

A PHONOLOGICAL ANALYSIS OF TWI VOWELS

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The phonological analysis for Twi vowels set out in this paper is an application of the technique of prosodic abstraction in phonological statement originated by the late Professor J. R. Firth.¹ This type of phonological analysis makes use of two types of elements – Prosodic and Phonematic elements.

PROSODIC ELEMENTS are phonological features that have phonetic exponents extending over more than one place in the relevant structure, or have implications over more than one place in the structure in so far as they help to delimit it from preceding and following structures. In this paper the prosodies are stated for the word (word prosody), and for the syllable (syllable prosody).

PHONEMATIC ELEMENTS are phonological features that have phonetic exponents which may be referred to one place only in the phonetic structure of the syllable. There are two types of phonematic elements, and these are the C and V elements which are referable at the phonetic level to consonantal and vocalic articulations respectively. This paper deals specifically with the V phonematic element.

Twi has ten vowels. The tongue positions for these vowels are shown on the vowel diagram below.



The distribution of these vowels is such that it is almost impossible to make any phonological statement of Twi vowels without reference to Vowel Harmony. This paper is however not a statement of Vowel Harmony in Twi, and therefore a detailed account of Vowel Harmony in Twi is not attempted here.

In most Twi words of more than one syllable the vowel qualities that occur are either [i, e, æ, o, u] in the same word, or [ɛ, æ, ɔ, ɔ].

e.g. obetu (he will dig) ɔbetɔ? (he will throw)
wætu (he has dug) wɔtɔ? (he has thrown)

Leaving out examples with the vowels [æ, a] for the moment, the following examples illustrate the relation between vowel qualities in successive syllables of Twi words. (All

¹ J. R. Firth, 'Sounds and Prosodies', *TPS* 1948, pp. 127-52. (See also R. H. Robins, 'Aspects of Prosodic Analysis', *PROCEEDINGS OF THE UNIVERSITY OF DURHAM PHILOLOGICAL SOCIETY*, vol. 1, 1957.)

the examples used here function as verbs in Twi. Although the phonological statements made here will apply to words of the other grammatical categories, the verb has been selected for this analysis because it can be easily analysed into its stem and affixes, and the dependence between vowel qualities in stem and affixes can be easily illustrated). The prefixes in the following examples are underlined.

TABLE 1

| | | | |
|--------------------|-------------|--------------------|---------|
| 1. <u>mi</u> tu | I dig | 2. <u>mi</u> tɔʔ | I throw |
| 3. <u>mi</u> hɔɪre | I pierce | 4. <u>mi</u> kyɪre | I show |
| 5. <u>mi</u> suro | I am afraid | 6. <u>mi</u> pɔtɔʔ | I mash |

TABLE 2

| | | | |
|--------------------|---------------|--------------------|----------|
| 1. <u>je</u> tu | we dig | 2. <u>je</u> tɔʔ | we throw |
| 3. <u>je</u> hɔɪre | we pierce | 4. <u>je</u> kyɪre | we show |
| 5. <u>je</u> suro | we are afraid | 6. <u>je</u> pɔtɔʔ | we mash |

The examples in Table 1 show that the close front vowel [i] occurs in the 1st person singular pronominal prefix where the vowels in the rest of the verb are [i, e, o, u]. The more open vowel [ɪ] occurs in the prefix where the vowels in the rest of the verb are [ɪ, ɛ, ɔ, ɔ]. In Table 2 the half-close front vowel [e] occurs in the prefix where the vowels in the rest of the verb are [i, e, o, u], and it is [ɛ], a half-open front vowel where the vowels in the rest of the verb are [ɪ, ɛ, ɔ, ɔ].

In each of these examples there is a mutual dependence between the quality of the vowel in the prefix and those in the verb stem, so that it is possible for the eight vowels considered here to be paired into i/ɪ, e/ɛ, o/ɔ, u/ɔ, the first of each pair having a closer quality and a higher tongue position (H) than the second, which has a more open quality and a lower tongue position (L).

Phonologically it is possible to set up one phonematic V unit for each pair of vowels, and to distinguish between them by means of two prosodic elements – H-prosody and L-prosody which will take into account the features of closeness or openness that characterise the vowels [i, e, o, u] and [ɪ, ɛ, ɔ, ɔ] respectively. In the following phonological formulae the symbol ² is used for the V element of the first person singular pronominal prefix, and E for the first person plural pronominal prefix. H or L outside the brackets indicates that H- or L-prosody as the case may be is an element of the verb as a whole.

In examples 3 and 4 the vowels of the final syllable and the preceding syllable have front vowel quality and spread lips. In examples 5 and 6 the vowels of the final syllable

TABLE 1

| | | | | |
|-------------|------------|-----------|-------------|-----------|
| H/L[miCV] | 1. mitu | H[miCV] | 2. mitɔʔ | L[miCV] |
| H/L[miCVCV] | 3. mihɔɪre | H[miCVCV] | 4. mi kyɪre | L[miCVCV] |
| H/L[miCVCV] | 5. misuro | H[miCVCV] | 6. mipɔtɔʔ | L[miCVCV] |

² i.e. capital I.

A PHONOLOGICAL ANALYSIS OF TWI VOWELS

TABLE 2

| | | | | |
|---------------|------------|-------------|------------|-------------|
| H/L[(j)ECV] | 1. jetu | H[(j)ECV] | 2. jɛtɔʔ | L[(j)ECV] |
| H/L[(j)ECVCV] | 3. jehɥire | H[(j)ECVCV] | 4. jɛkyɪɾɛ | L[(j)ECVCV] |
| H/L[(j)ECVCV] | 5. jesuro | H[(j)ECVCV] | 6. jɛpɔtɔʔ | L[(j)ECVCV] |

and the preceding syllable have back vowel quality and rounded lips. Disyllabic verb stems in Twi either have front vowels with spread lips in each verb stem or back vowels with rounded lips.³ In the phonological formulae below frontness of vowel quality and spread lips in [hɥire, kyɪɾɛ] are exponents of *y*-prosody for the piece contained in the round brackets. Similarly the exponents of *w*-prosody in [suro, pɔtɔ] are backness of vowel quality and rounded lips.

Moreover in examples 3-6 the vowels in the final syllables have a lower tongue position than the vowels in the preceding syllables, although both syllables are characterised as H/L or *y/w* as the case may be. Phonologically therefore it is possible to set up two V elements - a close V element symbolised as *l* for the vowel sounds [i, ɪ, u, ɔ] and an open V element *E* for the vowel sounds [e, ɛ, ɔ, ɔ]. The difference between the vowels [i, ɪ, e, ɛ] on the one hand and [o, ɔ, u, ɔ] on the other is expressed in terms of *y*-prosody and *w*-prosody. Thus the above examples may now be represented by the following phonological formulae.

TABLE 1

| | | | | |
|-----------------------------------------------|------------|-------------------------------------------|-------------|-------------------------------------------|
| H/L[(ml) ^y (Cl) ^w] | 1. mitu | H[(ml) ^y (Cl) ^w] | 2. mlɔʔ | L[(ml) ^y (Cl) ^w] |
| H/L[(ml) ^y (CICE) ^{y/w}] | 3. mihɥire | H[(ml) ^y (CICE) ^y] | 4. mlɛkyɪɾɛ | L[(ml) ^y (CICE) ^y] |
| | 5. misuro | H[(ml) ^y (CICE) ^w] | 6. mlɛpɔtɔʔ | L[(ml) ^y (CICE) ^w] |

TABLE 2

| | | | | |
|-----------------------------------------------|------------|-------------------------------------------|------------|-------------------------------------------|
| H/L[(j)E ^y (Cl) ^w] | 1. jetu | H[(j)E ^y (Cl) ^w] | 2. jɛtɔʔ | L[(j)E ^y (Cl) ^w] |
| H/L[(j)E ^y (CICE) ^{y/w}] | 3. jehɥire | H[(j)E ^y (CICE) ^y] | 4. jɛkyɪɾɛ | L[(j)E ^y (CICE) ^y] |
| | 5. jesuro | H[(j)E ^y (CICE) ^w] | 6. jɛpɔtɔʔ | L[(j)E ^y (CICE) ^w] |

The H/L or *y/w* prosodic elements of structure in these examples are not dependent on any particular C element or set of C elements and therefore a detailed description of the C elements in these examples is not given here.

The above tables show that my phonological analysis so far recognises two V elements - a close V element *l*, and an open V element *E*. For each example the rounding or unrounding of the lips in pronunciation is stated phonologically as a prosody of the syllable and symbolised as 'w' or 'y' outside the round brackets. The degree of raising of the tongue is considered for the vowels in each example as a whole and stated phonologically in terms of H- or L-prosody and symbolised as H or L outside the square brackets to indicate that it is the more raised or the more lowered vowel sounds associated with the V elements *l* and *E*. The V elements and the vowel sounds associated with them are set out in the following table.

³ There are a few 'mixed' disyllabic verb stems all of which have rounded back vowels in the first syllable and front vowels with spread lips in the second syllable, e.g. sɔnt, porɪ, hurɪ, wɔtɪ.

TABLE 3

| V element | Word Prosody | | Syllable prosody |
|-----------|--------------|---|------------------|
| | H | L | |
| I | i | ɿ | y |
| | u | o | w |
| E | e | ɛ | y |
| | o | ɔ | w |

WORDS IN WHICH THE VOWELS [æ, a] OCCUR (the prefixes are underlined)

TABLE 4

| | | | |
|-------------------|--------------------|-------------------|---------------|
| 1. <u>mætu</u> | I have dug | 2. <u>matɔ?</u> | I have thrown |
| 3. <u>mæhqire</u> | I have pierced | 4. <u>makyɿɛ</u> | I have shown |
| 5. <u>mæsuɾo</u> | I have been afraid | 6. <u>mapɔtɔ?</u> | I have mashed |

TABLE 5

| | | | |
|-------------------|---------------------|------------------|----------------|
| 1. <u>jætu</u> | we have dug | 2. <u>jatɔ?</u> | we have thrown |
| 3. <u>jæhqire</u> | we have pierced | 4. <u>jakyɿɛ</u> | we have shown |
| 5. <u>jæsuɾo</u> | we have been afraid | 6. <u>jaɔtɔ?</u> | we have mashed |

In the above examples the vowel [æ] occurs in the prefix where the vowels in the rest of the verb are [i, e, o, u] and [a] where the vowels in the rest of the verb are [ɿ, ɛ, ɔ, o]. [æ] is a closer vowel quality than [a], and since [æ] occurs before syllables with the closer vowel qualities associated with the V elements I and E, and [a] before syllables with the more open vowel qualities associated with the V elements I and E, a V element A may be set up at this point for the vowel qualities [æ, a] and the difference between them dealt with in terms of H- and L-prosody which will take into account the features of closeness or openness of the vowel sounds in the following syllables as well. The phonological formulae below show that H-prosody or L-prosody as the case may be is an element of each word as a whole.

TABLE 4

| | | | | |
|---------------------------------|-------------------|-----------------------------|-------------------|-----------------------------|
| H/L[(mA) (Cl)] ^m | 1. <u>mætu</u> | H[(mA) (Cl)] ^m | 2. <u>matɔ?</u> | L[(mA) (Cl)] ^m |
| H/L[(mA) (ClCE)] ^{y/m} | 3. <u>mæhqire</u> | H[(mA) (ClCE)] ^y | 4. <u>makyɿɛ</u> | L[(mA) (ClCE)] ^y |
| | 5. <u>mæsuɾo</u> | H[(mA) (ClCE)] ^m | 6. <u>mapɔtɔ?</u> | L[(mA) (ClCE)] ^m |

TABLE 5

| | | | | |
|---------------------------------|-------------------|-----------------------------|------------------|-----------------------------|
| H/L[(jA) (Cl)] ^m | 1. <u>jætu</u> | H[(jA) (Cl)] ^m | 2. <u>jatɔ?</u> | L[(jA) (Cl)] ^m |
| H/L[(jA) (ClCE)] ^{y/m} | 3. <u>jæhqire</u> | H[(jA) (ClCE)] ^y | 4. <u>jakyɿɛ</u> | L[(jA) (ClCE)] ^y |
| | 5. <u>jæsuɾo</u> | H[(jA) (ClCE)] ^m | 6. <u>jaɔtɔ?</u> | L[(jA) (ClCE)] ^m |

A PHONOLOGICAL ANALYSIS OF TWI VOWELS

So far three phonological values I, E, A have been set up for the ten vowels of Twi. I and E have four phonetic qualities associated with each of them (see Table 3, page 86). The vowel qualities associated with A are [æ, a].

The H and L prosodic features stated for the above verbal forms also applies to reduplicated forms of the verb.

| VERB STEM | | | REDUPLICATED FORM | |
|-----------|-------|-------------------|-------------------|-----|
| 1. | tu | (H) to dig | tutu | (H) |
| 2. | tɔ | (L) to throw | tɔtɔ | (L) |
| 3. | bɔ | (L) to break | bɔbɔ | (L) |
| 4. | sɛ | (L) to spread out | sɛsɛ | (L) |
| 5. | ka | (L) to bite | kɪka | (L) |
| 6. | hɪɪre | (H) to pierce | hɪɪrehɪɪre | (H) |
| 7. | kyɪre | (L) to show | kyɪrekyɪre | (L) |
| 8. | kasa | (L) to speak | kasakasa | (L) |
| 9. | kɔra | (L) to keep | kɔrakɔra | (L) |
| 10. | kura | to hold | kurekura | |
| 11. | bisa | to ask | bisebisa | |

The underlined part in each of the above examples bears the closest resemblance to the simple verb stem and is therefore referred to here as the verb stem. The term 'countersegment' is used for the prefix. These reduplicated forms are therefore considered as made up of two parts - the final part referred to as the verb stem, and the initial part referred to as the countersegment. The description of the countersegment is made in relation to the verb stem.

Reduplicated forms of verbs inflect for person and tense like the simple verb stem, but they are used in different contexts to denote plurality of subject, plurality of object and repetition of action. In the examples used here, only the meanings of the verb stems are given.

In examples 1-9 where H- or L-prosody is an element of the verb stem the same prosodic feature is an element of the reduplicated form. In examples 1-5 where the verb stems are monosyllabic, the close V element I occurs in the countersegment whether the V element of the verb stem is I, E or A. In examples 6-9 where the verb stems are disyllabic the vowels of the countersegments are the same as the vowels in the corresponding syllables of the verb stem.

In examples 10 and 11 however where the verb stems have an H-L structure (i.e. the first syllable is characterised as H and the second syllable as L), the vowel quality of the second syllable of the countersegment is [e], the front and more raised vowel quality associated with the open V element E, and this is regular in all the reduplicated forms of H[CI]L[CA] verb stems.

In order to account for, and show the relation between the V elements in the second syllables of the countersegments and those of the verb stems in examples 10 and 11, it is possible to consider that there are two 'A' V elements, the first one having the vowel quality [æ] as its H exponent (see Tables 4 and 5, page 86), and the second one having the vowel quality [e] as its H exponent, as in the countersegments of examples 10 and 11.

However since the vowel quality symbolised as [a], the L exponent of the V element A, is the same in the prefixes of the verbal forms given in Tables 4 and 5 and in the second syllables of [bisa, kura], it is considered here that there is one V element which has the vowel qualities [æ, e] when it occurs in an H syllable.⁴ On account of the close similarity between the vowel quality of the H exponent of the V element E when it occurs in a 'y' syllable, and that of the H exponent of A in the countersegments of examples 10 and 11 above, I want to consider the vowel qualities [æ, a] as well as [e] as exponents of the same V element E. Since the vowel qualities [æ, a] are pronounced with a neutral lip-position these are considered here as the exponents of the open V element E when it occurs in a 'a' syllable; [e, ε] being its exponents when it occurs in a 'y' syllable; and [o, ɔ] when it occurs in a 'w' syllable. The reduplicated forms of examples 10 and 11 may be represented by the following phonological formulae.

10. kurekura H[(C₁l)^w(C₂E)^y(C₁l)^w]L[(C₂E)^a]

11. bisebisa H[(C₁lC₂EC₁l)^y]L[(C₂E)^a]

In thus doing away with a third V element A in the phonological analysis and in considering its exponents as part of the exponents of the V element E, a certain degree of economy is achieved in the phonological statement for Twi vowels. For example only the vowels [e, ε, æ, a, o, ɔ] occur initially in vowel-initial words. If a third V element A is retained such a statement will have to be made twice, for the V element E and for the V element A. Again, apart from a few examples in the Akuapem dialect of Twi, all monosyllabic stems in which the open V element occurs are characterised as L, that is, the vowels [e, æ, o] do not occur in monosyllabic stems. Such phonological statements which equally apply to the V elements E and A can now be made once for the V element E.

The phonological analysis presented here for the ten vowels of Twi [i, ɪ, e, ε, æ, a, o, ɔ, u, ɔ] now recognises two V elements – a close V element l and an open V element E. The degree of raising of the tongue for the vowel sounds in each word as a whole is stated phonologically as a word prosody and dealt with in terms of H- and L-prosody. This is symbolised as H or L outside the square brackets to indicate that it is the more raised or the more lowered vowel sounds associated with the V elements enclosed in the brackets.

The third dimension of vowel quality dealing with the position of the lips during the articulation of the syllables in which the V elements occur is stated separately for the syllables with close V element l, and for the syllables with the open V element E.

For the syllables in which the V element l occurs the lips are either rounded or spread during the articulation of each syllable as a whole. This is stated phonologically in terms of w- and y-prosody, and symbolised as w or y outside the round brackets enclosing the syllables in which the V element l occurs.

For syllables in which the V element E occurs the lips may be rounded, spread or neutral during the articulation. This is dealt with phonologically in terms of w-, y- and ə-

⁴ A similar phenomenon occurs at word boundaries, as illustrated by the following examples where the word for 'come' has the vowels [æ, e] when it occurs before an H syllable, but [a] when it occurs in isolation and before an L syllable.

| | | |
|---------|-----------|-----------|
| bra | [bra] | come |
| bra ha | [bra ha] | come here |
| bra mu | [bræ mu] | come in |
| bra fie | [bre fie] | come home |

A PHONOLOGICAL ANALYSIS OF TWI VOWELS

prosody, and symbolised as *w*, *y* or *ə* outside the round brackets enclosing the syllables with the open V element *E*.

The V elements and the vowel qualities associated with them are set out in the following table.

TABLE 6

| V element | Word Prosody | | Syllable Prosody |
|-----------|--------------|---|------------------|
| | H | L | |
| I | i | ɪ | y |
| | u | ʊ | w |
| E | e | ɛ | y |
| | o | ɔ | w |
| | æ | ɹ | ə |

CORRIGENDUM TO VOLUME III, No. 2.

In David Dalby, 'Lexical Analysis in Temne, with an Illustrative Word List' (Vol. III, No. 2), the phoneme *f* should be added to the chart of consonantal phonemes on p. 6. The omission of this character was a printer's error at a late stage in the preparation of the journal.