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Ekegusii Phonemic Inventory Constraints on Borrowing: An Optimality Perspective

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Abstract:
Sound adaptation is a phenomenon that languages cannot escape in borrowing. This is because phonemic inventories differ significantly. This paper explores how Ekegusii native speakers map foreign segments from English so that they conform to the inventory constraints of Ekegusii. In this paper, couched in Optimality Theory (OT), it is demonstrated that English vowels are mapped to Ekegusii front and back vowels respectively constrained by shared features while consonant adaptation is guided by shared features as well. This is to ensure that segments that are unmarked cross linguistically are adapted over the marked ones. OT's markedness constraints largely dominate the faithfulness constraints because modifications must occur when English loanwords are different from their Ekegusii counterparts in the mapping process.

Keywords: Constraints, faithfulness, markedness, optimal, adaptation

1. Introduction

Ekegusii, a Bantu language spoken in Kenya, has had a long historical contact with English language due to the colonial experience and subsequent adoption of the language in the post-independence period (Githiora, 2008). This contact situation has led to borrowings. Languages are very dynamic, and in an attempt to cope with the arrival of new concepts, emerging technologies and new products, speakers of a particular language may have to borrow from a foreign language (Hall-lew, 2002; Mavoungou, 2005; Nagy, 2010). When borrowing occurs, it hardly escapes sound adaptations. This is because languages differ in their phonemic inventories because a uniform inventory for all world languages is impossible. Thus, when speakers of a language find themselves in situation where they have to speak the other's language, they will tend to interpret each of the segments in the foreign word using their own inventory and whatever that is disallowed is repaired (Gussenhoven& Jacobs, 2005). In fact, the loans are changed to conform to the borrowing language's phonology in a process called nativization or adaptation (Sarker, 2012). Nativization does not just occur, rather it triggers a number of processes in the native speaker's mind which include; perception, in which the speaker perceives the acoustic input of the foreign element; interpretation of the foreign element and finally the operative, whereby the speaker maps the foreign segment to conform to the inventory constraints of his or her language (Silverman, 1992).

There is plethora of research on language borrowing, which points to the extent languages undergo so as to adapt foreign segments. For instance, Kambuziya, Aghagolzade, Ferdow and Golfam (2014) found that the interdental, pharyngeal and bilabial glide places of articulation are not active articulators in Persian. Consequently, Persian speakers replace loanwords containing these consonants with those that are very close in terms of place of articulation. Hence, the alveolar Persian fricatives /s/ and /z/ replace the Arabic interdentals /θ/, /ð/ respectively, while the voiced uvular fricative /ʁ/ is adapted as the voiced uvular plosive/ɢ/, the bilabial glide /w/ is realized as labiodental /v/ and finally, the voiced pharyngeal fricative /ʕ/ is adapted as the glottal plosive /ʔ/.

Similarly, in Cantonese, Silverman (1992) establishes that English consonants are replaced by those in close correspondence in Cantonese. Specifically, English bilabial plosive /b/ is replaced by Cantonese /p/ while /d/ is replaced by /t/, all of which share place features. Miao (2005) observes that, there is both faithful preservation and deviant output in Mandarin Chinese. When mapping patterns, articulatory features of manner for consonants show differential changeability and are likely to be maintained than other features like voice, place and aspiration. The English voiceless bilabial plosives /p/ and /t/ are replaced by Mandarin aspirated plosives /pʰ/ and /tʰ/ respectively.

Faezeh and Zafarantu's (2013) studied the mapping of German diphthongs to Persian in loanwords and found that the diphthongs are changed to simple vowels in Persian language. This is the case in Ekegusii whereby the English

diphthongs are reduced to simple vowels. Similar to this paper is Mogaka (2009), on Ekegusii adaptation of Kiswahili loanwords. She finds that the close front unrounded vowel /i/ changes to the mid-close front unrounded vowel /e/,   the back close round vowel /u/ to the close front unrounded vowel /i/, the back close rounded vowel /u/ changes to the mid-close back rounded vowel /o/ while the mid-open back unrounded vowel /ɔ/ is adapted as /u/, in some instances the mid-open back unrounded vowel /ɔ/ changes to /i/. She explains that the substitution of one vowel and not the other depends on the environment and there is no direct mapping even when the same vowel exists in Ekegusii. On the adaptation of consonants, Mogaka observes that the bilabial fricative /β/ in Ekegusii is adapted in place of the voiceless bilabial stop /p/, the labiodental fricatives /f/ and /v/ respectively. The voiced alveolar stop /d/ is replaced by its voiceless counterpart /t/ while voiced palatal affricate /ʤ/ changes to the voiceless palatal affricate /ʧ/. The lateral approximant /l/ on the other hand is adapted as the alveolar trill /r/ while the voiceless velar stop /k/ is adapted as voiced velar fricative /ɣ/. Other consonants like, the voiceless interdental fricative /θ/ changes to the voiceless alveolar stop /s/ or the voiceless alveolar stop /t/, while the voiced interdental /ð/ simply changes to /t/. Stridents like, /z/ is adapted as /s/, the voiceless post alveolar fricative /ʃ/ as /s/, while /nz/ changes to /ns/. Lastly, the homorganic sounds /nʤ/ is adapted as /nʧ/ and /nd/ as /nt/ respectively. Mogaka's study pays attention to how Kiswahili sounds are adapted to Ekegusii.

Prince and Smolensky's (2004) constraint-based model (Optimality Theory, OT) with its key notions of markedness and faithfulness constraints is used to explain the inventory constraints in Ekegusii borrowing. This is because loanword adaptation is constraints and repairs in 'real-time' (Farazandeh&Kumbuziya, 2013). This means that when a speaker adapts a loanword, he/she tries to be faithful to the source word while at the same time making the loan to conform to native language's phonotactic constraints, segmental inventory and prosodic structures (Kenstowicz&Atiwong, 2004).

2. Ekegusii Phonemic Inventory

Ekegusii language orthography has five vowels, namely: a, e, i, o, u. However, it has seven vowel phonemes as follows: /a/, /ɛ/, /e/, /i/, /ɔ/, /o/ and /u/ (Nyakundi, 2010). The Figure below presents the vowel position in the vowel trapezium.
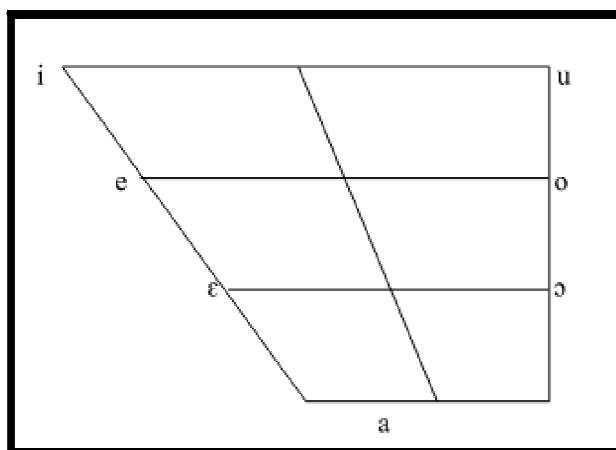

Figure 1: Ekegusii Vowel Chart
(Source: Komenda, 2011:28)

On the other hand, according to Mose, Mwangi and Njoroge (2013), Ekegusii has twenty consonants.

Place Manner	Labial	Dental	Alveolar	Alveo-palatal	Palatal	Velar	Glottal
Plosives			t			k	
Prenasalized stops	ᵐb		ⁿt, ⁿd			ᵑk, ᵑg	
Fricatives	β		s, ⁿs			ɣ	
Affricates				ʧ,nʧ			
Nasals	m	n			ɲ	ŋ	
Approximants	w				j		
Liquids			r				

Table 1: Ekegusii Consonant Phonemes
(Source: Mose, Mwangi and Njoroge, 2013: 114)

2.1. RP English Phonemic Inventory

English on the other hand, has five long vowels: /u:/, /ɜ:/, /ɑ:/, /ɔ:/ and /i:/; six short vowels: /ɒ/ /ɪ/, /e/, /æ/, /ʌ/ and /ʊ/; eight diphthongs: /ɪə/, /eə/, /ʊə/, /eɪ/, /aɪ/, /ɔɪ/, /əʊ/ and /aʊ/ and /eə/; five triphthongs: /eɪə/, /aɪə/, /ɔɪə/, /əʊə/ and /aʊə/ which give a total of twenty four vowels and twenty four consonantal sounds. They are: /p/, /b/, /t/, /d/, /k/, /g/, /f/, /v/, /θ/, /ð/, /s/, /z/, /ʃ/, /ʧ/, /ʒ/, /ʤ/, /h/, /m/, /n/, /ŋ/, /r/, /l/, /j/ and /w/ (Roach, 2009).

3. Adaptation of Vowel Sounds

Vocalic sounds are produced by egressive pulmonic airflow by vibrating or constricted vocal cords in the larynx so that the sounds generated are modified by the cavities of the tract. The size and shape of the tract is varied, just like the positioning of the tongue and the lips, so the perceived phonetic quality of the vocalic sound is altered. Thus, the two most fundamental manoeuvres in producing various vocalic sounds are the shape and position of the tongue as well as the shape and degree of protrusion of the lips (Clark &Yallop, 2007, p. 62). Data analysed in this study reveals that vowel adaptations generally display both predictable and unpredictable patterns in the mapping of English vowels to Ekegusii. The discrepancy is not unique since English has twenty four vowels whereas Ekegusii has seven.

3.1. The Adaptation of /i/ in Ekegusii

The Ekegusii data reveals that in most of the borrowed segments, the close front unrounded vowel /ɪ/ was mapped to Ekegusii's /i/ as shown:

English Input	Ekegusii Output	English Gloss	
/pɪn/	[eβɪni]	'pin'	
/gɪ'tɑ:/	[eɣita]	'Guitar'	
'tɪkɪt/	[etiɣiti]	'ticket'	

The close front unrounded /i/ and the mid-close front unrounded /ɪ/ have shared features [+high, -back, -round] which facilitate the mapping. Closely related is the mapping of the close front unrounded long vowel /i:/ realized as /i/. This too could be explained as the two have similar shared features [+high, -back, -round].

English Input	Ekegusii Output	English Gloss
/ti:'vi:/	[etiβi]	'T.V'
/ti:m/	[etimu]	'team'

Another instance is that of the diphthong /aɪ/ as in 'biro' /'baɪrəʊ/ adapted as [eβiro]. Ekegusii does not have diphthongs just like most Bantu languages. Thus, the first vowel is deleted and the component part of the diphthong /ɪ/ is retained but realized as /i/.

These findings on vowel adaptation in Ekegusii can be accounted for using OT (Prince &Smolensky, 2004). The theory proposes that the grammar of all languages have a set of universal constraints which are part of Universal Grammar or the innate language knowledge that humans have. However, what differs is the significance a language will attach to these various constraints. Thus, the phonology of a particular language is determined by how a language ranks a set of universal constraints which results in a language's constraint hierarchy. First, there is the markedness constraint which presupposes that languages have 'marked' and 'unmarked' features. Whereas unmarked features are basic in all grammars and preferred cross-linguistically, marked are avoided cross-linguistically (Kager, 1999). Therefore, to account for the Ekegusii substitution of /i/ for both the long vowel /i:/ and the diphthong /aɪ/ in English, we invoke the following universal markedness constraints. Diphthongs are unattested in the vowel phonemic inventory of Ekegusii, we can posit an undominated anti-diphthong markedness constraint; *DIPH which prohibits complex nuclei. Similarly, *CODA markedness constraint which is not violated in the Ekegusii language because of its open syllabicity. In addition, from the input English 'biro' /'baɪrəʊ/   adapted as [eβiro], it can be observed that the bilabial plosive /b/ is adapted as the labial fricative /β/. This can be accounted for by proposing undominated markedness constraint *[b]; the bilabial plosive is not attested in the language. Besides, the markedness constrains, OT proposes faithfulness constrains which demand that the output form is identical to the input. In other words, the output form must be as faithful as possible to the input form. In this regard, the vowels /i/ and /i:/ have shared feature [+high, -back, -round] which seem to be constraining the incoming input. IDENT-IO$_{BACK}$ can be proposed to evaluate the outputs further. Moreover, IDENT-IO$_{DIPH/CONT}$ which prohibits feature change between input and output, in this case changing diphthong to a simple vowel as well as a stop to a continuant are relevant. Similarly, the output allows an epenthetic vowel violating DEP-IO (V). The ranking will be as follows in tableau (3.1): *CODA, *DIPH, *[b] >> IDENT-IO$_{BACK,}$ DEP-IO (V), IDENT-IO$_{DIPH/CONT}$

(3.1) /'baɪrəʊ/ ⟶ [eβiro] 'biro'

/'baɪrəʊ/	*CODA	*DIPH	*[b]	IDENT-IO$_{BACK}$	DEP-IO (V)	IDENT-IO$_{DIPH/CONT}$
a. [bəɪ.rəʊ]		*!*	*			
b. ☞ [e.βi.ro]					*	*
c. [e.bu.ro]			*!	*	*	
d. [e.βa.ir]	*!				*	*

From the tableau (3.1), candidate (b) is the optimal candidate; it satisfies all the markedness constraints. It is the winning candidate although it violates the low ranked constraint DEP-IO(V) and IDENT-IO$_{DIPH/CONT}$ by allowing the epenthetic vowel and feature change respectively. Candidate (a) is the most disharmonic. It not only violates the high ranked *DIPH but also allows the occurrence of /b/ which is not attested in the language. Candidate (c) does not fare well either, it allows for the occurrence of the voiced bilabial plosive /b/ which is not attested in the language besides violating the low ranked faithfulness constraints like allowing the occurrence of a back vowel instead of a front vowel. Lastly,

candidate (d) violates the high ranked undominated *CODA constraint besides the low ranked faithfulness constraints which prohibit vowel insertion DEP-IO (V) and IDENT-IO$_{DIPH/CONT}$ that forbid feature change.

3.2. The Adaptation of /e/ in Ekegusii

Besides direct mapping, the mid-close front unrounded vowel /e/ substitutes a number of vocalic English sounds. These include: /ɪ/, /æ/, /ə/ and the diphthong /eɪ/ as shown.

English Input	Ekegusii Output	English Gloss
/ˈbændɪdʒ/	[eβaⁿdetʃi]	'bandage'
/bæŋk/	[eβeᵑgi]	'bank'
/ˈæmbjələns	[eaᵐbjureⁿsɪ]	'ambulance'
/breɪk/	[eβureki]	'brake'

Similarity of sounds between two languages due to shared features plays a role in language borrowing (Mc Mahon, 1999). Therefore, the mid-close front vowel /e/ shares the [-back, +lax, -round] features with both /æ/ and /ɪ/. The schwa which has a central feature is usually a weak sound and it is a lax vowel. Hence, it is simply realized as /e/. In the absence of a diphthong in Ekegusii /eɪ/ undergoes reduction to become /e/. Of importance to note is that the substitution only allows vowels that are similar in terms of front and -back dimension so as to maintain harmony. OT has an explanation for this in that the markedness constraints *DIPH can be invoked. Further, from the data, it can be inferred that in the input 'brake' /breɪk/ adapted as [eβureki]; a cluster consonant 'br' is not tolerated in the language. Therefore, *CO$_{ONS}$ which disallows occurrence of complex clusters is proposed to account for this adaptation. Moreover, other relevant markedness constraints include: *[b] and *CODA. Additionally, the input allows vowel insertion as a repair strategy. Consequently, DEP-IO(V) can be proposed as well as IDENT-IO$_{DIPH/CONT}$. The constraints are ranked as follows in tableau (3.2)

*CODA, *DIPH, *CO$_{ONS}$, *[b] >> IDENT-IO$_{DIPH/CONT}$ >> DEP-IO(V)

(3.2) /breɪk/ ⟶ [eβureki] 'brake'

/breɪk/	*CODA	*DIPH	*CO$_{ONS}$	*[b]	IDENT-IO$_{DIPH/CONT}$	DEP-IO(V)
a. [breɪk]	*!	*	*	*		
b. ☞ [e.βu.re.ki]					**	**
c. [eβ.ue.ki]	*!	*			**	**
d. [e.bre.ki]			*!	*	*	*

In tableau (3.2), candidate (b) is the most harmonic. The diphthong is replaced by the mid-close vowel /e/, thus it does not violate the high ranked markedness constraints *DIPH, as well as other undominated constraints like *CODA, *CO$_{ONS}$ and *[b]. On the other hand, (a) is the most disharmonic. It violates all the high ranked constraints *CODA, *DIPH, *CO$_{ONS}$ and *[b]. Candidate (c) is also less harmonic. It allows occurrence of a diphthong, violating the undominated *DIPH as well as the undominated *CODA besides the low ranked faithfulness constraints. Candidate (d) violates the high ranked *CO$_{ONS}$ and *[b].

3.3. The Adaptation of /ɛ/ in Ekegusii

/ɛ/ is a mid-open front unrounded vowel in Ekegusii. The English vowels adapted to this sound are /æ/, /ə/ and the diphthong /eɪ/ as illustrated.

English Input	Ekegusii Output	English Gloss
/ˈbætrɪ/	[εβɛtiri]	'battery'
/ˈbeɪkərɪ/	[εβɛkɛri]	'bakery'

In terms of adaptation, sound /ɛ/ in not frequent. It substitutes /æ/ which it shares [-back, +low] features. As for the schwa /ə/, the close approximation is /ɛ/ while the absence of diphthongs in the Ekegusii inventory facilitates the adaptation of /eɪ/ as /ɛ/. As already accounted for in tableau (3.2), the markedness constraint *DIPH ensures no complex nucleus occurs in the Ekegusii language. In the adaptation of the English input 'battery' /ˈbætrɪ/ as [εβɛtiri] in Ekegusii, a number of adaptations take place which can be accounted for by OT's markedness constraints. They include; *CODA, *CO$_{ONS}$ and *[b]. The faithfulness constraints such as DEP-IO(V), MAX-IO$_{SEG}$ and IDENT-IO$_{CONT}$ can be invoked. The constraints will be ranked as: *CODA, *CO$_{ONS}$, *[b] >> MAX-IO$_{SEG}$ >> IDENT-IO$_{CONT}$, DEP-IO(V)

(3.3) /ˈbætrɪ/ ⟶ [εβɛtiri] 'battery'

/ˈbætrɪ/	*CODA	*CO$_{ONS}$	*[b]	MAX-IO$_{SEG}$	IDENT-IO$_{CONT}$	DEP-IO(V)
a. ☞ [ε.βɛ.ti.ri]					*	*
b. [ε.βɛ.ri]				*!	*	
c. /ˈbætrɪ/		*!	*		*	*
d. [ε.βɛ.tri]		*!			*	
e. [e.be.tɪ.rɪ]			*!			*

Candidate (a) is the most harmonic, although it violates the low ranked faithfulness candidate. Conversely, (b) does not violate the high ranked markedness constraints. However, it violates MAX-IO$_{SEG}$. Candidate (c), is the most disharmonic. It violates two of the high ranked markedness constraints. As for candidate (d) and (e), both are all isoharmonic. Each of them violates at least one of the high ranked markedness constraints; *CO$_{ONS}$ and *[b] respectively.

3.4. The Adaptation of /a/ in Ekegusii

Different English vowels were substituted with the open unrounded central vowel /a/. They are: /æ/, /ɜ:/, /ə/, /ʌ/ and the diphthong /eɪ/

(5).English Input	Ekegusii Output	English Gloss
/ˈtrænsfɜ:/	[eturansiβa]	'transfer'
/juːnɪˈvɜːsɪtɪ/	[ejuniβasiti]	'university'
/əˈkaʊnt/	[eakaoⁿti]	'account'
/ˈkʌpəd/	[ekaβati]	'cupboard'
/ˈeɪprən/	[eaβuroni]	'apron'

As shown from the data, /a/ is adapted in place of /æ/, /ɜ:/ and /ə/. These vowels, a part from the schwa, share [-back, +low, -round] features. In the case of a schwa, there seems to be fronting. Besides, /a/ is adapted in place of the mid-open back unrounded vowel /ʌ/. The shared features which perhaps motivates the substitution are [+low, -round]. As for the diphthong, there is reduction. In addition, /a/ is one of the extreme vowels in the canonical vowel space besides /ɪ/ and /u/ (Liberman, 1995; Flemming, 2004). It is preferred and favoured cross linguistically because of its unmarkedness; therefore, it is adapted in Ekegusii in place of /æ/, /ɜ:/, /ə/, /ʌ/ and the diphthong /eɪ/. We can use OT's constraints to account for the adaptation of 'university' /juːnɪˈvɜːsɪtɪ/ as [ejuniβasiti]. First, *CODA that is consistently undominated. Then, the adaptation of the labial dental fricative /v/ as /β/; we propose the undominated markedness constraint *[CONT, LAB-DENT]. Also, the input's long vowels are adapted as short vowels violating the IDENT-IO$_{LONG}$. Similarly, the input allows epenthesis; DEP-IO(V) is a relevant faithfulness constraint. The constraints in tableau (3.4) will be re-ranked as follows: *CODA, *[CONT, LAB-DENT] >> IDENT-IO$_{LONG}$, DEP-IO(V)

(3.4) /juːnɪˈvɜːsɪtɪ/ ——► [ejuniβasiti]   'university'

/juːnɪˈvɜːsɪtɪ/	*CODA	*[CONT, LAB-DENT]	IDENT-V$_{LONG}$	DEP-IO(V)
a.☞ [e.ju.ni.βa.si.ti]			**	*
b. [e.ju.ni.βa.si. ɪt]	*!		**	*
c. [juː.nɪ.vɜː.sɪ.tɪ]		*!		
d. [e.ju.nɪ.vɜː.sɪ.ɪt]	*!	*	*	*

In tableau (3.4), candidates (d) are the most disharmonic. It not only violates the undominated *CODA and *[CONT, LAB-DENT] constraints, but also the lowly ranked faithfulness constrains. As for candidates (b) and (c) both are isoharmonic. They violate one of the high ranked markedness constraints which are *CODA and *[CONT, LAB-DENT] respectively in addition to the low ranked faithfulness constraints. Candidate (a) is the winner although it violates the DEP-IO(V) and IDENT-IO$_{LONG}$.

3.5. The Adaptation of /o/ in Ekegusii

The mid-close back rounded vowel is very frequent in occurrence. It is adapted in place for /ɒ/, /ə/, /ʊ/, /ɔ:/ and the diphthong /əʊ/.

English Input	Ekegusii Output	English Gloss
/bɒm/	[eβomu]	'bomb'
/kənˈdʌktə/	[ekoⁿdaɣita]	'conductor'
/ˈkʊʃən/	[ekosoni]	'cushion'
pəʊst/	[eβositi]	'post'
/ˈlɔ:jə/	[eroya]	'lawyer'

Both the open back round vowel /ɒ/, the mid open back round long vowel /ɔ:/ and the back mid close round vowel /ʊ/ are close in terms of horizontal tongue position and lip rounding; thus, the substitution is not a surprise. In addition, they share the features [+round, +back]. Similarly, the schwa seems to be closing towards /o/ sound. Diphthongs are unattested in Ekegusii language, hence, the reduction of /əʊ/ to a simple /o/ with which it shares features [+back, +round]. OT's markedness constraints *CODA, *DIPH, *CO$_{ONS}$ and *[b] can account for the adaptation of 'post' /pəʊst/ as [e.βo.si.ti] in Ekegusii. The faithfulness constraints relevant in this case are DEP-IO(V) and IDENT-IO$_{DIPH/CONT}$. The constraints are ranked as follows:

*CODA, *DIPH, *CO$_{ONS,}$ *[p] >> IDENT-IO$_{DIPH/CONT}$, DEP-IO(V)

(3.5) /pəʊst/ ——► [e.βo.si.ti]   'post'

/pəʊst/	*CODA	*DIPH	*CO_ONS	*[p]	IDENT-IO_DIPH/CONT	DEP-IO(V)
a. [pəʊst]	*!	*	*	*		
b.☞ [e.βo.si.ti]					**	**
c. [e.po.si.ti]				*!	*	**
d.[e.βəʊ.sti]		*!	*			

Tableau (3.5) indicates that candidate (a) is the most disharmonic. It violates all the high ranked *CODA, *DIPH, *CO_ONS and *[p] markedness constraints. (b) is the most harmonic although it violates DEP-IO(V) and IDENT-IO_DIPH/CONT. As for candidate (c), it allows the occurrence of the voiceless bilabial plosive which is not attested in the Ekegusii language besides violating the low ranked DEP-IO(V) and IDENT-IO_DIPH/CONT. Candidate (d) is equally less harmonic. It violates two of the high ranked markedness constraints; *DIPH and *COONS.

3.6. The Adaptation of /u/ in Ekegusii
This is the back close round vowel /u/.

English Input	Ekegusii Output	English Gloss
/stu:l/	[esuturu]	'stool'
/'trʌmpɪt/	[etɑruᵐbeta]	'trumpet'
/'kʊkə/	[ekuka]	'cooker'

In all instances where we have the long back close round vowel /u:/ it is mapped to the /u/ in Ekegusii. Both vowels share [+round, +back, +high] features. Equally, the low back unrounded vowel /ʌ/ and /ʊ/ are substituted with the /u/ with which they share the [+back] feature. We illustrate using 'stool' /stu:l/ which is adapted as [esuturu]: First, *CODA is constantly undominated. Secondly, the output allows epenthesis to break cluster comprising a consonant and an obstruent. The markedness undominated *CO_ONS is a relevant constraint too. Another undominated markedness constraint which can be considered is *[LAT] considering laterals are not found in the Ekegusii inventory which explains why the rhotic /r/ is adapted. The faithfulness constraints DEP-IO(V) and IDENT-IO_LONG/LAT can similarly be used to explain the adaptation because the output allows insertion and feature change. The constraints will be ranked as follows:
*CODA, *CO_ONSET, *[LAT] >> DEP-IO(V), IDENT-IO_LONG/LAT
(3.6) /stu:l/ ⎯⎯⎯→ esuturu] 'stool'

/stu:l/	*CODA	*CO_ONSET	*[LAT]	DEP-IO(V)	IDENT-IO_LONG/LAT
a. [stu:l]	*!	*	*		
b.☞ [e.su.tu.ru]				**	**
c. [e.stu.ru]		*!		*	**
d. [e.su.tu.lu]			*!	**	*

Tableau (3.6) indicates that candidate (a) is the most disharmonic. It violates all the high ranked undominated markedness constraints. (b) is the most harmonic even though it violates DEP-IO(V) and IDENT-IO_LONG/LAT. As for candidate (c) and (d), they each violate one of the high ranked markedness constraints *CO_ONS and *[LAT] respectively as well as the low ranked faithfulness constraints.

Generally, on vowel adaptation, it can be noted that English vowels tend to be substituted with those in Ekegusii which they have shared features in terms of horizontal and vertical tongue position, tenseness as well as shape of the lips. Also, the schwa which is not found in the Ekegusii inventory, is very unpredictable when it is adapted. Otherwise, apart from the unusual pattern where English back vowel /ʌ/ was adapted to Ekegusii /a/; the adaptation is relatively predictable; the back and front English vowels are adapted to the back and front Ekegusii vowels respectively. Therefore, only vowels that are similar in terms of height, front and back dimensions are allowed to substitute for one another to maintain vowel harmony.

3.2. The Adaptation of Consonants in Ekegusii
Consonant sounds are described according to the place of articulation (the different places on the roof of the mouth, the movements of the lips and different parts of the tongue), they are also characterized by manner of articulation and phonation (Ladefoged& Johnson, 2011). In adaptation of consonant sounds in borrowing, Zafarantu and Hashemi (2011) note that the recipient language will phonemically replace non-existing donor consonants with closely similar existing ones in terms of place and manner of articulation as well as phonation. However, others are of the view that this adaptation is based on the perspective of auditory similarity rather than proximity in feature geometry or shared natural classes (Kenstowicz, 2005). We investigated what determines the adaptation of English consonants in Ekegusii borrowing. On consonant adaptation, we group the English consonants according to the substituting consonant(s) in Ekegusii.

3.2.1. Adaptation of English Consonants /b/, /p/, /v/, /f/ to Ekegusii /β/

English Input	Ekegusii Output	English Gloss
/bæŋk/	[eβeⁿgi]	'bank'
/ˈplæstɪk/	[eβurasitiki]	'plastic'
/ˈgʌvənə/	[eɣaβana]	'governor'
/ˈsəʊfə/	[esoβa]	'sofa'

/β/ is a voiced bilabial fricative in the Ekegusii language, while /b/ and /p/ are voiced bilabial plosive and voiceless bilabial plosive respectively. These two bilabial plosives are not attested in the Ekegusii language. The absence of these two bilabials in Ekegusii inventory, necessitates a phonemic substitution of what is existing; /β/. All the three sounds share [+labial], [+anterior] and [-sonorant] features. On the other hand, /β/ is also adapted in place of the voiced labial-dental fricative /v/ and the voiceless labial-dental fricative /f/. In this case, both sounds are fricatives. Katamba (2003) observes that, this is not accidental, in fact in many languages, fricatives, stops and affricates form a natural class called obstruents with the shared feature [+labial]. Katamba further observes that these sounds share the phonetic characteristics of having significant obstruction in the oral tract and being typically voiceless. Moreover, they tend to display similar phonological behaviour. Though voiceless obstruents are cross linguistically preferred, in the absence of the other obstruents which are close in terms of place and manner of articulation, the bilabial fricative /β/ becomes an appropriate substitution. Save for one instance where the English loanword 'biscuit' [ˈbɪskɪt] is adapted as [eɣesuɣuti] thereby /b/ changes to /ɣ/; a voiced velar fricative, all the other adaptations are predictable. Though in this case, there are shared features of [+labial, +voice].

The adaptation of English bilabials and fricatives, can be accounted for using OT. First the bilabial plosives are not attested in Ekegusii language. Consequently, the markedness constraints *[p] and *[b] are relevant. Labial dentals can be accounted for using *[CONT, LAB-DENT] markedness constraint. If we illustrate using 'bank'/bæŋk/ adapted as [e.βe.ⁿgi] in the Ekegusii, a number of constraints can be invoked. First, the undominated *CODA. Secondly, we invoke *[b] that ensures that voiced bilabial plosives do not occur in Ekegusii. Thirdly, the markedness constraint: the post nasal voicing *NÇ. All these markedness constraints will interact with faithfulness constraints which include: DEP-IO(V) and IDENT-IO$_{CONT/VOI}$. The constraints will be ranked as follows: *CODA, *[b] >> *NÇ >> DEP-IO(V), IDENT-IO$_{CONT/VOI}$

(3.7) /bæŋk/ ⟶ [e.βe.ⁿgi] 'bank'

/bæŋk/	*CODA	*[b]	*NÇ	DEP-IO-V	IDENT-IO$_{CONT/VOI}$
a. [bæŋk]	*!	*	*		
b. [e.be.ⁿgi]		*!		*	*
c. ☞ [e.βe.ⁿgi]				*	**
d. e.βe.ŋki]			*!	*	*

Candidate (a) is the most disharmonic. It violates all the undominated markedness constraints *CODA, *[b] and *NC which are very important to the Ekegusii language. However, the language is less concerned with DEP-IO(V) and IDENT-IO$_{CONT/VOI}$ which the optimal candidate (c), violates. Candidate (b) is less harmonic compared to the winner. It allows the occurrence of the voiced bilabial plosive /b/, violating the *[b] besides the low ranked faithfulness constraints; DEP-IO(V) and IDENT-IO$_{CONT/VOI}$. Likewise, candidate (d) is less optimal. It violates not only the lowly ranked DEP-IO(V) and IDENT-IO$_{CONT/VOI}$ but also the higher ranked markedness constraint that requires post nasal voicing *NÇ; which is typical of Bantu languages.

3.2.2. Adaptation of English Consonant /g/ ⟶ /ɣ/, /k/, /ŋg/

English Input	Ekegusii Output	English Gloss
/gaʊn/	[eɣaoni]	'gown'
/gla:s/	[ekerasi]	'glass'
/gəˈzet/	[eⁿgaseti]	'gazette'

/ɣ/ is a voiced velar fricative found in Ekegusii. In terms of adaptation, it dominantly substitutes the English /g/ which is a voiced velar plosive that is non-existent in Ekegusii. /ɣ/ is also adapted in few instances where we have /k/ although the voiceless velar plosive is found in Ekegusii inventory. Another adaptation is that of /g/ to /ŋg/ in Ekegusii which is a homorganic sound. These two share the features [+dorsal], [-sonorant] and [+voice]. *[OBSVOI] a constraint which prohibits the voicing of pure obstruents can apply. However, [ŋg] is not a pure stop, therefore, it is tolerated having acquired voicing from the nasal. Moreover, the four sounds /g/, /ɣ/, /k/, and /ŋg/ are all obstruents. In this case, we can formulate a *[g] constraint that Ekegusii imposes on English donor words whose input comprises the voiced velar obstruent like 'gown' /gaʊn/ adapted as [e.ɣa.o.ni]. Additionally, Ekegusii does not tolerate diphthongs. The constraint *[DIPH] is relevant as well as the *[CODA] constraint. Faithfulness constraints which can be invoked are DEP-IO(V), MAX-IO$_{SEG}$ and IDENT-IO$_{DIPH}$. Thus, the constraints can be ranked as follows: *CODA, *[DIPH], *[g] >> MAX-IO$_{SEG}$ >> DEP-IO(V), IDENT-IO$_{DIPH}$

(3.8) /gaʊn/ ⟶ [e.ɣa.o.ni] 'gown'

/gaʊn]/	*CODA	*[DIPH]	*[g]	MAX-IO$_{SEG}$	DEP-IO(V)	IDENT-IO$_{DIPH}$
a. [gaʊn]	*!	*	*			
b. [e.ga.on]	*!		*		*	*
c.☞[e.ɣa.o.ni]					**	*
d. [e.ɣa.o]				*!	*	*

Tableau (3.8) shows that candidate (a), (b) and (d) are eliminated. Candidate (a) violates all the markedness constraints. (b) violates the undominated *CODA and as *[g] which prohibits the occurrence of the velar stop. As for (d), it allows for the deletion, violating MAX-IO$_{SEG.}$ Candidate (c) is the optimal, although it violates the low ranked faithfulness constraints.

3.2.3. Adaptation of English Consonants   /d/, /θ/ ——————▶/t/
English Input   Ekegusii Output English Gloss
/ˈdʌstə/   [etasita]   'duster'
/ˈbɑ:θru:m/   [eβaturumu]   'bathroom'

In the absence of the voiced alveolar plosive /d/ and the voiceless inter-dental fricative /θ/, the voiceless alveolar plosive /t/ is adapted. This confirms Paradis (1996) argument that when a segment is not preserved, its closest phoneme in the borrowing language is adapted. Besides, /d/, /θ/ and /t/ are all obstruents. Cross linguistically, the unmarked voiceless obstruents are preferred while the voiced are marked and avoided. Thus, the mapping to /t/ instead of /d/ is the most natural. Further, voiceless stops are the unmarked segments relative to fricatives; hence, the adaptation of /t/ in place of /θ/. They also share the features [+anterior], [+coronal], [-syllabic] and [-sonorant] among others.

OT accounts for this adaptation in Ekegusii via constraint interaction. For instance, if we illustrate using 'bathroom' /ˈbɑ:θru:m/ adapted as [eβaturumu], it imposes a constraint *[b] which prohibits the voiced bilabial obstruents which are marked cross linguistically. Secondly, it is evident Ekegusii does not allow cluster consonants except a consonant and a glide. Therefore, *CL$_{ONSET}$ is undominated besides *CODA. In addition, the voiceless dental fricative /θ/ is not attested in Ekegusii language. Hence, the markedness constraint *[CONT, DENT] can be proposed. Faithfulness constraints which are relevant in this case are DEP-IO(V)and IDENT-IO$_{CONT/LONG.}$ The constraints are ranked as follows:
*CODA, *CL$_{ONSET}$, *[b], *[CONT, DENT] >> DEP-IO$_{SEG}$, IDENT-IO$_{CONT/LONG}$
(3.9) /ˈbɑ:θru:m/ ——————▶[eβaturumu]   'bathroom'

[bɑ:θru:m]	*CODA	*CL$_{ONS}$	*[b]	*[CONT, DENT]	DEP-IO(V)	IDENT-IO$_{CONT/LONG}$
a.☞.[e.βa.tu.ru.mu]					**	***
b. [ba:θrum]	*!	*	*	*		
c. e.ba.tru.mu		*!	*		*	***
d. e.βa:θu.ru.mu				*!	**	**

As shown in tableau (3.9), though candidate (a) incurs some violations; they are for the low ranked faithfulness constraints. It is optimal. However, (b) is the most disharmonic. It violates *CODA, *CL$_{ONS}$, *[b] and *[CONT, DENT] constraints which are high ranked. (c) does not fare well either, it violates the high ranked *CL$_{ONSET}$ and *[b] besides the low ranked faithfulness constraints. As for candidate (d), it violates the undominated *[CONT, DENT] constraint besides the low ranked faithfulness candidates.

On the adaptation of voiceless obstruents, there are instances whereby those which are preceded by nasal undergo voicing and are tolerated in the Ekegusii language. Here are examples and we will show how OT accounts for their adaptation.
English Input   Ekegusii Output English Gloss
/kæmp/   [ekaᵐbi]   'camp'
/ˈblæŋkɪt/   [oβoraⁿgeti]   'blanket'

Much as Ekegusii language disallows occurrence of cluster consonants, except for a consonant followed by a glide, it is evident it allows prenasalized stops which are realized as single homorganic sounds. This is commonly attested in other Bantu languages as observed by Nandelenga (2013) in Lubukusu. From the data presented, the adaptation of a sequence of a nasal followed by a voiceless plosive in this case /p/ and /k/ which is marked cross linguistically, undergoes post nasal voicing to be realised as prenasalized stops. An input like 'camp' /kæmp/ is adapted as [ekaᵐbi]: OT accounts for this adaptation via the markedness constraint *NÇ. This constraint dominates faithfulness constraints because the voiceless plosive acquires the [+voice] feature of the nasal, bringing a disparity between the input and the output. *CODA which is undominated is relevant to prohibit any *NÇ cluster from occurring syllable boundary. Other relevant faithfulness constraints which can be invoked will be IDENT-IO$_{VOI/NAS}$ and DEP-IO(V). The constraints will be ranked as follows: *CODA >> *NÇ >> IDENT-IO$_{VOI/NAS}$, DEP-IO(V)

(3.10)   /kæmp/ ⟶ [ekaᵐbɪ] 'camp'

/kæmp/	*CODA	*NÇ̥	IDENT-IO$_{VOI/NAS}$	DEP-IO(V)
a. [kæmp]	*!	*		
b. [e.ka.mpɪ]		*!		*
c. ☞ [e.ka.ᵐbɪ]			**	*
d. [ek.a.ᵐbɪ]	*!		**	*

From tableau (3.10), the optimal candidate (c) allows the voiceless obstruent to undergo voicing and acquire the nasal features, therefore, realizes the prenasalized stop that is the attested form in the Ekegusii language. Candidate (b) and (d) are eliminated because of strict dominance of the high ranked markedness constraints *CODA and *NÇ̥ which theyviolate. As for candidate (a), it is the most disharmonic. It violates the highly ranked *CODA constraint and fails to allow post nasal voicing which is preferred in the language and is very prevalent in the languages of the world (Pater, 1999, 2004; Archangeli et al., 1998).

3.2.4 Adaptation of English Consonants /z/, /ʃ/ /ʒ/ ⟶ /s/
(12).English Input   Ekegusii Output English Gloss
/gə'zet/   [eⁿgaseti]   'gazette'
/'ʃɪlɪŋ/   [esiriⁿgi]   'shilling'
/'kʊʃən/   [ekosoni]   'cushion'
/'treʒərə/   [eturesara]   'treasurer'

The voiceless alveolar fricative /s/ is the closest phoneme in Ekegusii to the voiced alveolar fricative /z/. Likewise, with the absence of the voiced and the voiceless post alveolar fricatives /ʒ/ and /ʃ/ respectively, the closer adaptation is to /s/. Paradis and Prunet (1991 and 1994) note that coronals especially alveolars are the unmarked and if they are voiceless, they are preferred cross linguistically. In addition, all the three sounds are stridents. To account for the adaptation of /s/ in place of other coronals, we invoke OT's constraints. First, the *CODA constraint. Secondly, to account for the absence of the three sounds **/z/, /ʃ/ /ʒ**/, the proposed constraints are *OBSVOI and *[ʃ]. In the adaptation of 'treasurer' /'treʒərə/ as [eturesara], *OBSVOI is adopted as the markedness constraint as well as the undominated *CO$_{ONS}$ because of the presence of a cluster. Another relevant markedness constraint is *[REDUCED-V]. On faithfulness constraints DEP-IO(V) and IDENT-IO$_{VOI}$ are relevant. In tableau (3.11) the constraints will be ranked as follows:
*CODA, *CO$_{ONS}$,*[REDUCED-V] >> *OBSVOI >> IDENT-IO$_{VOICE,}$ DEP-IO(V).
(3.11) / 'treʒərə/ ⟶ [e.tu.re.sa.ra]   'treasurer'

/'treʒərə/	*CODA	*CO$_{ONS}$	*[REDUCED-V]	*OBSVOI	IDENT-IO$_{VOI}$	DEP-IO(V)
a. [tre.sa.ra]		*!			*	
b. [e.tre.sar.]	*!	*			*	
c. ☞[e.tu.re.sa.ra]					*	*
d. [tre.ʒə.rə]		*!	*	*		

As shown in tableau (3.11), the constraints are ranked depending on the Ekegusii phonology which is the recipient language. Ekegusii ranks the markedness language constraints of *CODA, *CO$_{ONS}$ and *[REDUCED-V] higher than *OBSVOI followed by IDENT-IO$_{VOI}$ and DEP-IO(V) which are not crucially ranked. Consequently, candidate (c) is the most harmonic. Candidate (a) violates the high ranked markedness constraint *CO$_{ONS}$. As for candidate (d), it is the most disharmonic. It violates three undominated markedness constraints; *CO$_{ONS,}$ *[REDUCED-V] and *OBSVOI. Finally, candidate (b) does not fare as well. It violates two of the undominated markedness constraints in Ekegusii; *CODA and *CO$_{ONS}$ as well as the faithfulness constraint IDENT-IO$_{VOI}$.

3.2.5. Adaptation of English Consonant /l/ to /r/
English Input   Ekegusii Output English Gloss
/ləʊn/   [eroni]   'loan'
/'lɔːjə/   [eroja]   'lawyer'
/'trɒlɪ/   [eturori]   'trolley'

The voiced alveolar trill /r/ is found in the Ekegusii phonemic inventory and so it is the closest substitute to the voiced alveolar lateral approximant /l/ in terms of place and manner of articulation as well as voicing. Besides, both sounds are coronal, sonorants, alveolars, anteriors and liquid. In addition, trills make better onsets than laterals due to their relative low sonority and laterality is a marked feature across languages, in fact medial release of airflow is preferred over lateral. Thus, Ekegusii substitution of the lateral for the trill is expected. In the adaptation of the lateral approximant, Ekegusii imposes a constraint on the loanwords *[LAT] which is markedness constraint. In the adaptation of 'trolley' /'trɒlɪ/ as [eturori], *CO$_{ONS}$ is also required so as to be counterbalanced with faithfulness constraints; IDENT-IO$_{LAT}$ and DEP-IO(V). The faithfulness constraints formulated are dominated as illustrated in tableau (3.12).

*[LAT], *CO_ONS>> DEP-IO(V), IDENT-IO_LAT

(3.12) /'trɒlɪ/ ⟶ [eturori] 'trolley'

/'trɒlɪ/	*[LAT]	*CO_ONS	DEP-IO(V)	IDENT-IO_LAT
a.☞ [e.tu.ro.ri]			*	*
b. [e.tro.ri]		*!		*
c. [e.tu.ro.li]	*!		*	
d. ['trɒ.lɪ]	*!	*		

OT stipulates that perfect forms are non-existent since every output form will violate at least some constraint. The optimal form wins by minimally violating the lower ranked constraints. Candidate (a) is the optimal form because it satisfies the universal markedness constraints; *[LAT] and *CO_ONS. On the other hand, candidate (b) and (c) are isoharmonic. They violate the high ranked markedness constraints; *CO_ONS and *[LAT]. As for candidate (d), it is the most disharmonic. It violates *[LAT] as well as *CO_ONS.

3.2.6 Adaptation of English Manner-contour Consonants

Manner-contour consonants are single segments but in some they have two distinguishable articulations and their constriction changes half-way through their articulation (Gussenhoven& Jacobs, 2005). Ekegusii, a Bantu language, has a number of manner-contour consonants. These include prenasalized stops; consonants which begin as oral stops with superimposed nasality at initial articulation phase and affricates; a combination of a plosive and a fricative at the same place of articulation, but the release is so slow that friction is heard. Similarly, English has affricates and although it distinguishes nasals like /m/ and stops like /p/ in some phonetic environment, they are also prenasalized.

English Input	Ekegusii Output	English Gloss
/'trʌmpɪt/	[etaru^mbeta]	'trumpet'
/tæŋk/	[eta^ŋgi]	'tank'
/'kæbɪdʒ/	[ekaβitʃi]	'cabbage'
/'sɪrɪndʒ/	[esire^ntʃi]	'syringe'

The data reveals that 'mp' is substituted with /^mb/ and the English /ŋk/ is replaced by /^ŋg/ in Ekegusii. In both instances, there is voice and nasal assimilation leading to the formation of voiced prenasalized stops. The formation of prenasalized stops is a phenomenon that is attested across Bantu languages (Hyman, 2001). In the adaptation of 'trumpet' /trʌmpɪt / as [etaru^mbeta], the cluster is simplified so as not to violate Ekugusii's syllable structure. The markedness constraint *CO_ONS is required as well as *CODA to ensure adherence to open syllabicity. Moreover, Ekegusii imposes a constraint that bans the occurrence of voiceless obstruents after nasals. This is the markedness constraint *NÇ. Further, this constraint dominates the faithfulness constraints IDENT-IO_VOICE and IDENT-IO_NASAL andDEP-IO(V). The constraints will be ranked as follows: *CODA, *CO_ONS>>*NÇ >> IDENT-IO_VOI/NAS, DEP-IO(V)

(3.13)   / trʌmpɪt / ⟶ [etaru^mbeta]   'trumpet'

/ trʌmpɪt /	*CODA	*CO_ONS	*NÇ	IDENT-IO_VOI/NAS	DEP-IO(V)
a. [trʌ.mpɪt]	*!	*	*		
b. [e.ta.ru.mpe.ta]			*!		**
c. ☞ [e.ta.ru.^mbe.ta]				**	**
d. [e.tru.^mbe.ta]		*!		**	*

Tableau (3.13) indicates that the optimal candidate is (c). It does not violate any of the high ranked undominated markedness constraints. Candidate (b) violates higher ranked *NÇ. On the other hand, candidate (d) is eliminated because of strict dominance of the high ranked markedness constraints *CO_ONS which it violates. Lastly, candidate (a) is the most disharmonic. It violates all the highly ranked markedness constraints: *CODA, *CO_ONS an *NÇ.

In addition, there is the adaptation of voiceless post alveolar affricate /tʃ/ in place of the voiced post-alveolar affricate /dʒ/. The two consonants are very similar in place and manner of articulation save for voice. Equally, both belong to the natural class of obstruents and voiceless obstruents are the unmarked category. Therefore, Ekegusii adapts the most unmarked sound cross linguistically. The constraint we posit to account for the preference of the voiceless obstruent is *[OBSVOI], which militates against voicing of obstruents and the *CODA constraint which bans codas. In the adaptation of 'cabbage' /'kæbɪdʒ/ as [e.ka.βi. tʃi], the undominated *[b] is an appropriate constraint. Moreover, Ekegusii outputs indicated that there is insertion of vowels and feature change. Consequently,DEP-IO(V) and IDENT-IO_VOI/CONT are relevant and will be dominated as: *CODA, *[b] >>*[OBSVOI] >> DEP-IO(V), IDENT-IO_VOI/CONT

(3.14) /'kæbɪdʒ/⟶ [e.ka.βi.tʃi] 'cabbage'

/ˈkæbɪʤ/	*CODA	*[b]	*[OBSVOI]	DEP-IO-V	IDENT-IO$_{VOI/CONT}$
a. ☞ [e.ka.βi.ʧi]				*	**
b. [ka.βi.ʤi]			*!	*	*
c. [e. ka. bi.ʧi]		*!	*	*	*
d. [kæ.bɪʤ]	*!	*	*		

Candidate (a) incurs the least serious violations of the faithfulness constrains which demand structural similarity between input and output and ranked low in the language. As a result, it is said to be optimal. As for candidate (b), it allows obstruent voicing which is disallowed in the adaptation. Candidate (c) violates two of the high ranked constraints: *[b] and *OBSVOI. (d) is the most disharmonic candidate. It violates all the high ranked markedness constraints.

4. Summary and Conclusions

In the study, English vowels were shown to be mapped to Ekegusii front and back vowels respectively. For instance, the close front unrounded vowel /ɪ/ was directly mapped from English to Ekegusii, however, in some loanwords it substituted the close front unrounded long vowel /i:/ which it shares the features [+high, -round, -back]. Furthermore, high front unrounded vowel /ɪ/ was adapted in loanwords having the diphthong /əɪ/ because diphthongs are unattested in the language. As for the mid-close front unrounded vowel /e/, besides direct mapping, it substituted the English vowels /ɪ/, /æ/, /ə/, /ɒ/ and the diphthong /eɪ/. It was noted that the mid-high front vowel /e/ shares the [-back, +lax] features with both /æ/ and /ɪ/ which necessitated the substitution. The schwa /ə/ is realized as /e/ because it is a weak central vowel. The diphthong /eɪ/, undergoes reduction or mora loss to become /e/. Similarly, /ɛ/, the mid-open front unrounded vowel, substitutes English loans which have /æ/, /ə/ and the diphthong /ei/. Apart from the diphthong, the three vowels share [-back, +lax, -round] features. Lastly on the front vowels, is the Ekegusiiopen unrounded central vowel /a/. It substitutes /æ/, /ɜ:/, /ə/, /ʌ/ and the diphthong /eɪ/. In this adaptation, /a/ shares [-back, +low, -round] features with /æ/, /ɜ:/. As for the /ə/ there seems to be fronting. Also, /a/ and the mid-open back unrounded vowel /ʌ/ share the features [+low, -round] which perhaps motivate the substitution. As for the diphthong, there is reduction

On the back vowels, the mid-close back rounded vowel /o/ in Ekegusii is very frequent in occurrence. It is adapted in /ɒ/, /ə/, /ʊ/, /ɔ:/ and the diphthong /əʊ/. It is noted that /ɒ/, /ɔ:/ /ʊ/ are close in terms of horizontal tongue position and lip rounding; leading to the substitution. In addition, they share the features [+round, +back]. The schwa closed towards /o/ phoneme since both are mid vowels in horizontal tongue dimension. Absence of diphthongs in Ekegusii language justifies the reduction of /əʊ/ to a simply /o/ due to gliding to [+back, +round] position. Lastly, the round close back vowel /u/ in Ekegusii is mapped in all English loans with the long back close round vowel /u:/ with which it shares the features [+round, +high, +back]. The round back close vowel /u/ also substituted /ʊ/ and the two share [+back, +round] features.

As pertains consonantal segments, data reveals that the adaptation is guided by shared features which ensured that the violations are minimal, a key feature of OT. It also determined markedness considerations that ensured segments that are unmarked cross linguistically are adapted over the marked ones. For instance, the bilabial fricative /β/ was mapped in loanwords which had /b/, /p/, /v/ and /f/. The sounds share [+labial] [+anterior] and [-sonorant] features. Secondly, the adaptation of the voiced velar stop /g/ to Ekegusii's /ɣ/, /k/ and /ŋg/ respectively. The shared features which motivated the mapping include; [+dorsal], [-sonorant] and [+voice]. Also, the voiced alveolar stop /d/ was adapted to Ekegusii's voiceless stop /t/. The data revealed that the absence of the voiced alveolar stop /d/ necessitated the mapping, although both share the features [-sonorant], [+coronal] and [+anterior]. Moreover, the voiceless alveolar stop in Ekegusii was adapted in loanwords which had the voiceless interdental fricative /θ/. Absence of the interdental in Ekegusii could explain the adaptation although both sounds share [-sonorant, +anterior, +coronal] features. Another preferred adaptation was that of the voiceless alveolar fricative /s/ being adapted in place of English loans with /z/, /ʃ/ and /ʒ/. These three sounds are not attested in the Ekegusii inventory though all are stridents. Equally, the voiceless alveolar fricative is the unmarked and preferred cross linguistically. Also, absence of the lateral /l/ in Ekegusii inventory led to its mapping as /r/ driven by the markedness constraint *[LAT]. Laterality as a feature is marked and therefore cross-linguistically avoided. Lastly, on the adaptation of manner-contour consonants in Ekegusii, it is noted that the English 'mp' and /ŋk/ are substituted with /ᵐb/ and /ŋg/ respectively in Ekegusii. In both instances, post-nasal voicing leads to the formation of prenasalized stops which are phonemic in the language as is the case across Bantu languages. Also attested in the Ekegusii language is the voiceless palatal fricative /ʧ/ which is the 'optimal' output in instances where loanwords have the voiced palatal affricate /ʤ/. In the adaptation of both vowels and consonants OT's markedness constraints such as *DIPH, *[REDUVED-V], *CODA, *CO$_{ONS}$, *OBSVOI and *NC̣ as well faithfulness constraints like MAX-IO$_{SEG}$, IDENT-IO$_{VOI/NAS/DIPH/CONT/LONG}$ and DEP-IO(V) among others, are used to account for the adaptation.

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