory also dictates that the features High, Back, and Low should be used primarily as a starting point to distinguish all the vowels in any given language. If, after using these three features, any two segments share the same features, there will then be a need to introduce further features to ensure that each segment is uniquely distinguished in the matrix. If, however, the three features are adequate to describe all the vowels of a language, there will be no need to apply other features since the aim of a distinctive features matrix is to ensure that each segment is represented by a unique set of features.

If we take Kiswahili as another example, we can represent the vowels as shown in Table 4.

Table 4: Distinctive features matrix for Kiswahili

	i	ɛ	ɔ	u	a
High	+	-	-	+	-
Back	-	-	+	+	-
Low	-	-	-	-	+

Table 4 above is a maximally specified distinctive features matrix for Kiswahili vowels. According the principle of economy, which is an integral component of the theory of generative phonology, only three features, namely *High*, *Back*, and *Low*, are required to describe all the vowels of Kiswahili. The three features constitute the set of features required to describe the five-vowel system.

But what are the implications of the principle of economy for a typical five-vowel system? According to Hyman (1975:99),

> Economy ... is a quantitative measure by which a given solution can be evaluated as requiring fewer or more mechanisms (phonemes, rules, conventions, etc.) than another solution. A solution using fewer rules is judged more economical than a solution requiring more rules.

Since the present features I have used can adequately distinguish each of the underlying vowels from the rest, adding another feature would be unnecessary and irrelevant since, as stated earlier, the aim of a features matrix is to ensure that each segment is represented by a unique set of features. Therefore, any other features (like *Tense vs. Lax*, or *Advanced Tongue Root*) will be deemed irrelevant to a five vowel language like Kiswahili because those extra features are simply not relevant to its phonological description. In short, a phonological description of Kiswahili vowels should be concerned with only the features required to distinguish each underlying phoneme. No feature therefore can be applied to the vowels if it is not included in the list of features required to describe the vowels.

3. Seven (7) vowel system languages

We have seen above that any five vowel Kenyan language must have the common three /a, i, u/ plus either the pair /e, o/ or the pair/ɛ, ɔ/. A typical seven-vowel language has the three common vowels /a, i, u/ but does not have to choose between the two extra sets /e, o/ or /ɛ, ɔ/. Instead, it combines both sets with the common vowels to produce the following seven vowel system: /a, i, u, e, o, ɛ, ɔ/.

3.1. An example of a seven-vowel language

Below are examples of all the vowels above from a seven-vowel language, Kikamba.

Table 5: Data from a seven-vowel language, Kikamba

	Orthography	Transcription	Gloss
/i/	*isio*	/isʲio/	'boiled maize'
	kimba	/kimba/	'corpse'
/e/	*ĩa*	/ea/	'ice'
	ngitĩ	/ŋgite/	'dog'
/o/	*ũkĩ*	/oke/	'honey'
	lũma	/loma/	'ant bear'
/ɛ/	*eītũ*	/ɛeto/	'girls'
	methoi	/mɛðɔi/	'tears'
/ɔ/	*oyu*	/ɔju/	'now'
	nondo	/nɔndɔ/	'breasts'
/u/	*ua*	/ua/	'to cook'
	kua	/kua/	'to carry'
/a/	*atha*	/aða/	'to shoot'
	wathi	/waði/	'song'

3.2. Features required to describe a seven vowel system

Starting with the three basic features (High, Back, and Low), we can present all the vowels of a typical seven vowel system in a distinctive features matrix. If, after presenting them, it is determined that the features are not adequate to distinguish each underlying segment in the matrix, other features will be added as appropriate to ensure that each segment is uniquely distinguished. The following table is a features matrix for all seven-vowel languages.

Table 6: Distinctive features matrix for a seven-vowel language

	i	e	ɛ	o	ɔ	u	a
High	+	-	-	-	-	+	-
Back	-	-	-	+	+	+	-
Low	-	-	-	-	-	-	+

In the above matrix, it can be observed that after using the features High, Back and Low, the mid-vowels /e, o, ɛ, ɔ/ cannot be distinguished from each other. Two sets of vowels share the same features: the sets /e, ɛ/ and /o ɔ/ share the features /Back and Low/. Since these two sets are the only ones sharing similar features, it would be practicable to look for a feature that would apply only to those two instead of imposing extra features on the whole matrix. Such a feature would apply strictly to the two and therefore would be redundant for the other segments in the matrix. We can borrow the feature *Tense*, which is used in English to distinguish between Tense and Lax vowels. The feature *Tense* will be applied only to the mid-vowels as shown in Table 7.

Table 7: Revised distinctive features matrix for a seven-vowel language

	i	e	ɛ	o	ɔ	u	a
High	+	-	-	-	-	+	-
Back	-	-	-	+	+	+	-
Low	-	-	-	-	-	-	+
Tense		+	-	+	-		

Applying the feature *Tense* to only the mid vowels now makes our distinctive features matrix for a typical seven vowel language complete. Thus, no features other than those used in the matrix should be applied to the seven vowel systems. Therefore applying Tense to the high and low vowels would be redundant since these are already adequately distinguished in the matrix.

4. Nine (9) vowel system languages

We have seen that the features *High, Back* and *Low* are adequate for the five-vowel systems, and that the three plus an additional feature *Tense* are adequate to describe a seven-vowel system. Let us now

examine the list of vowels that make up a nine-vowel system language.

4.1. An example of a nine-vowel language

Table 8: Data from a nine-vowel language, Dholuo

	Orthography	Transcription	Gloss
/i/	iro	/iro/	'to smoke'
	pien	/pʲien/	'skin'
/ɪ/	inyo	/ɪɲɔ/	'to hurt'
	pino	/pɪnɔ/	'wasp'
/e/	weche	/wetʃe/	'words'
	nengo	/neŋgo/	'price'
/ɛ/	ber	/bɛr/	'good'
	oboke	/ɔbɔkɛ/	'leaf'
/o/	tong	/toŋ/	'border'
	duto	/duto/	'all'
/ɔ/	ot	/ɔt/	'house'
	tong	/tɔɔŋ/	'egg'
/u/	uno	/uno/	'rope'
	udi	/uudi/	'houses'
/ʊ/	uso	/ʊsɔ/	'selling'
	hum	/hʊm/	'sign'
/a/	pala	/pala/	'knife'
	aluru	/aluru/	'quail'

The previous discussion of five-vowel and seven-vowel systems involved two high vowels /i, u/, one low vowel /a/, and two or four mid-vowels /e, ɛ, o, ɔ/. However, the data IN Table show that there are four high vowels /i, ɪ, u, ʊ/, four mid-vowels /e, ɛ, o, ɔ, /, and one low vowel /a/. That is, nine vowels in all.

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Nine-vowel systems are governed by a unique principle known as "vowel harmony". According to Vago (1980:i),

> vowel harmony is a principle that "governs the co-occurrence of vowels within a span of utterance, nearly always the word and...dictates that the vowels of a word must belong to the same harmonic set."

In vowel harmony languages, all the vowels are divided into two distinct subsets, known as harmonic sets, based on the feature Advanced Tongue Root (ATR). I chose to rely on this ATR notion because although phonologists agree on the fact that there are two subsets of vowels in a vowel harmony language, they disagree on how to describe the two types, which has resulted in varied terminologies that have been used to describe them.[2]

It was Christaller (1875) who first observed the distinctiveness of the two sets and attributed it to "vowel height". In 1964 Ladefoged published the first X-ray tracings of an Igbo speaker, and the difference was shown to be based on the position of the root of the tongue rather than its height. From this finding, Pike (1967) and Stewart (1967) proposed the term *Advanced Tongue Root* and applied this feature to the distinction found in vowel harmony languages. This was later supported by Halle and Stevens (1969). I therefore prefer to classify the two harmonic sets according to the presence or absence of the feature *Advanced Tongue Root*.

This means that the vowels for any word in a nine-vowel language will be drawn from only one of two subsets. In other words, all the vowels in a word will belong to either subset (i) only, or subset (ii) only. Vowels from the two sets do not co-occur in a given word. The two distinct sets of vowels are specified in Table 9 below.

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[2] Lindau (1979) traces the history of the many terms that have been applied over the years.

Table 9: The two distinct sets of vowels based on vowel harmony

Advanced Vowels	Unadvanced Vowels
i	ɪ
e	ɛ
o	ɔ
u	ʊ
a	

From the table above, it can be observed that all the advanced vowels have unadvanced counterparts. The only vowel that does not participate in vowel harmony is the low vowel /a/. If we look closely at the table, the division into advanced and unadvanced vowels actually closely resembles a five vowel system, which is divided into two parts. Therefore, by using this feature, our description of the nine vowel system actually resembles two five-vowel systems combined. We can therefore present the vowels of the nine vowel system in a distinctive features matrix as follows:

Table 10: Fully specified distinctive features matrix for a typical nine vowel system.

	i	ɪ	e	ɛ	o	ɔ	u	ʊ	a
High	+	+	-	-	+	-	+	+	-
Back	-	-	-	-	-	+	+	+	-
Low	-	-	-	-	-	-	-	-	+
ATR	+	-	+	-	+	-	+	-	

4.2   Features required to describe a nine-vowel language

From the above matrix, we see that four features (High, Back, Low, ATR) are required to describe a nine-vowel Kenyan language. If we applied only the features /High, Back and Low/, we would find that four sets of vowels share the same features. The four sets would be /i, ɪ/, /e, ɛɛ/, /o, ɔɔ/, /uʊ/. By adding the feature ATR, each of those four sets are now distinguishable from each other. It should be

observed that the ATR slot for the low vowel /a/ is unmarked: it has been left blank because the feature does not apply to that vowel.

5. Conclusion

This paper has looked at the pattern of distribution of vowels in Kenyan languages. It has dealt with the three different vowel systems (5-vowel, 7-vowel and 9-vowel) and identified the relevant distinctive features required for the description of each one of them. Although the analysis used as a sample a few Kenyan languages, it has established a standard by which the vowel system of any Kenyan language can be described. In other words, the vowel system of any Kenyan language will fall into one of the three categories established by the analysis.

We can summarize all the features we have used in describing the vowel systems of all Kenyan languages in the following table:

Table 11: Features required to describe vowel systems of all Kenyan languages

FEATURES REQUIRED TO DESCRIBE FIVE VOWEL SYSTEMS	FEATURES REQUIRED TO DESCRIBE SEVEN VOWEL SYSTEMS	FEATURES REQUIRED TO DESCRIBE NINE VOWEL SYSTEMS
HIGH BACK LOW	HIGH BACK LOW TENSE	HIGH BACK LOW ATR

We can also present all the vowel systems in Kenya in a Venn diagram in the following figure:

Figure 2: Diagram showing the distribution of vowels for all Kenyan languages

VENN DIAGRAM SHOWING THE DISTRIBUTION OF VOWELS AMONG ALL THE KENYAN LANGU
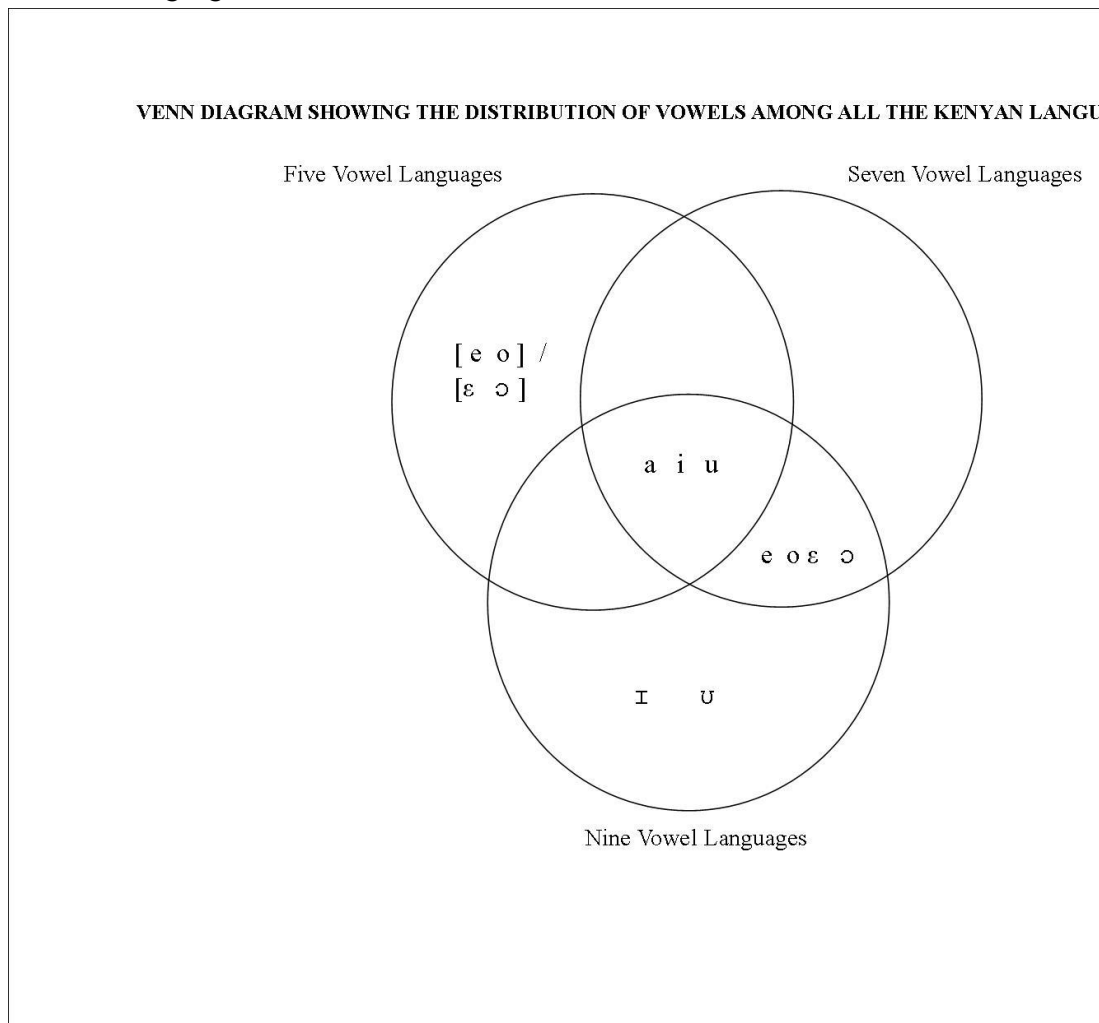
The paper has made some observations concerning the choice of features needed for the description of each vowel system. One of them is that every vowel system needs to be analyzed on its own merit so that features that are not relevant to a particular system are not used to apply to it. For example, the features "tense" and

"Advanced Tongue Root (ATR)" cannot be applied to a five-vowel system because they are not relevant to its description. Similarly, the feature ATR cannot be applied to the description of any seven-vowel in Kenya. For its part, the feature Tense that applies to the seven-vowel system can only be applied to the mid-vowels, not to the high and low ones. Since every system is unique in terms of features required for a description, it would for instance be absurd to talk of Advanced Tongue Root for a system other than the nine-vowel system.

The classification of Kenyan languages based on their vowels systems is a departure from the traditional classification of languages because this attempt is based solely on the phonological component.

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Author's address

Francis Eshun
Dept of Linguistics and Languages
University of Nairobi
P O Box 30197 – 00100
Nairobi, Kenya
E-mail: feshun@uonbi.ac.ke