

A descriptive analysis of vowel harmony in Efutu¹

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Efutu, also known as Simpa, a less-studied, minority language of Ghana, is found to exhibit vowel harmony. The goal of this paper is to use data from a documentation of Efutu to present a descriptive analysis of vowel harmony as it manifests in the language. ATR and Rounding harmony constitute the two types of vowel harmony found in the language, with ATR harmony being more prevalent. The phenomenon shows up in various domains of the grammar, including verbal affixation, possessive constructions, and locative constructions. In verbal affixation, vowels in verbal prefixes assimilate the ATR and rounding values of the verb stem's vowels. In possessive constructions, vowels in possessive pronouns assimilate the ATR and rounding values of the possessed noun's vowels. In locative constructions, the definite article's vowel assimilates the locative noun's vowels' qualities. Thus, there is a clearly delineated domain of harmony with clear restrictions on both triggers and targets. In Efutu, vowel harmony involves leftward spread in terms of directionality, a case of regressive assimilation.

Keywords: *Simpa, Efutu, Guan, vowel harmony, ATR harmony, rounding harmony, verbal affixation.*

1. Introduction

This paper presents a language documentation-based descriptive analysis of vowel harmony in Efutu (sometimes spelt 'Effutu'), a previously under-described South-Guan language of Ghana. Like many of its Kwa relatives, Efutu exhibits vowel harmony in various aspects of its grammar, including the domains of verbal affixation, possessive constructions, and locative constructions. Two types of vowel harmony, namely, ATR harmony, and rounding harmony, occur in these domains of grammar of the language, though, ATR harmony is found to be more prominent. In terms of directionality, the spread of ATR and rounding features in the relevant domains is leftward, such that the target occurs to the left of the trigger to result in what could be described as regressive assimilation. The following sections expound on the Efutu vowel harmony. The discussion begins with a socio-linguistic background of the language in section 2, followed by a brief characterisation of the phenomenon of vowel harmony from a cross-linguistic perspective in section 3. Section 4 is devoted to the discussion of the Efutu vowel harmony, with sub-sections 4.1 and 4.2 focusing on ATR and rounding harmony, respectively. Section 5 deliberates on the prominence of ATR harmony over rounding harmony in Efutu. Section 6 touches on directionality. Section 7 concludes the discussion.

2. Sociolinguistic background of Efutu

Efutu is considered as one of three dialects of Awutu (Eberhard et al. 2020). The other two dialects are Awutu and Senya. Awutu, along with its dialects, is genetically classified as a South-Guan language belonging to the Kwa branch of the Niger-Congo family of languages (Hall 1983; Eberhard et al. 2020). A partial family tree in Figure 1 illustrates the linguistic

¹ This paper is based on sections from Agyeman 2016, a PhD thesis by the author.

classification of Efutu. It is spoken in Winneba, a coastal town in the central region of Ghana. The exact number of speakers of Efutu is not known, however the total number of speakers for all the three dialects of Awutu is estimated at 129,000 (Eberhard et al. 2020). In Winneba, speakers live mainly in suburbs close to the sea. That is to say, Efutu is spoken mainly in the quarters close to the sea, whereas Fante is the main language spoken in the inland parts (Welmers 1974:11, Agyeman 2016: 31).

Although the language is known to outsiders as Efutu², speakers call their language Simpa. Speakers also refer to their township, as well as their clan or tribe, as Simpa. In an interview, speakers explained that the term 'Efutu' is an Akan word with the meaning 'mixed up'. Apparently, outsiders perceive the language as containing vocabulary from different languages, hence the name Efutu (see Agyeman 2016: 25-26). Issues about the language names Simpa and Efutu, as well as other related names, including Ewutu and Awutu are discussed in detail in Agyeman (2016: 25-27). Speakers of Simpa or Efutu are bilingual in the Fante dialect of Akan and speak it as a second language. Fante is also the language used in schools, in addition to English, the official language of Ghana (see Agyeman 2013: 267-270; Ansah G.N. 2014; Ansah & Agyeman 2015). In terms of linguistic typology, significant features of Efutu include tone³, subject-verb-object word order, verb serialisation, and vowel harmony.

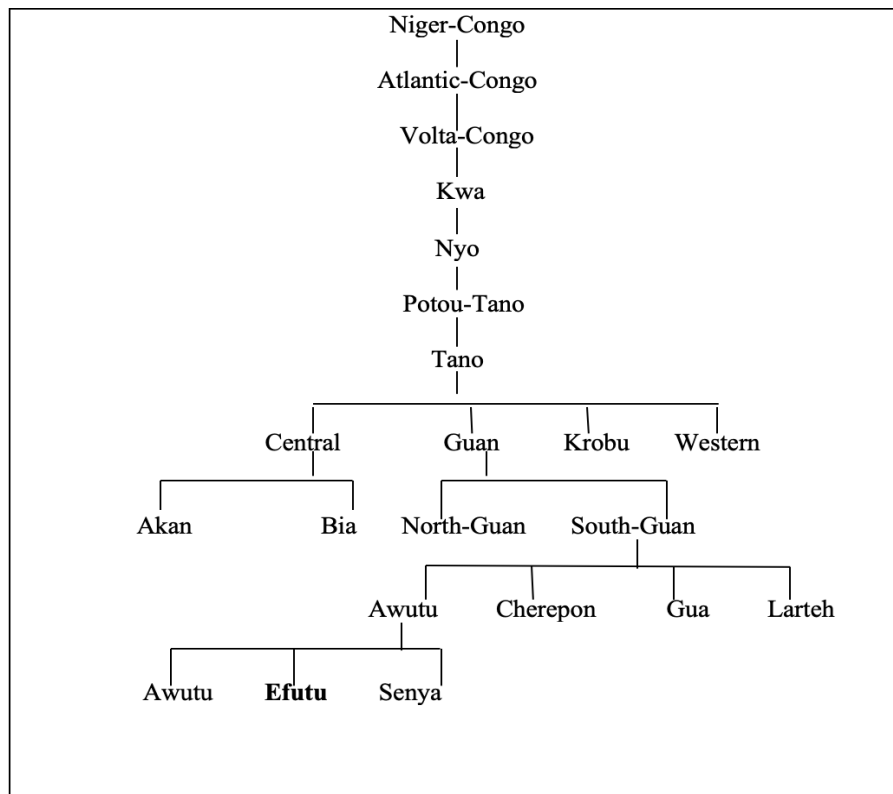


Figure 1: A partial family tree of Efutu

² All documents, including published materials, refer to the language as Efutu. For instance, the Ghana government has named the district Effutu Municipal District (Ghana Statistical Service, 2014).

³ Although Efutu is a tone language, tone is not marked in the data in this paper since it is considered not central to the discussion. Another feature which is not marked in the data is nasality, as it is not central to the discussion.

3. Vowel harmony

Vowel harmony has received extensive discussion in both theoretical and descriptive terms because of its intriguing nature. Cross-linguistic as well as language-specific studies of the phenomenon abound (Aoki 1968; Painter 1971; Hall et al. 1973; Clements 1976, 1985, 1991; Anderson L. 1980; Anderson S. R. 1980; Ringen 1988; Van der Hulst & Van de Weijer 1995; Casali 1995, 2003, 2008, 2012; Obeng 1995, 2000; Anderson, C.G. 1999; Finley 2006, 2008; Archangeli & Pulleyblank 2007; Nevins 2010; Gafos & Dye 2011; Archangeli et al. 2012; Van der Hulst 2012). Vowel harmony may be described as a phonological, assimilation process in which vowel sounds in a given domain share some or all articulatory features (Van der Hulst & Van de Weijer 1995; Rose & Walker 2011; Van der Hulst 2016). The domain of vowel harmony may vary in languages. Harmony may occur within a word or a smaller domain in some languages (Archangeli & Pulleyblank 2007: 363-364; Rose & Walker 2011: 251; Van der Hulst 2016:3), but also may extend to a larger domain such as an entire phrase in other cases (Archangeli & Pulleyblank 2007: 365). In some cases, the assimilating vowels may be separated by consonants (Van der Hulst 2016: 5; Rose & Walker 2011: 251). Cross-linguistically, vowel harmony types identified in languages involve one or more phonetic features, including the feature backness [+/- Back], height [+/- High], rounding [+/- Round] and tongue root [+/- ATR] (Van der Hulst 2016; Rose & Walker 2011; Van der Hulst & Van de Weijer 1995). Vowel harmony is widespread. It is reported in some related Guan languages, including Anum (Painter 1971), Nawuri (Casali 1995), Larteh (Akrofi-Ansah 2009; Ansah M. A. 2014) and Nkami (Akanlig-Pare & Asante 2016). It is also reported in some related Kwa languages like Akan (Dolphyne 1988; Clement 1985), and also Gur languages like Buli (Akanlig-Pare 2002) and Dagbani (Hudu 2010), as well as unrelated languages, such as Turkish (Khalilzadeh 2010), Finnish (Ringen & Heinamaki 1999; Valimaa-Blum 1999), Warlpiri (Harvey & Baker 2005) and Korean (Kim 2000; Finley 2006). The phenomenon is illustrated in (1) with ATR harmony in Nkami.

(1) Nkami

a. [+ATR]	b. [-ATR]
<i>e-muo</i> 'clay'	<i>ε-bɪ</i> 'time'
<i>e-ŋu</i> 'head'	<i>ε-yʊ</i> 'self'
<i>e-wei</i> 'house'	<i>ε-dano</i> 'tongue'
<i>e-fifi</i> 'sweat/ warmth'	<i>ε-mɛɪ</i> 'horn/ antenna'

(Akanlig-Pare & Asante 2016: 28)

The Nkami example in (1) involves ATR vowel harmony in nominal affixation. Vowels in nominal prefixes assimilate the ATR properties of vowels in stems. Thus, in each of the examples in (1a), the [+ATR] value of the nominal prefix /e/ is conditioned by the [+ATR] vowels in the respective noun stems, whereas in (1b), the [-ATR] value of the nominal prefix /ε/ in each example is conditioned by the [-ATR] vowels in the respective noun stems. In effect, two alternative forms of the same nominal prefix could be realised in Nkami based on ATR harmony in the language.

4. Efutu vowel harmony

This section begins with a brief overview of Efutu vowel inventory. Efutu operates a nine (9) vowel system, as presented in Table 1. In terms of distribution, each of the vowels may occur word-initially, except the High, Back vowels /u/ and /ʊ/, as illustrated in (2). Thus, in (2), /u/ and /ʊ/ are found to be without examples where they occur word-initially. These nine vowels are all contrastive, nonetheless, they are patterned in a way to achieve harmony in words and some other domains, as discussed in the following sections.

Table 1: Efutu vowel inventory

	Front	Central	Back
High	i, ɪ,		u, ʊ,
Mid	e, ɛ,		o, ɔ,
Low		a	

- (2).
- | | | |
|-----|--------------|--------------|
| /i/ | <i>lgo</i> | 'wall' |
| /ɪ/ | <i>ɪpan</i> | 'nine' |
| /e/ | <i>editɔ</i> | 'food' |
| /ɛ/ | <i>ɛda</i> | 'net' |
| /a/ | <i>atɔ</i> | 'thing' |
| /u/ | - | |
| /ʊ/ | - | |
| /o/ | <i>odefe</i> | 'chief/king' |
| /ɔ/ | <i>ɔsa</i> | 'person' |

The Efutu data from the language documentation corpus reveals two types of vowel harmony, namely, ATR harmony and rounding harmony, with ATR harmony being more prevalent, as mentioned earlier. Observed areas of grammar of the language where ATR and rounding harmony occur include the domains of verbal affixation, possessive construction, and locative constructions. A common feature associated with these areas of vowel harmony involves a somewhat morphological and positional restrictions on both targets and triggers. In each case, the target is a grammatical form whereas the trigger is a lexical form. With regards to position, the target occurs to the left of the trigger. These conditions hold for all instances of vowel harmony discussed below, as will be seen in the examples. For the sake of clarity, the two vowel harmony types, viz., ATR and rounding harmony will be discussed separately in the following sub-sections.

4.1 ATR harmony in Efutu

ATR harmony in Efutu requires that all vowels in certain domains - precisely, a root or a lexical

item, and its preceding grammatical word or prefix - share the same ATR value, such as [+ATR] or [-ATR]. Based on ATR harmony, vowels in Efutu may be classified into two harmonic sets, as in Table 2.

Table 2: Efutu ATR vowel harmonic sets

Set 1: [+ATR]	Set 2: [-ATR]
i	ɪ
e	ɛ
o	ɔ
u	ʊ
	a

The ATR harmonic sets as depicted in Table 2 suggest that the central vowel /a/ is without a [+ATR] equivalent.⁴ This gap creates an apparent asymmetry in the vowel system. Nevertheless, such a gap does not disturb the Efutu vowel harmony, as will be shown in the discussion.

In Efutu, it is common for all the vowels in a root or stem word to belong to the same ATR harmonic group. Stem words that conform to ATR harmony include those illustrated with the near-minimal pairs in (3a) for [+ATR] and (3b) for [-ATR].

(3a) [+ATR]

- i. *odu* 'medicine'
- ii. *oni* 'man/male'
- iii. *tɔire* 'call'
- iv. *mbiew* 'bone'
- v. *dei* 'sleep'
- vi. *yibi* 'tree/wood'
- vii. *inu* 'fish/meat'

(3b) [-ATR]

- i. *ɔpɔ* 'sea/salt'
- ii. *ɔɲɪ* 'red'
- iii. *tɔirew* 'write'
- iv. *bɪɛ* 'greet'
- v. *ɛbɛɪ* 'herrings'
- vi. *ɣɛɣa* 'arrange'
- vii. *anɔ* 'lips'

In spite of the prevalence of ATR harmony in Efutu, not all words in the language conform to the phenomenon. Example of words containing both [+ATR] and [-ATR] vowels are listed in (4), where [-ATR] vowels follow [+ATR] vowels in (i-vi) whereas [+ATR] vowels follow [-ATR] vowels in (vii-x).

(4)

- i. *gotɔ* 'room'
- ii. *bisa* 'ask'
- iii. *buyaa* 'needle'

⁴ Some related Kwa languages have a similar ATR harmonic inventory (see for instance Akanlig-Pare & Asante 2016 on Nkami). Nevertheless, some other related Kwa language include a [+ATR] counterpart (see for instance Dolphyne 1988 on Akan).

- iv. *burufɔ* 'urine'
- v. *editɔ/edutɔ* 'food'
- vi. *ebiɛ* 'chair'
- vii. *ɔse* 'woman/ female'
- viii. *ɔwɔse* 'faeces'
- ix. *atobi* 'child'
- x. *ɔsɔko* 'someone/ somebody'

In a sense, root words seem not to follow ATR harmony strictly (and also rounding harmony) in Efutu, as shown in (4). Indeed, in a cursory survey of a wordlist of eighty-five (85) root words, seventeen (17) of them were disharmonic in ATR, while sixty-eight (68) of them were ATR harmonic. This seems to suggest that ATR harmonic roots are more prevalent in the language. However, in other areas of grammar, the phenomenon is strictly adhered to. One such area of grammar is the domain of verbal affixation, where vowels in verbal affixes assimilate the ATR value of the verb stem's vowels. Such verbal affixes include pronominal prefixes and aspectual markers. The process of ATR harmony in verbal affixation is illustrated with the first person singular pronominal prefix and two aspectual markers, namely, the habitual marker and the future marker⁵, in (5) for [+ATR] and (6) for [-ATR].

(5)

- a. *mi-i-di mpuwa*
1SG-HAB-eat bananas
'I eat bananas'
- b. *mi-i-bete tɔibi n*
1SG-HAB-take knife DEF
'I take the knife'
- c. *mu-u-do yibi n*
1SG-HAB-climb tree DEF
'I climb the tree'
- d. *mu-u-tu empi n*
1SG-HAB-throw stone the
'I throw the stone'
- e. *m-ee-di mpuwa*
1SG-FUT-eat bananas
'I will eat bananas'
- f. *m-ee-bete tɔibi n*
1SG-FUT-take knife DEF
'I will take the knife'
- g. *m-ee-do yibi n*
1SG-FUT-climb tree DEF
'I will climb the tree'
- h. *m-ee-tu empi n*
1SG-FUT-throw stone the
'I will throw the stone'

⁵ For a more detailed discussion of pronominal prefixes, tense, and aspect marking in Efutu, see Agyeman (2016).

In example (5), the [+ATR] forms *mi* in (a-b) and *mu* in (c-d) of the first person singular '1SG' are triggered by the [+ATR] vowels in the verb stems *di* 'eat' (a), *bete* 'take' (b), *do* 'climb' (c) and *tu* 'throw' (d). Likewise, the forms *i* in (a-b) and *u* in (c-d) of the habitual aspect marker 'HAB' are conditioned by the [+ATR] vowels in the respective verb stems. In (5e)-(5h), the [+ATR] form /*ee*/ of the future marker⁶ 'FUT' is conditioned by the [+ATR] vowels in the stems *di* 'eat', *bete* 'take', *do* 'climb', and *tu* 'throw'. In (5e)-(5h), the pronominal prefix deletes its vowel segment in order to accommodate the sequence of vowels in the future marker /*ee*/ (for further discussion on vowel deletion, see Agyeman 2016: 88-90, 197-199). It is worth noting that in Efutu, all verbs begin with consonants

On the other hand, in (6), the [-ATR] forms *mu* in (a-c) and *mʊ* in (d-e) of the first person singular '1SG' are conditioned by the [-ATR] vowels in the verb stems *bɪɛ* 'greet' in (a), *fɛ* 'sell' in (b), *na* 'walk' in (c), *dɔ* 'like' in (d) and *fʊ* 'wash' in (e), respectively. Also, the forms *ɪ* in (a-c) and *ʊ* in (d-e) of the habitual aspect marker 'HAB', are triggered by the [-ATR] vowels in their respective verb stems. Furthermore, the [-ATR] form /*aa*/ of the future marker 'FUT' in (f-g) is conditioned by the [-ATR] vowels in the stems *fɛ* 'sell' in (f), and *fʊ* 'wash' in (g).

(6)

- a. *mɪ-ɪ-bɪɛ w⁷*
1SG-HAB-greet 2SG
'I greet you'
- b. *mɪ-ɪ-fɛ mpuwa*
1SG-HAB-sell bananas
'I sell bananas'
- c. *mɪ-ɪ-na*
1SG-HAB-walk
'I walk'
- d. *mʊ-ʊ-dɔ dwaade*
1SG-HAB-like cassava
'I like cassava'
- e. *mʊ-ʊ-fʊ bamba n*
1SG-HAB-wash cloth DEF
'I wash the cloth'
- f. *m-aa-fɛ mpuwa*
1SG-FUT-sell bananas
'I will sell bananas'
- g. *m-aa-fʊ bamba n*
1SG-FUT-wash cloth DEF
'I will wash the cloth'

The illustrations in (5) and (6) demonstrate that each of the targets, viz., the verbal

⁶ In Efutu, the future marker and the progressive marker are similar in form but different in tone (see Agyeman 2016).

⁷ At object position, the second singular uses the form *w*; at subject position, it is *o* or *ɔ*; the full form, that is the emphatic form is *ɔwʊ*.

prefixes, occurs with vowels of the same ATR value as found in the, trigger, viz., the verb stem's vowels. Again, it could be seen from the illustrations in (5) and (6) that the central vowel /a/ successfully participates in the vowel harmony. Thus, even though /a/ creates asymmetry in the Efutu vowel system, as pointed out in section 4, it is found to alternate with the [+ATR] vowel /e/ to produce an accurate harmony, as illustrated in (5e)-(5f) and (6f)-(6g). Thus, in the data, in (6f)-(6g), *m-aa-fɛ* '1SG-FUT-sell' and *m-aa-fɔ* '1SG-FUT-wash' occur in the environment of [-ATR] harmony, whereas in (5e)-(5f), *m-ee-di* '1SG-FUT-eat' and *m-ee-tu* '1SG-FUT-throw' occur in the environment of [+ATR] harmony.

Besides the domain of verbal affixation, ATR harmony occurs in possessive constructions in Efutu. In possessive constructions, the vowels in the possessive pronoun - the target - assimilates the ATR value of the possessed noun's vowels. This is illustrated in (7) and (8).

- (7)
- a. *mi bi* 'my child'
 - b. *mi se* 'my father'
 - c. *mu gotɔ* 'my room'
 - d. *mu wubi* 'my stomach'
 - e. *me editɔ* 'my food'

In (7), the possessive pronoun forms *mi* in (a-b) and *mu* in (c-d) adapt the [+ATR] value of the vowels in the respective possessed nouns in (a-d). Note that in (c), where the noun *gotɔ* 'room' contains both [+ATR] vowel and [-ATR] vowels, the possessive pronoun's vowel assimilates the closest vowel in the noun, viz, the [+ATR] /o/. Indeed, when the possessed noun begins with a vowel, there is usually a total assimilation such that the possessive pronoun's vowel adopts not only the ATR value but also all other features of the initial vowel of the possessed noun. This becomes possible as there is no intervening consonant between the target and the trigger. This is illustrated in (7e) where the possessive pronoun *me* adopts all the features of the initial vowel /e/ of the possessed noun *editɔ* 'food'.

Alternatively, in (8), the possessive pronoun uses the [-ATR] forms *mi* in (a-c) and *mɔ* in (d-e) as a result of the [-ATR] vowels in each of the nouns in (a-e). In (8f), the possessive pronoun form *ma* represents a total assimilation of the initial vowel /a/ of the possessed noun *ada* 'name'.

- (8).
- a. *mi bisi* 'my kola nut'
 - b. *mi tɛɛntɛɛ* 'my earth oven'
 - c. *mi ɲama* 'my boat/canoe'
 - d. *mɔ kɔn* 'my neck'
 - e. *mɔ dɔrɔwa* 'my needle'
 - f. *ma ada* 'my name'

Another domain where ATR harmony features in Efutu grammar is in locative constructions in which the locative noun is preceded by a definite article.⁸When the definite

⁸ See Agyeman (2016: 115) for discussion of locative nouns and also Agyeman (2016: 142) for discussion of articles in Efutu.

article occurs without a following locative noun, it is pronounced as an alveolar nasal /n/, and without a vowel (see examples (5b-d) and (6e), above, and also (12b-c), (16a-c), (17a-c), and (18a-b), below). However, when it occurs before a locative noun, the definite article, i.e. the target, is pronounced with a vowel which assimilates the ATR value of the locative noun's vowel. Examples (9)-(10) illustrate ATR harmony in the definite article. In (9a-b), the form *nu* 'DEF' of the definite article, with the [+ATR] vowel, is conditioned by the [+ATR] vowels in the respective locative nouns *so* 'top' and *wo* 'exterior'. The examples in (10a-b) on the other hand use the forms *nɔ* and *na*, respectively, with [-ATR] vowels as a result of the [-ATR] vowels in the locative nouns *tɔ* 'inside' and *ayinɛ* 'under'. In (10b), there is total assimilation since there is no intervening consonant between the target and the trigger; the definite article *na* adopts all the features of the initial vowel /a/ of the locative noun *ayinɛ* (see the discussion on (7e) and (8f), above).

(9)

- a. *mi-sina me ebie nu so*
1SG-sit.PST⁹1SGchair DEF top
'I sat on my chair'
- b. *mi-dzire igo nu wo*
1SG-stand.PST wall DEF exterior/side
'I stood by the wall'

(10)

- a. *mɔ-sɔ tɛibi nɔ tɔ*
1SG-hold.PST knife DEF inside
'I held the knife'
- b. *mi-dzire yibi na ayinɛ*
1SG-stand.PST tree DEF under/beneath
'I stood under the tree'

4.2 Rounding harmony in Efutu

Rounding harmony in the language requires that all the vowels in a given domain have the same rounding value, that is, either [+Round] or [-Round]. Based on Rounding feature, two harmonic sets could be realised in the language, as presented in Table 3.

Table 3: Efutu rounding vowel harmonic sets

Set 1: [+Round]	Set 2: [-Round]
u	i
ɔ	ɪ
o	e
ɔ	ɛ

⁹ In Efutu, the past tense has no morphological marking; the unmarked form is analysed as past tense in dynamic verbs (see Agyeman 2016: 188).

	a
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The Efutu rounding vowel harmonic sets are asymmetrical, in that, the central vowel /a/ lacks a [+Round] equivalent, as shown in Table 3. Nevertheless, there are no evidence of dissonance in the harmony system resulting from this asymmetry. In other words, any violation of rounding harmony is not attributed to the existence of the asymmetry (see discussion of violation of rounding harmony in §5).

Rounding harmony may be found in root words, such that, there are root words that contain [+Round] vowels only, as in (11a), as well as words that contain [-Round] vowels only, as in (11b). However, words in the language may contain both [+Round] and [-Round] vowels, as in (11c), suggesting that rounding harmony is not a requirement in root words. Apparently, a random survey of a wordlist of eighty-five (85) root words revealed forty-nine (49) rounding harmonic root words against thirty-six (36) disharmonic ones. Nonetheless, rounding harmony is essential in certain areas of grammar of the language, as discussed below.

(11)

(a) [+Round]	(b) [-Round]	(c) Both
i. <i>odu</i> 'medicine'	i. <i>yeya</i> 'arrange'	i. <i>inu</i> 'fish/meat'
ii. <i>ɔpɔ</i> 'sea/salt'	ii. <i>bisa</i> 'ask'	ii. <i>ɔpi</i> 'man/male'
iii. <i>gotɔ</i> 'room'	iii. <i>tɛɾɛw</i> 'write'	iii. <i>ɔwɔse</i> 'faeces'
iv. <i>burufɔ</i> 'urine'	iv. <i>bɪɛ</i> 'greet'	iv. <i>editɔ</i> 'food'
v. <i>ɔsɔko</i> 'somebody'	v. <i>ɛbɛɪ</i> 'herrings'	v. <i>buyaa</i> 'needle'

In Efutu, rounding harmony takes place in verbal affixation where vowels in verbal affixes assimilate the rounding value of the vowels in verb stems. The verbal affixes include pronominal prefixes and aspectual markers. Rounding harmony in Efutu is illustrated in (12) for [+Round] and (13) for [-Round].

(12)

- a. *mɔ-ɔ-wɔ ewuso*
1SG-HAB-go home
'I go home'
- b. *mɔ-ɔ-dɔkɔra esumi n*
1SG-HAB-finish work DEF
'I finish the work'
- c. *mu-u-ku yibi n*
1SG-HAB-cut tree DEF
'I cut the tree'

In (12), the first person singular pronominal prefix '1SG', uses the forms *mɔ* in (a-b) and *mu* in (c), both of which have [+Round] vowels conditioned by the [+Round] vowels in the verb stems *wɔ* 'go' in (a), *dɔkɔra* 'finish' in (b) and *ku* 'cut' in (c). Likewise, the habitual marker 'HAB' uses the [+Round] forms *ɔ* in (a-b) and *u* in (c), both of which are conditioned by the [+Round] vowels in the respective verb stems.

In contrast, in (13), the first person singular '1SG' uses the [-Round] forms *mi* in (a-b) and *mi* in (c), conditioned by the [-Round] vowels in their respective verb stems. Likewise, the [-Round] forms of the habitual marker 'HAB' *i* in (a-b) and *ɪ* in (c).

(13)

- a. *mi-i-dei*
1SG-HAB-sleep
'I sleep'
- b. *mi-i-wir inu*
1SG-HAB-steal fish
'I steal fish'
- c. *mɪ-ɪ-ba pɔase*
1SG-HAB-come beach
'I come to the beach'

Another domain where rounding harmony occurs is in possessive constructions. In possessive constructions, the possessive pronoun's vowels adapt the rounding value of the vowels in the possessed noun, as illustrated in (14) for [+Round] and (15) for [-Round].

(14)

- a. *mu kur* 'my husband'
- b. *mu kotoku* 'my sack'
- c. *mʊ pʊsɪrɛɪ* 'my octopus'
- d. *mʊ nkɔba* 'my hook'

(15)

- a. *mi kyibi* 'my knife'
- b. *mi feibi* 'my thread'
- c. *mɪ nkɛɪ* 'my groundnuts'
- d. *mɪ ka* 'my wife'

In (14), the possessive pronoun uses the forms *mu* in (a-b) and *mʊ* in (c-d) with [+Round] vowels, as a result of the [+Round] vowels in their respective possessed nouns. In (14c-d), where each of the possessed nouns has both [+Round] and [-Round] vowels, the possessive pronoun's vowel assimilates the closest vowel. Thus, in the case of *pʊsɪrɛɪ* 'octopus' in (14c), for instance, the possessive pronoun's vowel assimilates the closest vowel in the noun, that is, the [+Round] vowel /ʊ/. In (15), on the other hand, the [-Round] variants *mi* in (15a-b) and *mɪ* in (15c-d) of the possessive pronoun occur as a result of the [-Round] vowels in the respective possessed nouns. It should be pointed out that in (14d) and (15c), the initial segment /n/ of the possessed nouns *nkɔba* 'hook' and *nkɛɪ* 'groundnut', respectively, is syllabic. This then seems to suggest that vowel harmony can prevail over an intervening syllable between the target and the trigger. This may warrant a fuller investigation with more data in a future research.

So far, the discussion has demonstrated that ATR and Rounding harmony are prevalent in certain areas of the grammar of Efutu where they may occur concurrently. Notwithstanding, it is worth noting that neither of the harmonic processes is dependent on the other. In other

words, ATR harmony or disharmony does not necessarily influence Rounding harmony or disharmony, and vice versa. So, for instance, a Rounding harmony or disharmony in a word may not be attributed to the presence of or lack of ATR harmony or disharmony. Differently put, a violation of one harmony process is not a result of an observation of (or a violation of) the other. Thus, each harmony system is independent of the other.

5. Prominence of ATR harmony over rounding harmony in Efutu

As mentioned in §1, in Efutu, ATR harmony is more prominent than rounding harmony. In certain contexts, rounding harmony fails to occur, or it gets violated, whereas ATR harmony persists in all instances¹⁰. Violation of rounding harmony could be found in verbal affixation involving certain types of pronominal prefixes, including the second person singular, the third person singular (both animate and inanimate), and the third person plural (both animate and inanimate). The second person singular, the third person singular animate and the third person plural pronominal prefixes are found to resist [-Round] harmony while the third person singular inanimate resists [+Round] harmony. Nevertheless, ATR harmony is observed in all these cases.

Unlike other pronominal prefixes, the second person singular, the third person singular, and the third person plural pronominal prefixes, each resists [-Round] harmony and therefore has no [-Round] variants. This violation of rounding harmony is illustrated with the second person singular and the third person singular in (16) and (17), respectively.

(16)

- a. *o-o-ku tamɸɪ n*
2SG-HAB-cut rope DEF
'you cut the rope'
- b. *ɔ-ɔ-fɔ bamba n*
2SG-HAB-wash cloth DEF
'you wash the cloth'
- c. *o-o-di amanaa n*
2SG-HAB-eat plantain DEF
'you eat the plantain'
- d. *ɔ-ɔ-ka simpa*
2SG-HAB-speak Simpa
'you speak Simpa'

In (16a-b), Rounding harmony is observed, as the verbal prefixes, *o-o-* '2SG-HAB' in (16a) and *ɔ-ɔ-* '2SG-HAB' assimilate the [+Round] feature of their respective stems. One would then expect that in (16c-d), where the stems *di* 'eat' and *ka* 'speak' contain [-Round] vowels, their prefixes will assimilate the [-Round] feature. But that does not happen. The [-Round] stems fails to transfer the unrounded feature to the prefixes. Rounding harmony, or, better still [-Round] harmony, is therefore violated in (16c-d); the prefixes maintain their [+Round]

¹⁰ A similar observation, regarding the prominence of ATR harmony, has been made in Nkami, where rounding and height harmonies are said to be restricted and secondary, in comparison with ATR harmony (Akanlig-Pare & Asante, 2016: 21)

feature. Hence, these verbal prefixes do not have [-Round] variants. Notwithstanding, ATR harmony occurs in (16a-d), thus, the prefixes have both [+ATR] and [-ATR] variants, as could be seen in (16a-d).

In a similar manner, in (17a-b), rounding harmony is observed. The vowels in the prefixes *mu-u-* in (17a) and *m̄v-̄v-* in (17b) adapt the [+Round] feature of the vowels in their respective verb stems. In (17c-d), however, the verbal prefixes retain their [+Round] feature against the expectation of adapting the [-Round] feature of the vowels in the respective verb stems. Thus, rounding harmony is observed in (17a-b) but violated in (17c-d). Nevertheless, ATR harmony is observed in (17a-d).

(17)

- a. *mu¹¹-u-ku* *tampɪɪ n*
3SG-HAB-cut rope DEF
's/he cuts the rope'
- b. *m̄v-̄v-f̄v* *bamba n*
3SG-HAB-wash cloth DEF
's/he washes the cloth'
- c. *mu-u-di* *amanaa n*
3SG-HAB-eat plantain DEF
's/he eats the plantain'
- d. *m̄v-̄v-ka* *simpa*
3SG-HAB-speak Simpa
's/he speaks Simpa'

The other instance of violation of rounding harmony in Efutu involves the resistance of [+Round] harmony in the second person singular inanimate pronominal prefix. This is illustrated in (18).

(18)

- a. *i-i-ku* *tampɪɪ n*
3SG.INAN-HAB-cut rope DEF
'it cuts the rope'
- b. *ɪ-ɪ-f̄v* *bamba n*
3SG.INAN-HAB-wash cloth DEF
'it washes the cloth'

In (18a-b), each of the verb-stems *ku* 'cut' and *f̄v* 'wash' fail to transfer the [+Round] feature of its vowel to its respective prefixes, hence rounding harmony is violated. The third person singular inanimate pronominal prefix therefore does not have [+Round] variants. ATR harmony however is observed in (18a-b). From the above discussion and illustrations, it could be concluded that in verbal affixation in Efutu, ATR harmony is always observed whereas rounding harmony sometimes gets violated. Such a violation was initially thought to be motivated by a sort of feature preservation in these forms, particularly with regards to the

¹¹ In Efutu, the third person singular pronominal prefix sometimes coincides with the first person singular (compare examples (5c-d), (6d-e) and (10), all in section 4.1., and (12a-c) in section 4.2.). When the form is used out of context, it may create ambiguity.

rounding value of the vowels in the emphatic¹² form of the pronoun, which does not change form. For instance, in the case of the second person singular, it was assumed that the resistance to [-Round] harmony was motivated by the need to preserve the feature [+Round] of the vowels in the emphatic form *ɔwɔ*. This assumption however seems inaccurate because of other instances where such preservation is not observed, as in the case of the first person singular, where the emphatic form *emi* has only [-Round] vowels, and yet the [+Round] variants *mɔ* and *mu* occur in addition to the [-Round] variants *mi* and *mi*. A more critical investigation is needed to unearth a possible justification for the above-described exceptions.

Regarding the underlying form of each of the set of morphs in question, this study has analysed as the underlying form the one that uses the vowels in the emphatic form. This analysis is grounded on the fact that the emphatic form does not alternate; it is therefore plausible to suggest that the underlying form is the one that retains the emphatic form's vowels while the other alternatives adjust their vowels based on adjacent vowels. Thus, in the first singular for instance, as a result of the [+ATR, -Round] vowels in the emphatic form *emi*, the form *mi* is analysed as underlying, while the alternative forms *mi*, *mu*, and *mɔ* are considered as allomorphs triggered by adjacent vowels. Likewise, in the second singular, based on the emphatic form *ɔwɔ*, the form *ɔ* is analysed as underlying whereas the alternative form *o* is analysed as an allomorph.

6. Directionality

It was mentioned in §1 that the Efutu vowel harmony involves leftward spread in terms of directionality, yet, this needs further consideration. From the illustrations so far, it could be observed that, in each of the examples, the relevant features, viz., ATR and rounding, spread from right to left. In other words, the spread is leftward, such that the target occurs to the left position in relation to the trigger. Thus, in (5a), for instance, repeated here as (19), the features [+ATR, -Round] of the verb stem's vowel /i/ which is the trigger, spread leftwards to influence the verbal prefixes to yield the [+ATR, -Round] forms *i* and *mi* of the habitual aspect marker and the first person singular pronominal prefix, respectively. Thus, the prefixes' vowels assimilate the features of the stem's vowel. The result is the various alternative forms of each affix, as seen in all the examples. The above-described leftward spread illustrates a case of regressive assimilation. Nevertheless, an evidence of how suffixes behave in suffixation is necessary to fully establish the argument. Meanwhile, data available so far has not revealed suffixes in the language. This therefore needs to be investigated further in order to draw a firm conclusion.

- (19) *mi-i-di mpuwa*
 1SG-HAB-eat bananas
 'I eat bananas'

7. Conclusion

¹² For further discussion of the emphatic forms of pronouns in Efutu, see Agyeman (2016: 121-123).

This paper has deliberated on some phonological processes in Efutu, a previously under-studied minority language. The study has used empirical data from a documentation of Efutu to analyse ATR and rounding vowel harmony in the language. The discussion has explained and illustrated how the two vowel harmony types pattern vowels in the language to achieve harmony in words, verb roots and their prefixes, nouns and their possessive pronouns, and locative nouns and their preceding definite articles. The analysis has pointed out apparent asymmetries in the vowel system of the language and has further explained and illustrated that such asymmetries do not obstruct vowel harmony in the language. The discussion has also pointed out the prevalence of ATR harmony over rounding harmony in the language, especially, with regard to violation of rounding harmony in certain pronominal prefixes. Directionality of the Efutu vowel harmony has been shown to be leftward, based on the available data. Essentially, this discussion has centred on vowel harmony in three areas of the grammar in the language, namely, verbal affixation, possessive constructions, and the definite article. Other interesting areas in terms of vowel harmony in the language worth exploring in future research could include nominal affixation, such as plural formation in nouns, as well as compounding in words. Also, this study has provided a descriptive account of vowel harmony in the language; a future research may target a theoretical approach to the analysis.

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