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## Consonant Substitution in Gichuka Loanwords

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*Abstract:*
*This paper is an analysis of lexical items that Gichuka(Class E.20: Ethnologue, 2009) has borrowed from English and Kiswahili using Government Phonology Theory. Borrowing is one of the major ways in which a language enlarges its vocabulary. Languages borrow out of need to refer to new items which the language through contact with other language as a result of trade and colonialism (in the case of African languages). The paper analyses consonant substitution. This is a process where a consonant in the donor language is replaced with another consonant in the receptor language. In Government Phonology Theory, the substitution occurs because of the licensing constraints present in Gichuka which determine the possible combinations in the language. The findings of this paper are that consonants that are not found in Gichuka are replaced with those found in Gichuka under Gichuka licensing constraints.*

*Keywords: Government phonology theory, consonant substitution, licensing constraints, loanword.*

## 1. Introduction

The theory of Government Phonology (GP), was founded by (Kaye, Lowenstamm and Vergnaud, 1985; 1990; Kaye, 1990b) and expounded on by Charette (1991). It originated in the early 1980s and is based on the notion that all languages necessarily follow a small set of universal principles along with a series of parameters delimiting the nature of linguistic variation from one system to another (Cyran, 1995). Elements present in PE's (originally phonemes) are monovalent and can be shared in the locality in which they occur by spreading. GP also proposes that each language has got licensing constraints that operate in the language allowing certain combinations and not allowing others.

Government Phonology (GP) is a theory that is also based on constraints. It replaces the rule component with a group of universal principles common to all linguistic systems in the world along with a series of parameters delimiting the nature of linguistic variation from one language system to another. It is a highly constrained theory in its view of phonological structure and different from optimality theory in its use of parameters and principles. In GP, the derivation of licensing constraints is language specific based on phonological processes in a language. It proposes a spreading analysis, which is superior to a re-write rule. It is also closer to phonological reality because the elements that make up a phonological expression can spread and in this way the theory explains phonological processes in way that is a natural and close to reality than any other theory (Cyran, 1995).

In Government Phonology Theory (GP) there are three recognized constituents: onset
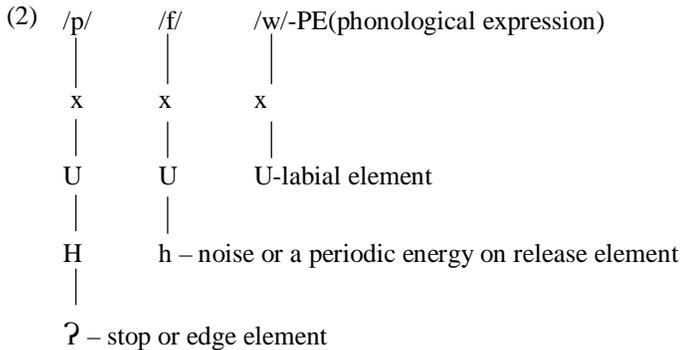(O) Nucleus (N) and Rhyme (R). The three constituents attach on tier called $P^0$ which dominates a tier of timing slots called a skeleton as shown in 1.

(1)

```
O  R      O  R    P^O(Constituent)
|  |      |  |       |
|  |      |  |       |
|  N      |  N       N
|  |      |  |
xxxx  Skeletal tier
```
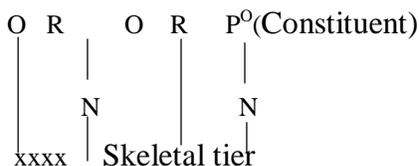
In (1) we see the three constituents in GP, (Onset, Nucleus, Rhyme) the constituent tier and the skeletal tier. The rhyme element will not be used in the Gichuka language because Gichuka has a non-branching structure. The representation will be in ON pairs.

The smallest interpretable units that combine to form sound segments or phonological expressions (PE's) in GP are elements. Up to nine elements (A I U R H L N h Ɂ) can be employed for the purpose of representing the sound segments of a language depending on the version of GP being used. This is why the theory is highly constraining. Certain characteristics are attributed to the elements and they are discussed in chapter four. Elements are monovalent and they combine to form sound segments traditionally known as phonemes. PE's can be made up of only one element, in which case they are simplex, for example, / a / is made up of element (A) or they can be made up of more than one element, in which case they are  complex, for example, / p / (Ɂ H U ) which is made up of three elements as illustrated in 2.

(2)    /p/        /f/          /w/-PE(phonological expression)
        |          |            |
        x          x            x
        |          |            |
        U          U         U-labial element
        |          |
        H             h – noise or a periodic energy on release element
        |

         Ɂ – stop or edge element

In (2) / p / represents a complex element, / f / is also complex while / w / is simplex element. A simple PE (segment) is made up of only one element. The (H) element indicates voicelessness. The combination of elements to form phonological expressions (PE's) is regulated by the notion of licensing constraints (LC's). LC's are a set of restrictions that define the combination of elements in both the vocalic and consonantal systems of a language. LC's capture all and only those sound segments relevant to a particular language. They place restrictions on the possible phonotactic combinations in a language. They are derived from the phonological processes present in a language such as vowel harmony for vocalic elements.

According to the Minimalist Hypothesis in GP, phonological processes apply whenever their conditions are met (Kaye, 1992b). The primary mechanism of phonological change in GP is that spreading of elements. The elements are monovalent and can spread from one segment to another. The notion of spreading means sharing of features and not the total loss of an element in a feature. In a complex PE, one element is head. The other elements that assume a non-head position are called operators/ dependents. Heads rarely spread. Dependents are the ones that spread most. When heads spread, they do so with their dependents.

## 2. Elements in Government Phonology Theory

The smallest interpretable units that combine to form sound segments or (PE's) are referred to as elements in GP. PE's are the cognitive and melodic units that can be manipulated and which attach to the skeleton. In GP, elements combine to create PE's. The elements have been undergoing modification and they differ according to the version of GP being used. A total of nine elements (A I U R H L N h Ɂ) can be employed for the purpose of representing the sound segments of a language (Kula, 2002).

The characteristics attributed to the elements given below are derived from Harris (1994) and Kula (2002).

A –'low' in vowels /present in uvulas and pharyngeals in consonants

I –'front, high' in vowels/ Palatality in consonants

U –'round, back' in vowels/ Labiality in consonants

R – coronality in consonants

H – stiff vocal words, aspiration, and voicelessness

L – slack vocal cords, voicing

N– nasality in both consonants and vowels

h – noise or aperiodic energy or release/ present in all released obstruents

Ɂ – stop or edge/present in all oral and nasal stops and laterals

Segments are made up of one single element as in the case of [I] or are created through 'fusion' of two or more elements to give a compound segment. For example, the phonological expression /t/, is made up of the phonological elements (Ɂ, H, R) while /m/ is made up of [N, U]. The three basic elements 'A' 'U' and 'I' correspond to the corner vowels [a], [u], and [i] respectively. 'A' and 'I' can be fused. The combination takes the form of asymmetric (unequal) relations in which one of the elements acts as the head and other as operator (non-head) in the compound that will be formed. 'If elements are combined with each other to form compound expressions one element is usually predominant; it is called the head of the expression,' (Brockhaus&Ingleby, 1997:4). There is a maximum of one head. The non-heads are referred to as operators. This means that the element assumes a non-head position in a phonological expression. Operators that occur together in the same expression are referred to as co-operators. An expression may contain zero or more operators (Kaye, 1996). In a simplex expression, the lone element can be the head (Harris, 1995).When 'A' is operator and 'I' is the head (A.I), the resultant vowel is [e]. On the other hand, when the relations are reversed (I.A), we get [æ]. The same applies to the

combination of 'A' and 'U' where we get an open [ɔ] (U.A) or a close [o] (A.U) depending on the combination. Elements which are heads in an expression are underlined.

Elements spread from one PE to another and this spreading (sharing of elements) is the main explanation for phonological processes in GP. The spreading analysis will be used in the explanation for consonant substitution and vowel substitution in the analysis of loanwords in chapter five and six. Since the elements combine in GP, the issue of how they combine and how some become heads and others become dependents in a PE needs further clarification.

## 3. Element Geometry

Geometry regulates the manner in which elements may combine. The complexity condition requires a governing head to be at least as complex as the governee it governs; the governing head should contain at least as many elements as the governee. For example, given the respective representations of  [ t ] and [ r ] in terms of elements are [ʔ H R ] and [R ] respectively, [t ] will always govern [ r ]  but [ r ] may not govern [t] because it is less complex (Cyran,1995). In this regard, the issue of how phonological process access more than one element at the same time arises. This makes it necessary to perceive of some geometric organisation of elements. The element geometry developed in Kula (2002) will be adopted in this study and is shown in Figure 1.
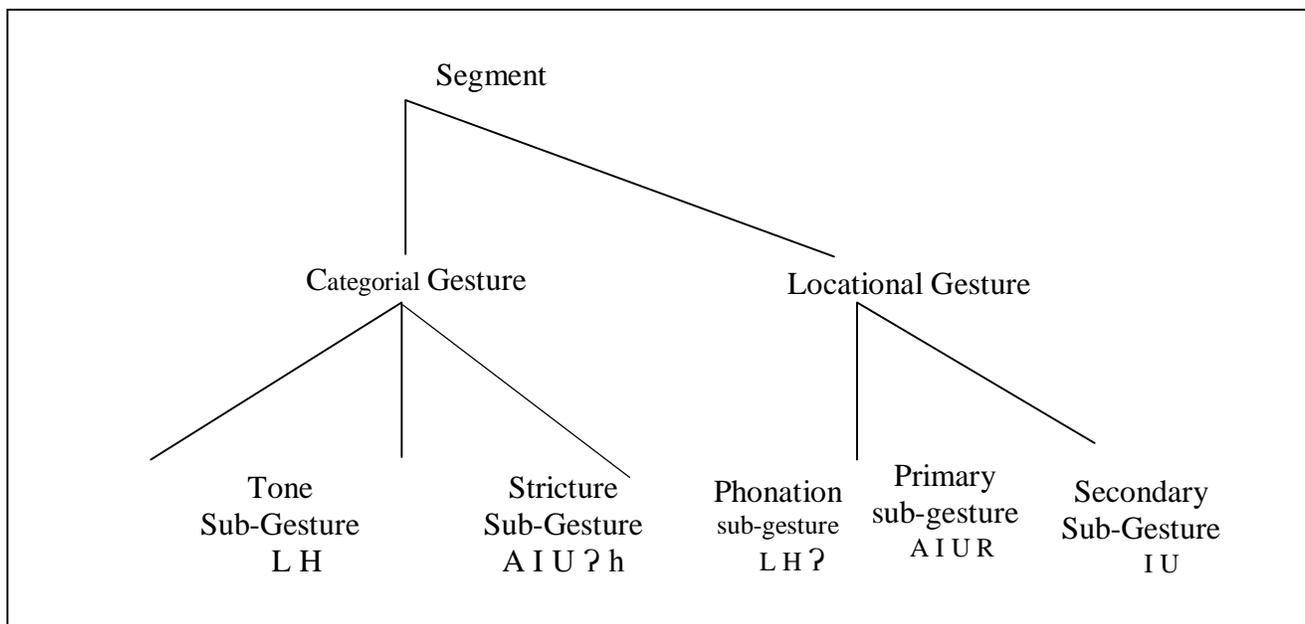


*Figure 1: Element Geometry. Adapted from 'The Phonology of Verbal Derivation inBemba' by N. Kula, 2002, p.3.*

In Figure 1, the diagram showing element geometry, the segment (PE) is divided into two gestures: the categorial gesture and the locational gesture. The categorial gesture is further divided into three sub-gestures: the tone sub-gesture, the stricture sub-gesture, and the phonation sub-gesture. On a par, the locational gesture is also divided into two sub-gestures: primary location and secondary location sub-gestures. These gestures and sub-gestures stand in a fixed head-dependent relation to each other. The categorial gesture is head of the locational gesture. Within the categorial gesture, stricture is the head of the other two sub-gestures and in the locational sub-gesture, primary location is head of secondary location (Kula, 2002).

The categorial gesture is chosen as the head of the whole segment because stricture distinctions generally determine the distribution of segments in syllabic organization. The stricture sub-gesture contains features that express different levels of stricture such as stricture, non-absolute stricture, unimpeded outflow of air and some interruption in unimpeded outflow of air. Within the categorial gesture, the representation of the tone sub-gesture as forming the outer shell of the categorial gestures characterises its supra-segmental nature. The phonation sub-gesture expresses glottal stricture, glottal opening, oral voice and nasal voice. The locational sub-gesture defines both consonantal and vocalic place articulations. The same place feature is found in the primary and in the secondary sub-gestures with the difference that secondary place only occurs with some primary place specification (Kula, 2002).

Given the representation in Figure 1, any elemental composition with a stricture element has that element as head and this defines the class of the segment as a stop (ʔ) or fricative (h) or vowel (A I U). If a stricture element is specified and the phonation element (L) is added, (L) is interpreted as voice. In contrast, if no stricture feature is specified and (L) is specified in phonation, it acts as head and has the interpretation of nasality, depending on whether it is head or dependent. This gets rid of a specific element for nasality (N). Voice, which cannot be the head of any segment, will be represented by an (L) element in the operator position. Verality is represented by lack of a place element.

## 4. Element Geometry in Gichuka, Kiswahili and English

Following the discussion on element geometry in GP in section 4.2.4, in the three languages, the place of articulation will be represented by the elements ( I) for palatals, (R) for coronals and (U) for labials in the primary location sub-gesture. (A) Will not play

a role because there are no laryngeals and pharyngeals in the languages. Verality will be represented by a lack of place element following the geometry. The stop versus non-stop will be captured by (ʔ) in stops and (h) in fricatives in the stricture sub-gesture. Voice will be represented by an (L) element in the operator position in non-nasals. Voicing will be treated as the unmarked case with no voice specification while voiceless segments will contain (H). When the element (L) assumes head position, it represents nasality in nasal segments and since voicing is by default a characteristic in nasal segments, nasality will imply voiceness. Nasality and voice is captured by an (L) element. (L) occupies the phonation sub-gesture in the geometry presented in Figure 5, which, when it is dependent on stricture, contributes voicing When it is head, with some dependent in the location sub-gesture, it contributes nasality. Prenasalized stops will be treated as stops. Glides will have the same representation as the vowels / I / and / U/ and will only be differentiated by their position in the constituent structure.

The consonantal system of Gichuka and Kiswahili and English is therefore derived from the interaction of seven elements [ʔ L R h I U H A). This element geometry will be used to come up with licensing constraints (LC's) in Gichuka and also to represent the consonant inventories in the three languages.

## 5. Gichuka Consonantal Inventory in Government Phonology

The derived consonants are in square brackets. Derived consonants are the variants and allophones in a language which occur in specified phonological environments. Only lexical consonants are used in the derivation of LC's. The NC's (in Gichuka and Kiswahili) are included. Simplex expressions are headed. Co-operators are elements that can occur together in a PE. Operators are elements that are not heads in a PE. The derived consonants and the LC's for English and Kiswahili have not been included. The explanation for this is that the loanword will be subjected to Gichuka LC's and the LC's for Kiswahili and English have no role to play in the analysis of data. In all the PE's, the leftmost element is head.

| | | | | |
|---|---|---|---|---|
| Stops | b (ʔ.H U) | t (ʔ H R) | d (ʔ R) | c (ʔ. H I) |
| | ɟ (ʔ I) | k (ʔ H) g (ʔ.) | | |
| Fricatives | β (h. U.) ð (h. I.) ɣ (h. H) | [ ʃ (h. H. I)] | s [(h H R.)] [ç (h. I) | |
| Affricates | [ʧ (ʔ.H. I.)] | [ʤ (h. I.] | | |
| Nasals | m (L .U) | n (L R) ɲ (L I) | ŋ (L.) nd (ʔ. L. R ) | mb (ʔ. L.U) ng (ʔ L) nj (ʔ L I ) |
| Voiceless Nasals | nð( h L H I) | nc (ʔ. L H I). | nt (ʔ.L H R) | nk (ʔ. L.H) |
| Liquid | r (R) | l [R] | | |
| Glides | w (U) | j (I) | | |

## 6. Gichuka Licensing Constraints

  i.   ʔ must be head
  ii.   h must be head
  iii.  L is head in the absence of ʔ and h
  iv.  ʔ can licence H.U.R I.L
  v.   h can licence  H I U L
  vi.  L ( as head ) can licence  U.R I.H
  vii.  H and U can be co-operators
 viii.  H and R can be co-operators
  ix.  L H and I can be co-operators
  x.   L H and R can be co-operators
  xi.  L and U can be co-operators
  xii.  I and R cannot be co-operators
 xiii.  No head may licence more than three operators

Constraints (i), (ii) and (iii) define the major categories of segments namely stops, fricatives and nasals. The constraints in (iv-vi) define the dependents that the major categories (heads) can licence. The constraints in (vii-x) capture the fact that each segment has one place of articulation and lack of a place is interpreted as Verality. Constraint (xii) restricts the size of any expression. It is difficult to tell whether the LC's are similar to any other language and there is need for further research in this area.

## 7. English Consonant Inventory in GP

Stops          p (?. H. U.)                    b (?. U) k (?.  H)      g (?.) t (?. H .R)                           d (?. U)

Fricatives     s (h. H. R.)     ∫(h. H. I.)    v (h. U)          f (h. .H. U)           z (h R)θ (h H R)      ð (h R)    h (h H)

Affricatives          ʧ (? H I)              ʤ (? I)

Nasals          m (L U)                    n (L R)                    ŋ(L)

Glides          w (U)                    j (I)

Liquids  l (R)                    r (R)

## 8. Kiswahili Consonant Inventory in GP

Kiswahili phonemes have been taken from Kiswahili Dictionary, (Said, 2013).

Stops          p (?. H U)    b (? U.)    k (? H)      g (?.)    t (?. H R)          d (? R)
                Ɉ (?. I.)
Fricatives     s (h. H R.)     ∫ (h. H. I)          v (h. U.)    f (h. H U)          z (h R) (h. H. R)      ð (h. R.)    h (h.. H)        x (h.)        ɚ (h. H)
Affricatives          ʧ (?. H I.)
Nasals          m (L. U)                    n (L. R)    ɲ (L.  I)    ŋ (L)    mb (?. L. U) nd (?. L. R)     mz (h. L. R)          nj (?. L.I)          ng (?.
L.)  mv (h. L. U)
nz (h. L. R)          mm (L. U)          m ð (h L R)    md (? L R) mg (?. L) mj (? L I.U)          ml (L R U.)        mr (L R U)
Voiceless nasals  mh  (L. H. U)    mf (h. H.L. U) mk (?. H.U )    mh ( L. H. U ) mp (?. H. U ) ms ( h. H L R. )    mt (?. H. L.R) nʧ (? L
H.I).
Glides          w (U)                    y (I)
Liquids  l (R.)                    r (R.)

## 9. English Loanwords

The process of consonant substitution will be explained using the licencing constraints (LC's) that were derived from the consonant inventories of Gichuka and English in section 5. A comparison between the inventories reveals that stops, fricatives and affricates are heads in the three languages.

When a language borrows a lexical item, the 'head' in the donor language is sometimes replaced with another head in the receptor language. This is referred to as element switching. The substitution is enabled by the similarity of operators that are in each head. For example, the PE / p / has the elements (?. H. U). The PE is not found in Gichuka consonant inventory. In borrowed lexical items, where this PE is found in a loanword, it is replaced with / β /. In Gichuka this PE has the elements (h.H U). In this case the headship is switched from a stop to a fricative. The new head is then subjected to the LC's in the receptor language to determine its dependents.

Dependents are the elements that can combine with the head; the elements that the head can license; also referred to as operators in GP terms. LC's are language specific combinations that place restrictions on what elements can be heads and what elements they can combine within a PE. The LC on the maximum number of elements that can occur in a PE applies in all cases and will therefore not be included in the analysis except in cased where it is applicable.

(3) Substitution of / l / for / r/

|  | Input | Output | Gloss |
|---|---|---|---|
| a. | /klinik/ | /kirineki/ | Clinic |
| b. | /lɔri/ | / ĩrori | Lorry |
| c. | /bil/ | /mbiro/ | Bill |

Input          Output



The substitution in (3) is the spreading (sharing) of element (R). In the inventory both PE's are represented with the coronal element (R) implying that they are the same in element composition thus one is substituted for another.

(4)The PE's /p, f, v, b / are substituted with the PE / β /

|  | Input | Output | Gloss |
|---|---|---|---|
| a. | /paip/ | /moβaiβo/ | Pipe |
| b. | /fʒ:talaiza(r)/ | / βataraica/ | Fertilizer |
| c. | /draivar(r)/ | /dereβa/ | Driver |
| d. | /kʌbad/ | / kaβondi / | Cupboard |

The elements in the PE's in 4 (a-d) are indicated below. The underlined element is head and all simplex expressions are headed.

```
            Input English              Output- Gichuka

    /f/   /b/   /v/   /p/                      /β/
     |     |     |     |                        |
    hʔhʔ                                        h
     |     |     |     |                        |
    H    ʊUH                                    H
     |           |                              |
    U           U                               U
```

The following Gichuka LC's explain the substitution in 4 (a-d)
   i.      h or ʔ  must be head (h is head in / β /).
   ii.     h can licence HUlL (H and U present in the above PE's).
   iii.    H and U can be cooperators.
   iv.      (h licences H and U to form / β / (h .H. U).

In (4) the only switching of heads is between / b / and / p / which have (ʔ) as head while / β / has (h) as head. This switching is possible because the operator labial element (U) is found in both / b / and / p /.The spreading of the labial element enables the switching of heads to take place.

(5)The PE's / ʧ, s, ʃ, z / are substituted with /c/

|     | Input        | Output      | Gloss  |
|-----|--------------|-------------|--------|
| a.  | / blaʊz /    | / mburaoci /| Blouse |
| b.  | / ʧɔ:k /     | / cɔka /    | Chalk  |
| c.  | /sku:l /     | / cukuru /  | School |
| d.  | / ʃʊga(r) /  | / cukari /  | Sugar  |

The elements in the PE's involved in (5) are indicated below. The underlined element is head.

```
        Input                              Output

                                             c
    ʧs ʃ    z                                |
    |   |  |   |                             h
    ʔh hh                                     |
    |   |  |   |                             H
    HR   H   R                                |
    |        |                               I
    I I
```

The following Gichuka LC's explain the substitution in 5 (a-d)
   i.      h or ʔ must be head (h is head in / c /).
   ii.     h can licence HUIL (HRI present in the above PE's).
   iii.    H and I can be cooperators.
   iv.     H and R can be coperators.
   v.       (h licences H and I to form /c / (h. H. I). (R) is not licensed because only voiceless nasal clusters can license more than two operators.

In (5), there is switching of heads from a stop element (ʔ) to a fricative (h). The two element have the same operators (H I) which enable the switching to take place. The coronal element (R) is then suppressed because only nasal clusters can license three operators, thus ruling out (iv).

A key feature in the substitution of consonants is merging, one consonant in Gichuka is used to replace more than one consonant in loanwords borrowed from English. According to Mwihaki (2005), this occurs because of the number of approximate consonants present in the borrowing language is fewer. In GP, this is a result of the combinatory possibilities in a language which are contained in the LC's of each language Merging has also been attested in Kikuyu loanwords borrowed from English (Mwihaki, 2005).

Kikuyu merger

/ s /

/θ / ———— /θ/

/z /
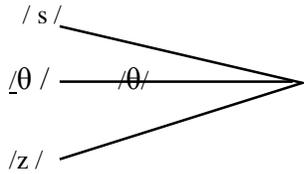
In Gichuka , / p, f, v,b / are all substituted for / β /  and / ʧ, s, ʃ z / are substituted for / c/.

Gichuka mergers

/p /

a)  /f/ —————— /β/

/v /

/b/

/ʃ/

b)  /s/ —————— / c /

/z/

/ ʧ /
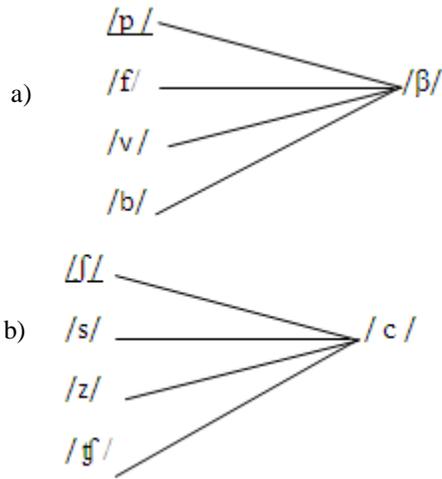
(6)The Substitution of /k/ with /ɣ /

| Input | Output | Gloss |
|---|---|---|
| a.   /sɔks/ | /sɔɣici/ | socks |

Input          Output

k              ɣ
|              |
ʔ              h
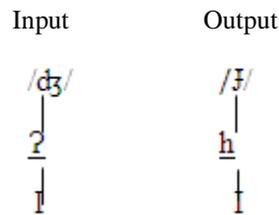|              |
H              H

The substitution in 6 (a) is possible because the borrowed word is subjected to the following Gichuka LC's:
   i.      h or ʔ must be head (h is head in / ɣ / )
   ii.     h can licence HUIL (H  present in the PE's)
   iii.     (h licences H only because the two elements are velars with no place specification  according to the element geometry discussed in section 4.6  to form / ɣ / (h.H)

(7)The Substitution of PE / ʤ / for PE / ɟ /

| Input | Output | Gloss |
|---|---|---|
| a.   / ʤ enereita(r)/ | / ɟɛnɛreta/ | Generator |

The elements involved in the substitution in (7) are:

```
            Input           Output

           /dʒ/             /ɟ/
            |                |
            ʔ                h
            |                |
            I                I
```

The substitutions in (7) are possible because the borrowed word is subjected to the following Gichuka LC's:

    i.   h or ʔ must be head (ʔ is head in/ɟ/)
    ii.   ʔ can licence HURIL (I present in the above PE's)
    iii.   ʔ licences I  to allow the substitution to take place to / ɟ / (h I)

The spreading of the palatal element (I) enables the switching of heads from a stop (ʔ) to a fricative (h).
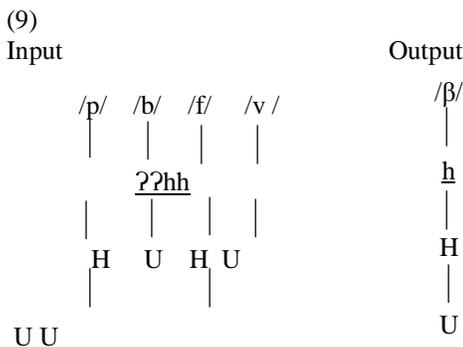
## 10. Kiswahili Loanwords

The replacement of a consonant with another consonant is the commonest process in adapting Kiswahili loanwords into Gichuka. The first substitution is illustrated in (8).

    (8) The substitution of / p, f, v, b / with / β /

| | Input | Output | Gloss |
|---|---|---|---|
| a. | / pilipili / | / βiriβiri / | Pepper |
| b. | / kibuyu / | / keβojo / | Plastic container |
| c. | / kufuli / | / kuβuri / | Padlock |
| d | / mwavuli / | / mwaβure / | Umbrella |

The elements involved in the substitutions in (8) are illustrated in (9). The head element is underlined.

(9)

```
Input                          Output

    /p/  /b/  /f/  /v /          /β/
     |    |    |    |             |
         ʔʔhh                     h
     |    |    |    |             |
     H    U    H    U             H
     |         |                  |
   U U                            U
```

The Gichuka LC's explaining the substitution in (9) is as follows:

    (i)       h or ʔ must be head (h is head in / β / )
    (ii)      h can license HUIL (h licences H and U)
    (iii)     H and U can be cooperators
    (iv)     h licences H and U to form / β / [ h H U]

For / b / and / p / in (9), there is switching of heads from a stop to a fricative. The elements in the PE's (H and U) in the PE's / b / and / p / can be licensed by (h). Also, in some cases, consonant substitution is motivated by nominalisation. In 4 (b) the prefix (ke-) is a singular prefix for class 7 nouns  which form their plural with (i- )and in (d) the prefix (mwa-) is a singular prefix for class 3 nouns. The second consonant substitution is illustrated in (10).

<center>(10)Substitution of/ ɟ, ʃʧ/ with / c/</center>

| | Input | Output | Gloss |
|---|---|---|---|
| a. | /kiɟikɔ/ | /geciko/ | Spoon |
| b. | /mʃipi/ | /mociβi/ | Belt |
| c. | / ʧumvi/ | /cumbe/ | Salt |

The elements involved in the substitutions in (10) are illustrated in (11). The head element is underlined.

(11)

    Input                                     Output

$$
\begin{array}{cccccc}
\text{ʧ} & \text{ʃ} & \text{ɟ} & & & \text{c} \\
| & | & | & & & | \\
\text{ʔ} & \underline{\text{h}} & \text{ʔ} & & & \underline{\text{h}} \\
| & | & | & & & | \\
\text{H} & \text{H} & \text{H} & & & \text{H} \\
| & | & | & & & | \\
\text{I} & \text{I} & \text{I} & & & \text{I}
\end{array}
$$

The substitution in (11) is enabled by the following Gichuka LC's
- (i)        Either ʔ or h can be head (h is head in / c / )
- (ii)      h can license HUIL (h licenses H and I)
- (iii)     H and I can be co-operators
- (iv)    No head may license more than three operators thus we have /c/ [h. H. I]

In (11) the element / ʔ / which denotes a stop is switched to a fricative in the case of / ʧ / and / ɟ /. All the PE's have the same operators (H I). This enables the switching of heads to take place.

(12) Substitution of/ k/ for /g/
This is a process which involves many lexical items but only two will be sampled.

|    | Input | Output | Gloss |
|----|-------|--------|-------|
| a. | / kitungu:/ | /getongoro / | Onion |
| b. | / Kijikɔ / | /geciko / | Spoon |

The elements involved in the substitutions in (12)are illustrated below. The stop element (ʔ) is head

                                  Input           Output

$$
\begin{array}{ccc}
\text{k} & & \text{g} \\
| & & | \\
\underline{\text{ʔ}} & & \underline{\text{ʔ}} \\
| & & \\
\text{H} & &
\end{array}
$$

The substitution of /k/ for /g/ in (12) is a spreading of features, enabled by following the following Gichuka LC's.
- i.     ʔ must be head
- ii.    ʔ can license the HUIL (ʔ licenses nothing to form the simplex element / g / [ʔ.].

The substitution occurs because the two PE's are velar stops with no place specification according to the element geometry. The substitution of / k / with / g / is also accompanied by the substitution of / i / with / e /. The prefix (ge-) is a morphological marker for class 7 and 8 nominal classes whose plural prefix marker is (e-). Similarly, the (ki-) prefix in the Kiswahili words is also a morphological marker for a nominal class 7 nouns.

(13) Substitution of PE / s / with / ð /
This is also a common substitution strategy in the adaptation of Kiswahili loanwords into Gichuka. Three examples have been sampled in 8(a-c)

|    | Input | Output | Gloss |
|----|-------|--------|-------|
| a. | /stima/ | / ðitima/ | Electricity |
| b. | /saa/ | / ða:/ | Time/clock |
| c. | /samaki/ | / ðamaki/ | Fish |

The elements involved in the substitutions in (13) are illustrated below. The topmost element is head

$$
\begin{array}{cc}
/s/ & /ð/ \\
| & | \\
h & h \\
| & | \\
H & I \\
| & \\
R &
\end{array}
$$
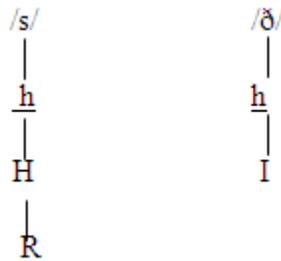
The substitution 13 (a- c) is enabled by following the following Gichuka LC's.

(i)       h must be head
(ii)      h can license HUIL (h licences I)
(iii)     I may not be co-operator with R
(iv)     H licenses I to form / ð / [h I]

## 11. Summary

In this paper, consonant substitution in Gichuka loanwords (borrowed from English and Kiswahili) has been explained as the spreading of elements under Gichuka licensing constraints. In the process of substitution there is switching of heads which is enabled by the spreading of the place element present in the phonological expressions involved. In English loanwords, / r / is substituted for / l /, /p, f, v, b / are substituted with the / β /, / ʧ, s, ʃ, z / are substituted with /c/, /k/ with /ɣ / and / ʤ / with / ɟ /. In Kiswahili loanwords, / p, f, v, b / are substituted with / β /, / ɟ,ʃʧ / with / c /, k/ with /g/and / s / with / ð /.

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