# The Systematic Phonological Realization in Keiyo Language as Spoken by the Keiyo Community in Kenya

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**Abstract**

*This paper gives a brief phonological system of Keiyo Language. It not only discusses the vowel and consonant inventories and their realizations, but also the diphthongs, syllable structure and the phonotactic possibilities. It analyzes the phonological and prosodic processes that Keiyo nouns (both definite and indefinite) undergo when inflected for number. The author is a native speaker of the language and generated the data, and later subjected it to four adult native speakers drawn from Tambach Division of Keiyo District in Rift Valley Province. Like the other Kalenjin languages, the vowel system of Keiyo is based on the five basic vowel qualities a, e, i, o, u. Beyond this basic level, these vowels are also distinguishable within the phonological supra segmental level of tongue root position - the retracted (RTR) versus (ATR) and length. The Keiyo phonemic inventory has a total of ten diphthongs [ai,ei,oi,ui,au,eu,ou,ia,ua,ao]. The language has a limited inventory of its consonants and this could be attributed to the fact that, voicing is not actually a distinctive feature.*

**Keywords:** Systematic Phonological Realization, Keiyo Language, Keiyo Community, Kenya

## *Introduction*

Keiyo is one of the Southern Nilotic Languages. The others include Nandi, Kipsigis, Tugen, Marakwet, Sebei, Kony, Pokot, and Nyangori (Prah, 1998). The word 'Keiyo' in this paper refers to one of the sub-dialects of the Kalenjin language group spoken in Keiyo District of Rift Valley. It also refers to the District where the Keiyo speakers are located.

Mushra (1990) observes that there is increased research on African languages cast on diverse linguistic areas. The morpheme and has been one of the most studied areas in the southern Nilotic languages. But how phonology affects morphological use has been of great interest. This paper basically discusses how the phonological realizations are systematically patterned at the segmental and non-segmental levels

To address these phonological realizations, the paper bases its arguments on two different theoretical constructs briefly explained below:

**a)** Feature Geometry

The basic tenets of feature geometry are that unrelated observations can be related. Pulleyblank (2008) observes that 'physiological properties of the vocal tract and acoustic properties of the speech signal are the basis out of which feature geometry evolved' (p. 8).

Phonemes are considered as bundles of features each unique from the other and can never at anytime be identical to another - each contains at least a separating feature.

To distinguish a front and back vowel, there is [-back] [+back] parameter, and for height [-high] [+High]. Under the prosodic parameter, vowels can be evaluated as [-long] [+long]. Consonants have the following features:
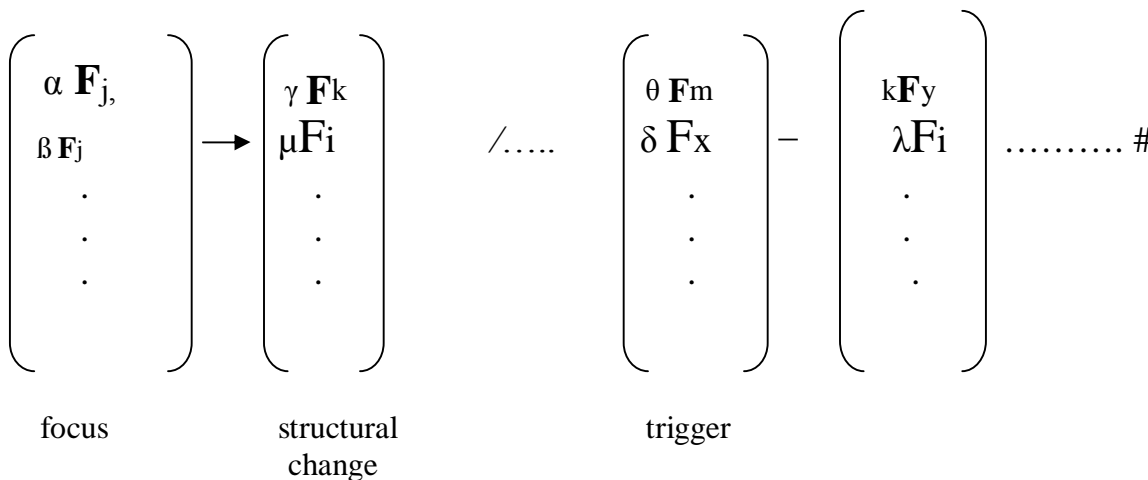
a) Manner of articulation:

[±voice]
[±nasal]
[±continuants]

b) Place of articulation:

[+bilabial]
[+alveolar]
[+velar] etc

Phonemic features at the end of singular nominal words and the features of the suffix, harmonize through the process of assimilation or deletion or lengthening.

Odden (2007) states that besides defining the phonemes, features play a role in formulating rules since in any case phonological rules are stated in terms of features as is illustrated below:

$$
\begin{pmatrix} \alpha \mathbf{F}_j, \\ \beta \mathbf{F}_j \\ \cdot \\ \cdot \\ \cdot \end{pmatrix} \rightarrow \begin{pmatrix} \gamma \mathbf{F}k \\ \mu Fi \\ \cdot \\ \cdot \\ \cdot \end{pmatrix} \quad /..... \begin{pmatrix} \theta \mathbf{F}m \\ \delta Fx \\ \cdot \\ \cdot \\ \cdot \end{pmatrix} - \begin{pmatrix} k\mathbf{F}y \\ \lambda Fi \\ \cdot \\ \cdot \\ \cdot \end{pmatrix} .......... \#
$$

    focus            structural              trigger
                      change

### Figure 1: Features of Phonological Rules

In the above $f_i$, $f_j$, $f_k$........ are features and **α, ß ,γ** --- are the plus [+] or minus [-] values.
The matrix to the left of the arrow is the segment that is changed by rule, and that segment is referred to as the **focus** or **target** of the rule. The matrix to the right of the arrow is the **structural change** and it describes the way in which the target segment is changed. The remainder of the rule constitutes the **trigger** stating the conditions outside the target segment, which are necessary for application of the rule.

An example to illustrate such a rule as the above in the language is shown below.

| Root | Singular definite | plural definite | gloss |
|---|---|---|---|
| [kakaru] | kakarwet [kàkarwét] | kakaroonik [kàkaró:ník] | 'tree' |
| [makataru] | makatarwet[makatarwet] | makataroonik[makataro:nik] | 'cactus' |

From the above, the actual pronunciation of the two words is attained through a modification processes. First, in both root words the simple addition of the singular definite suffix /et/ would lead to /uet/ but there is a glide formation of [w] to achieve /wet/. However, to pluralize these words, the simple addition of the plural suffix /ik/ would generate /rooik/*. This is not permissible in the language. It is countered through epenthesis by the nasal /n/. This leads to the phonological realization of /oonik/.

The two processes of glide formation and nasalization are useful in attainment of the actual pronunciations.

        i). [w] ⟶ [o]

The above process implies that [w] is modified to [o] whenever it comes in between [r] and [o]

        ii). [n] ⟶ insert / vv       v

This second process entails the sound [n] being epenthesised when three vowels follow one another and the initial vowel in the sequence is a long one. This is not a common feature in the language.

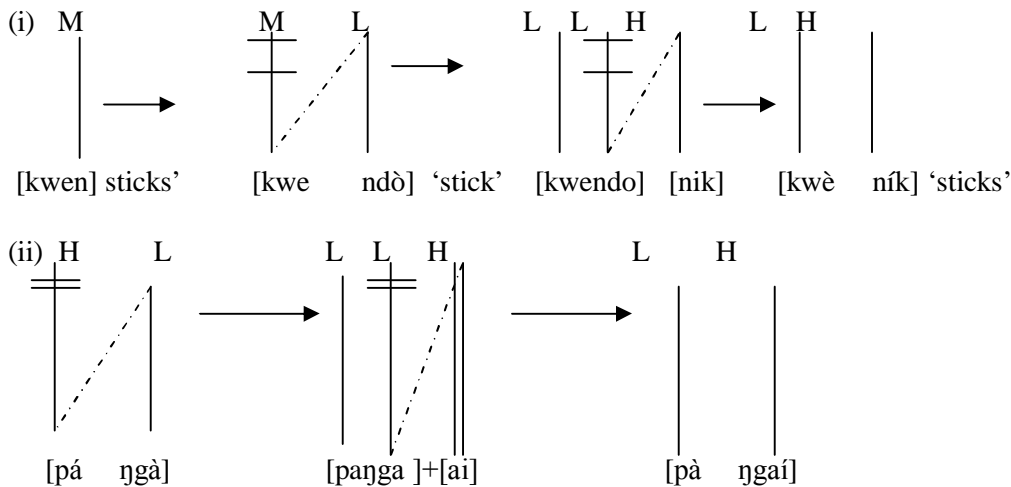**b)** Auto-segmental Phonology

Auto segmental phonology is also called the syllable theory and was developed in the context of the tonal phonology of African Languages" (Roca & Johnson, 1999, p. 399).

Individual vowels and consonants must not be seen to be immediate components of a syllable because there is an abstract tier/level which organizes them into syllables; this level has to do with timing relations and it supersedes any inherent features which individual segments are comprised of (Clements, 1986, p. 37). On the same, 'Segments occurring on the same tier are called auto-segments' (Clements & Keyser, 1983, p. 192).

The theory describes not only the Keiyo tone but also the syllable and how the two are interrelated. It stresses the autonomy of the tonal and the Segmental tiers. Clements (1986) and (Goldsmith, 1976) observe that tonal and segmental tiers are mutually autonomous: they are independent but relate to each other

Each segment is associated with at least one auto segment (feature) by an association line. In Keiyo, most of the noun roots end in either the mid tones (for the monosyllabic) or ML (mid low) tones for the polysyllabic. Once the noun roots are plural suffixed (either by the indefinite or definite suffixes) these tonal qualities change so that the first syllables of the suffixed nouns in most cases attain a low (L) tone and the suffix at the suffix position attaining the high (H) tone. This occurs because of the association influences occasioned by the High tones in the plural suffixes - the default being /ik/ which carries a high vowel.

Plural variants with the low vowel [o] that might have been thought to have a low tone attain high tones because in most cases they come in doubled (heavy) states so that [o] is likely to be of low tone but [oo] takes a high tone. This association is witnessed in the illustration below.

(i) M   →   M   L   →   L   L   H   →   L   H

[kwen] sticks'   [kwe   ndò] 'stick'   [kwendo] [nik]   [kwè   ník] 'sticks'

(ii) H   L   →   L   L   H   →   L   H

[pá   ŋgà]   [paŋga ]+[ai]   [pà   ŋgaí]

**Figure 2: Plural Variants**

In example (i) the low tone first associates to the first syllable then the high tone in the suffix associates to the last syllable of the noun resulting in a LH tone. In example (ii), the borrowed word (*panga*) loses its original tonal pattern of HL as used in Swahili and takes the Keiyo system of LH through association as wellThe association is left-ward (regressive). This tonal change is a kind of assimilation (Katamba, 1987).Vowels sounds
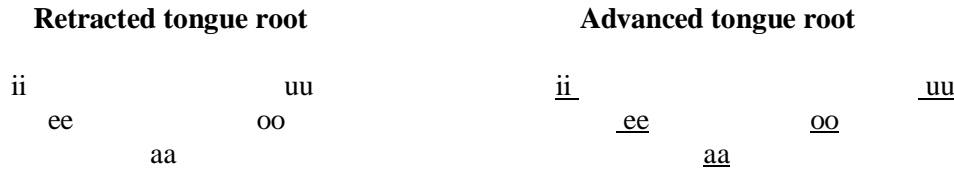
Below are diagrammatic representations of the different vowels in the language:

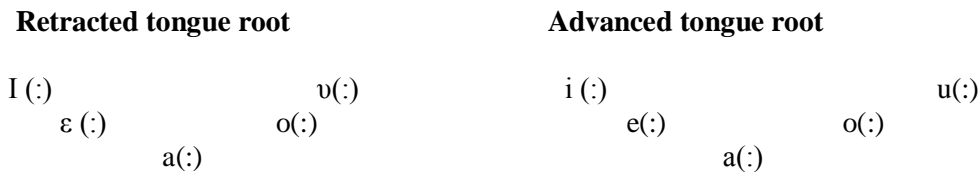| Retracted tongue root | | Advanced tongue root | |
|---|---|---|---|
| i | u | i̱ | u̱ |
| e | o | e̱ | o̱ |
| a | | a̱ | |

**Figure 3: Short vowels**

|          **Retracted tongue root**          |          **Advanced tongue root**          |
| --- | --- |

ii                    uu              <u>ii</u>                          <u>uu</u>

  ee         oo                    <u>ee</u>         <u>oo</u>

      aa                            <u>aa</u>

**Figure 4: Long vowels**

 **Retracted tongue root**          **Advanced tongue root**

I (:)                    ʋ(:)              i (:)                    u(:)

  ɛ (:)         o(:)                    e(:)         o(:)

     a(:)                            a(:)

**Figure 5: Corresponding IPA notations**

Vowel Realisations

The various vowels described are realised in the following different environments:

**a) Short vowels**

|  |  | **-ATR** | **+ ATR** |
| --- | --- | --- | --- |
| /i/ | as in | sis [sís] 'silence' | ip [íp] 'take' |
| /e/ |  | lel [lel] 'white' | leg[e]p [le<u>g</u>ép] 'salt' |
| /a/ |  | pal [pàl]'dig' | kapap [k<u>a</u>p<u>a</u>p] 'wing' |
| /o/ |  | chor [tʃòr] 'steal' | komda [k<u>o</u>mdà] 'bag' |
| /u/ |  | luch [lúch] 'punch' | kumnya [k<u>u</u>mnyà] honey' |

**b) Long vowels**

|  | **[-ATR]** | **[+ATR]** |
| --- | --- | --- |
| /i / as in | paniik[pàní:k] 'the witchdoctors' | mugiik[mùg<u>i</u>:k] 'the fleas' |
| /e / as in | panyeek[pàŋé:k] 'the pieces | kimeengwa[kìm<u>é</u>:ŋwà] 'the of meat' firefly' |
| /a/ as in | pukaa[puká:] 'the foam' | tyangik[tjà<u>ní</u>:k] 'the animals |
| /o/ as in | moor [mó:r] 'remains | mogoong[mòg<u>ó</u>:ŋ] 'the arthritis' of food' |
| /u/ as in | puun[pú:n] 'enemies' | muguung[m<u>ug</u>ú:ŋ] 'the hoof' |

Vowel Length

Length is a functional feature in the language. Long vowels in real sense consist of two units treated as short vowels which constitute one unit-the Mora. Therefore, two short vowels come together to form a long vowel as exemplified below.

    kol-[i]-[i]-k [kòlí:k]    'the planters'
    em-[i]-[i]-tik [èmí:tík]   'the olive trees'

The vowel /i/ in the language is lengthened and shown by a double indication. This creates heavy syllables, which according to Goldsmith (1995), depicts a branching.

For compensatory lengthening, when a consonantal phoneme is dropped in a word, another vowel with the same phonetic characteristics is added to an existing one in the same word making it long. The result is that the long realised vowel is a combination of a former and an introduced one-two different entities. Examples are shown below.

    polda[polda] 'a cloud'        →   p[o][o]l-ik [pó:lík] 'the cloud'
    pelyo[peljo] 'an elephant'     →   pel[e][e]-k [pelé:k] 'the elephant'

Length in Keiyo is distinctive and is used to differentiate two words in meaning.
Examples:

    chut [tʃut] 'enter'        chuut [tʃú:t] 'pull'

      pal [pal] 'dig'            paal [pá:l] 'tear'

      pel [pe̱l] 'defeat'          peel [pé:l] 'burn'

Diphthongs

The Keiyo phonemic inventory has in total ten diphthongs [ai,ei,oi,ui,au,eu,ou,ia,ua,ao]. These can be further categorized into two (2) main groups: the opening and the closing diphthongs discussed as follows:

*Opening Diphthongs*

a) The diphthong [ia]

This is exemplified in the following words:

      pandia [pàndiá] 'Maize cob'

      piat [piat́] 'dung'

a)      The dipthong [ua]

Although this has been categorized as one of the diphthongs, it is not actually physically realized. It only occurs underlyingly but at the surface level is realized as [wa]. This is because [u] becomes [w] through the process of assimilation.

The examples below point out this development to the surface realization,

      lakua-[lakwa] 'child'

      parua [parwa] 'letter'

      chorua[tʃorwa] 'friend'

The diagram below illustrates the directions in which one vowel moves to the other resulting in the above opening diphthongs:
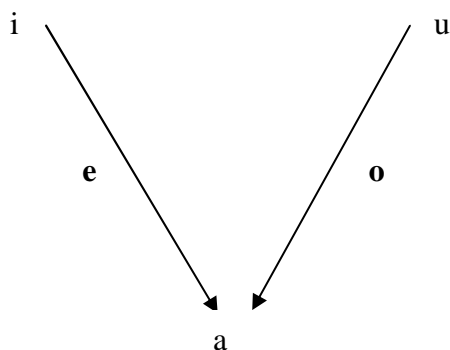


**Figure 6: Directions of Opening Diphthongs**

**The Closing Diphthongs**

Closing diphthongs in Keiyo are the most exploited. This is because the default plural suffix contains the vowel [i]. This is why there are four (4) diphthongs closing with this vowel. They are explained as follows:

a) The dipthong [ai]

This is manifested in words like

      pai [pai] 'grain'

      tai [tai] 'deny'

b) The dipthong [ei] This is realised in words like

      kei [kei] to milk

      kwei [kwei]'collect'

c) The diphthong [oi]

This is realized in words like,
        koi [koi] stone'
        moi [moi] 'calf'

d) The diphthong [ui]

This is observed in words like
        sui [sui] 'wild dogs'
        kui [kui]'prick'

e) The diphthong [ao]

This is found in the following words:

        mao [mao]'drought'
lamaon [làmaón] 'kind of hardwood'

f) The dipthong [eu]

This is found in words like
        eu[eu] 'arm'

g) The diphthong [au]

It is realized in the words as follows:

        au [au] 'when'
        tau[taú]'start'

h)  The diphthong [ou]

 This is found in the words
        ou [oú]'you move'
        kou [kou] 'They moved'

In summary, the diagram below demonstrates the directions of movement from one low vowel to another high vowel to realize these closing diphthongs.
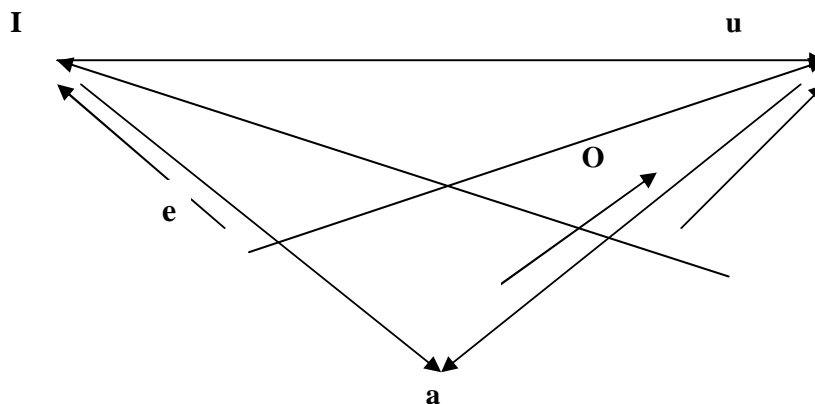


**Figure 7: Directions of closing diphthongs**

**Consonants**

Generally, Keiyo has quite a limited inventory of its consonants which is presented below.

**Table 1:  Keiyo Consonant Inventory**

|  | **Labial** | **alveolar** | **palatal** | **velar** |
|---|---|---|---|---|
| Plosive | **p (b)** | **t (d)** | **t∫ (dʒ)** | **k (g)** |
| Nasal | **m** | **n** | **n** | **ŋ** |
| Trill |  | **r** |  |  |
| Fricative |  | s | ∫ |  |
| Approximant |  |  | **j** | **w** |
| Lateral approximant |  | l |  |  |

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This limited inventory is partly due to the fact that in Keiyo voicing is not actually a distinctive feature. This is because phonemes like /p/ and /b/ or /t/ and /d/ can be used interchangeably in the same environments without a change in meaning.

 Consider the following words:

> kipet [kìpét] 'a boy's name'          katur [kàtúr] 'it appeared'
> kibet [kìbét] 'a boy's name'          kadur [kàdúr] 'it appeared'

It is observed that the change of voice in the same position does not change the meaning of the word.

However, the voiceless plosives are mostly exploited in the Keiyo. This implies that the voiced phonemes are those for which voicing is the unmarked option universally-the sonorants (vowels, nasals, liquids and approximants) but not the other obstruents (Zwarts, 2004).

*Consonant Realisations*

Although it has been stated that at the linguistic use the voiceless plosives are the most exploited, it is also noted that there are particular environments where some voiceless plosives become voiced. For example, the plosives /t /, /p / and /k/.

In the following examples these phonemes appear as voiced:

> pan-te          → pan[d]e          'maize'
> chum-pa          → chum[b]a          'europeans'
> kon-ta          → kon[d]a          'eye'
> nkok          → n[g]ok          'hen'
> n-chakan-chak          → n[tʃ]akan[tʃ]ak 'wild fruit'

There is a phonological rule that governs this kind of voicing stated as follows:

> Plosive (-voice) → + voice / nasal ─

The interpretation is that a voiceless plosive becomes voiced when it comes after a nasal.

Secondly, it is also observed that the plosives /p/ and /k/ become voiced whenever they come in between two vowels as argued by Local and Lodge (2004, p. 2) about the Marakwet.

Consider the nouns below.

>  tu-k-un                    tu-[g]-un 'things'
>  ne-k o                    ne-[g]-o 'goats'
>  che-p-et                    che-[b]-et 'girls name'
>  ki-p-ongi                    ki-[b]-ongi 'huge person'

In this data, some of the plosive consonantal sounds which ideally are supposed to be voiceless get voiced in certain environments. It appears then that in Keiyo one way in which voiceless plosive sounds becomes voiced is when they come after a nasal.

This argument is also in line with Odden (2007). In his study of Kimatumbi and Kipsigis Languages, he observed that [p, t] get voiced after nasals. From these observations, the following are the phonological rules governing the voicing:

> /P/
> a) /k/          →          + voice / _ v _
>    Voiceless /p, k / become voiced when they come in between vowels

> b) Voiceless          →          + voice / nasal _
>      A voiceless plosive becomes voiced if it immediately follows a nasal

> c) Nasal          →          α place / _     [c]          [α place]

A nasal changes in order to agree in place of articulation with the consonant that comes after it. For example in the word 'nkok'[ŋkok] hen. It is for these reasons, therefore, that the voiced phonemes in the inventory table were reflected in brackets although very scantily exploited in the language. However, where they appeared in the study they were treated as underlying phonetic cases and are indicated by the use of the square brackets [ ].

However, the use of both the voiced and the voiceless are acceptable and hence they are in free variation. The same meaning is brought out when either is used but the voiced is most exploited in the cited environments.

## *Phonotactic Possibilities*

### Vowel Sequences

It is possible to have a cluster made of two vowels in a word. These could be two different vowels or a common vowel in a lengthened form. This is possible because of diphthongization and lengthening of vowels that result from phonological processes. Certain nouns that are purely diphthongal in form, without any consonants attached form full lexemes. An example is presented below

eu (eu) 'arm'

The above portrays a VV cluster where there is no consonantal phoneme. It is however not possible to have a case where three vowels immediately follow one another in a word. This would mean a diphthong followed by a pure vowel. This clustering would result in ill-formed structures in the language.

For example, in these words

| Singular | Indefinite plural | definite plural |
|---|---|---|
| tapta [tàptà] | taptoi [tàptoí]' tussels' | taptook [tàptó:k] 'the tussels' |
| kata [kàtá] | katoi [kàtoí] 'thorns' | katook [kàtó:k] 'the thorns' |

There is a phonological modification /i/ to [o] by the effect of the preceding vowel [o]. This is to avoid the ill-formed structures of [taptoiok] and [katoiok] which are uncommon in the language. Ideally, the default plural suffix is /ik/ but as a result of the above operation this is conditioned into /ok/ by the presence of /o/ in the indefinite plural form.

### Table 2: Possible Consonant Clusters

| **Word initial** | **Medial** | **Final** |
|---|---|---|
| **nd** nderem [nderem] 'vegetables' | ko**nd**a [kòndá] 'the eye' | |
| **ng** ngano[ŋgano] 'wheat' | mai**ng**et[maiŋget] 'the bee hive' | |
| **nw** nwach[nwatʃ] 'short' | che**nw**ach[tʃenwatʃ] 'the short chair | |
| **kw** kwany[kwa ] 'cook' | chep**kw**ony[tʃepkwoŋ]'the name' | |
| **ry** ryach[rjatʃ] 'strike' | pa**ry**at[pàrját] 'the soda ash' | |
| **mb** mbar[ mbar]'land' | si**mb**ir[simbir] 'the goat disease' | |
| **mw** mwaita [mwaíta] 'fat' | ka**mw**a [kamwa] 'he said' | |
| | **pr** kiprop [kiprop] 'name' | |
| | **pt** kiptoo [kiptó: ]'name' | |
| | **sw** kalaswa[kalaswa] 'type o tree' | |
| | **rt** arta [arta] 'goat' | |
| | **md** namdaiywa [namdajwa] 'sucker' | |

From the above data, it is clear that Keiyo words almost wholly do not permit endings that contain clusters of consonants. Almost all of them either end in a pure vowel or a single consonantal phoneme.

A small number of words allow consonantal clusters on the first syllables of words. Majority of the Keiyo words have consonantal clusters appearing word medially. The reason for this big number at the medial position is that all the consonant clusters that are permissible on the first syllables of words are also allowed word medially. However, a good number like [md], [rt], [sw], [pr ] and [pt] are exclusively medial and cannot be found on initial syllables unless on borrowed words where either epenthesis or deletion occurs.

No word that ends in a consonantal cluster was found. Consonantal clusters are not permissible word finally. The above observations are important as they help in explaining the epenthetic cases of words borrowed from other languages which have clusters that are either not permissible in Keiyo, or clusters in positions that Keiyo doesn't allow. For example, the Swahili word *mkate* [*mkate*] 'bread' has the cluster [mk] at the initial position. Keiyo does not allow this positional usage and does not even exist in its phonotactics.

As such, an epenthetic [a] is inserted in between [m] and [k] to make it conform to the phonotactics of Keiyo.
*Vowel-Consonant Sequences*

The basic order of the vowel-consonant in Keiyo is CVC like in the words

> pukaa [puká:] 'foam'
> ruwon [ru̠wó̠n] 'sleep'
> oran [oran] 'routes'

However, it is also common to find other patterns derived from the above order as follows:

> VCCV
> CVV

The above patterns suggest that in the language:

- Some nouns can begin with a vowel, followed by a consonant (or consonants) and   end with a vowel

Other nouns can begin with consonants and simply end with a vowel.

From the two main clusters above, specific detailed sequences arise as shown below.

> VCCV

This occurs in words like

> arta [arta] 'goat'
> anga [aŋga] 'scarf'
> CVCCV

This is realized in words like

> kiplel [kiplel] 'a name'
> kipka [kipka] 'place'
> lakwa [lakwa] 'child'
> VCVCCV
> angurwa [aŋurwa] 'plant'
> aponwa[aponwa ]'plant'
> CVV
> koi [koi] 'stone'
> pai [pai] 'grain'
> sui [su̠i] 'wild dogs'
> CCVCVC
> nderem [nderem] 'vegetable'
> mbaret [mbàrét] 'land'
> CVVCVC
> poolik [pó̠:lík] 'clouds'
> keetin [kè:tín] 'trees'

The above patterns and descriptions of both vowels and consonants are important because they allow the researcher to not only point out the possible clustering in the language but also the phonetic properties that bring the sounds together. For example, in a word like arta[arta] 'goat' the sounds [r] and [t] are both alveolar.
The descriptions also help to show the positions in which certain consonants become voiced for instance when the voiceless [p, t, k] come in between two vowels.

## *Conclusion and Recommendations*

The paper has provided a brief phonological inventory of Keiyo, and how they become realized in various environments in the process of plural inflection.

Phonological realizations in this language are through an organized system. Plural morphemes are attached to nominal roots in a predictable fashion. Segmental phonemes and the non-segmental combine through interaction of features at morpheme boundaries to realize structures which are not only acceptable in the language but ease speech production.

The phonological inventory in Keiyo is small but phonological processing strategies allow an almost limitless interaction of various phonemes through assimilation of features

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